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Underwriting Performance and Insurance Sector Development in an Emerging Economy: Evidence from Nigeria.

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Abstract

The insurance sector's development is critical to fostering economic stability and sustainable growth. This research investigated the effect of underwriting performance on the Nigerian insurance industry's development. The research followed an ex-post facto design with a time-series orientation and quantitative methods of analysis, including descriptive statistics, correlation analysis, and autoregressive distributed lag (ARDL) estimation.

The result revealed that in Nigeria, underwriting performance indicators significantly affect insurance penetration in the short and long term ($p < 0.05$). Specifically, gross written premium, net premium and underwriting profit have overall significant effects on insurance penetration with underwriting loss showing short-run effect within the period investigated.

This study contributes theoretically by extending utility theory to insurance sector development in Nigeria through the inclusion of underwriting performance indicators. This link insurer operational efficiency with policyholders' welfare optimisation, thereby bridging the micro-foundations of insurance demand and macro-level development measured by insurance penetration. The results imply that insurers should prioritise disciplined underwriting by optimizing premium pricing, strengthening risk selection, and sustaining underwriting profitability to enhance insurance penetration.

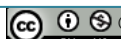
Keywords: Underwriting Performance, Insurance Sector Development, Insurance Penetration, Gross written premium, Net premium, Underwriting Profit.

INTRODUCTION

The development of the insurance industry is important to the promotion of economic stability and growth and as such it is of importance to businesses, governments and the general public (Horvey, Odei-Mensah & Liebenberg, 2024). Insurance is a form of protection that protects individuals, families and businesses against financial losses caused by risks that have economic value (Majka, 2024). But this crucial function depends on an efficient and purposeful development of the sector. Insurance firms serve as a financial cushion to lessen the impact of losses and damages that might adversely affect individual incomes and business earnings (Werigbelega & Oyinmiebi, 2024).

In addition to the direct benefits, a well-developed insurance sector has a significant contribution to the stability of banking systems and encourages the development of the financial sector at large, which is the bedrock for sustained economic growth (Quang, 2024). Moreover, the expansion and variety

of insurance services lead to higher government income through taxation (Adegbe, Ajayi, Agugum & Otitolaiye, 2023). It also helps governments manage the risks of private sector investment funds and thereby reduces fiscal vulnerabilities (Horvey et al., 2024). This double impact explains why the development of the insurance sector continues to be a major focus for governments, policy makers, financial regulators and academic researchers around the world. The notable advancement in some of the regions indicates the transformative potential of the insurance sector in economies by mitigating risks, enhancing financial stability, and stimulating economic growth (Horvey et al., 2024). The performance of underwriting is a major factor of insurance sector penetration because it has a direct impact on the financial soundness and operational stability of insurance companies (Onyinyechi, Inyang & Bassey, 2023). Strong underwriting performance reflects an insurer's ability to properly assess risks, diversify risk pools and manage claims effectively to maintain financial and market stability. These



factors are very essential in the affordability, accessibility and the general perception of insurance products which in turn affects the overall penetration and density of the sector (Yamoah, 2023). Weak underwriting performance, which is when claims are higher than the premiums collected, meaning underwriting losses, can also hurt an insurer's solvency.

The development of insurance sector in Nigeria is not impressive, no matter the quantitative yardstick used to measure it. As of 2023, the insurance penetration rate in Nigeria was just 0.34% far below Africa's average of 3.5% and significantly lowers than that of South Africa (Atlas Magazine, 2024). Several factors may be responsible for the low penetration such as the absence of diversified insurance products, poor insurance literacy and cultural perceptions on insurance services (NAICOM, 2023). It is important to note that at the aggregate level, Nigeria was behind in insurance penetration. However, the available evidence on underwriting performance indicates otherwise. The study therefore seeks to investigate the relationship between underwriting performance and the development of the insurance industry in Nigeria.

LITERATURE REVIEW

Underwriting Performance

The term underwriting was used to refer to the process in which each risk-taker was required to sign his name under the amount of risk he was willing to accept for a given premium (Chang, Chug & Lina, 2010). Underwriting performance is a company's ability to assess risk, price coverage appropriately and administer claims accurately. The OECD (2017) states that this skill is necessary for the growth of the insurance market. Underwriting is the process by which the risk of an individual is assessed before insurance is offered. This is what insurance companies and reinsurers do to decide whether to insure a risk, how much to charge and the type of cover to provide (Angima & Mwangi, 2017). Underwriting also involves assessing the riskiness of an individual or group and how to mitigate that risk. This process helps protect investors, banks, insurance companies and other financial bodies from loss (Angima & Mwangi, 2017).

Burca and Batrinca (2020) found that when underwriting risk goes down, financial results improve. Being able to take on risk wisely is vital for an insurance company's success because taking on bad risks can cause huge losses and even shut the company down (Browne & Kamiya, 2012).

Measures of Underwriting Performance

Apart from the absolute measure, underwriting profit used as underwriting performance in studies such as Akpan et al. (2020), other indicators based on ratio analysis have been used by different scholars across relevant studies. Horvey et al. (2024) addressed underwritten performance as the ratio of net premiums earned over total expenditure (claims incurred, management expenses, and commission), in which a higher ratio means an increase in underwriting performance. Within the insurance field, another measure of performance considered in literature is gross premium (Nwabunike, 2024; Mwangangi, 2020), but outside the context of insurance

industry, indicators such as profit after tax, total assets had also been used for operational performance (Jamal, 2023; Kisyeri et al., 2022), and those measures are also reflective in insurance industry reports (e.g. NIA digest) as a necessary measure of underwriting performance. Therefore, the underwriting performance in this study is approached from the perspective of gross premium, net premium, underwriting profit, underwriting loss ratio, total assets, and profit after tax.

Gross Premium

Gross premium (GP) is the money an insurance company earns when someone buys a policy, which is meant to protect the person from certain risks during the time or period the policy is active (Fadun, Aduloju & Oluwaleye, 2023). Similarly, Nwabunike (2024) explained that gross premium is the total money an insurance company gets from all the policies it sells over a certain period of time, before any deductions for reinsurance, claims, or cancellations.

Net Premium

Net premium (NP) is the portion of the premium income that an insurance company retains after accounting for the expenses related to purchasing reinsurance (Shaheen, et al., 2020). Net premium indicates the part of the insurance premium that is intended to mitigate the insurer's risk exposure or the anticipated cost of claims, without accounting for any additional charges such as administrative costs, commissions, or profit margins (Hissiyah & Meylianigrum, 2023).

Underwriting Profit

Underwriting profit (UP) is the profit that an insurer makes from its business activities, especially underwriting insurance policies. The profit from underwriting is determined by deducting all claims expenditure from the overall revenue generated by the insurance operations (Mwangangi, 2020). Profits from underwriting that exceed expectations show the insurer properly manages its risks and earns greater revenue than it disburses for claims payments (Amani & Markonah, 2020).

Underwriting Loss Ratio

Underwriting loss ratio is how much an insurance company paid out in claims compared to how much it earned in premiums, shown as a percentage (Adams et al., 2019). Loss ratios show how well an insurance company is doing financially. If it pays out a lot more in claims compared to what it collects in premiums, it could be a warning sign of financial distress. In essence, the more an insurance company pays out in claims compared to what it earns, the worse its underwriting performance becomes.

Total Assets

Total assets (TA) refer to the total value of all the resources owned by the insurance company. These assets are used to generate income, pay claims, meet regulatory capital requirements, and support the day-to-day operations of the company (Siopi & Poufinas, 2023). Total assets are a key indicator of an insurance industry's performance in terms of financial size, stability, and ability to meet its liabilities.

Profit after Tax

Profit after tax (PAT) of the insurance sector refers to the net income that insurers earn after all expenses, including operating costs, claims, taxes, and other obligations, have been deducted from the company's total revenue (Kamau, 2023). It represents the amount of profit that remains for the shareholders or owners after the company has paid its tax liabilities. Tsvetkova, Bugaev, Belousova and Zhukova (2020) also explained that profit after tax is an important financial gauge for assessing an insurer's profitability and overall financial potency.

Insurance Sector Development

Insurance sector development refers to the improvement in the function of the insurance industry in mitigating unexpected and catastrophic events associated with monetary values (Osifo and Isibor, 2023). Insurance sector development leads to an increase in the rate of mitigating unexpected risks in businesses and households, which reduces the fear of losing money, life, and property, among other economic values (Ogbeide, Adu, Fapohunda, and Obadeyi, 2022). Insurance sector development has to do with the process of growing the capacity, efficiency, and reach of the insurance industry to better meet a country's economic and social needs (Sapitri, Hasbi, Nurhikma, and Satri, 2024).

Therefore, insurance sector development encompasses several factors, including the development of insurance services, increased insurance penetration, improvements in insurance market activity, and the general evolution of insurance goods and practices. The most commonly used measure of insurance sector development in empirical studies across countries of the world has been insurance penetration (for example, Ogbeide et al., 2022; Septina, 2022)

Insurance Penetration

Insurance penetration denotes the degree of advancement of the insurance industry within a nation, depicting the extent to which insurance products are used as part of financial planning and risk management (Ehiogu et al., 2018). The insurance penetration rate also assesses the industry's growth from the prism of its share in the overall economy (Ehiogu et al., 2018). On this basis, it refers to the degree to which an insurance sector has grown and developed inside a nation, as seen by the rising amount of premiums collected to GDP, which emphasises how the insurance sector has grown and incorporated into the economic framework (George et al., 2012). Therefore, in a quantitative approach, the insurance penetration rate quantifies the overall worth of insurance premiums as a share of a country's GDP.

However, scholars study insurance penetration as consisting of aggregated and disaggregated categories. The disaggregated category measures insurance penetration based on life insurance penetration and the other on non-life insurance penetration. Life insurance penetration shows how much of the country's total income comes from life insurance, while non-life penetration shows how much comes from other types of insurance (Septina, 2022). The total insurance penetration indicates the comprehensive expansion of

insurance firms, including the financial success of both insurance sub-sectors (Agbo & Agbaji, 2020). Therefore, **total (or aggregated) insurance penetration is simply insurance earnings (premiums) measured as a share of the country's GDP.**

THEORETICAL REVIEW

Expected Utility Theory

In 1738, Daniel Bernoulli introduced the Expected Utility Theory (EUT) to help explain and solve the St. Petersburg dilemma of how people measure value. EUT estimates how valuable an action might be when the outcome is uncertain. The core assumption of this theory is that people are generally risk-averse, meaning they prefer to avoid uncertainty when possible. The theory also suggests the best decision is the one with the highest expected value. This theory serves as a framework for navigating scenarios in which people must make decisions without knowledge of the potential consequences, particularly in contexts of ambiguity (Etner, Jeleva & Tallon, 2012). People will choose the action that maximises predicted utility, defined as the totality of weighing up the chances and benefits of all possible outcomes of a product (Broome, 1991).

EUT is considered relevant to this study because it helps explain decisions where people don't earn an immediate reward, such as buying insurance. In this instance, EUT assumes that when one compares the possible future benefit from an insurance payout with the value derived from spending that money on other things like getting a chieftaincy title or spoiling oneself on a trip to the Maldives, the insurance investment often comes out as the smarter choice. Expected utility in insurance could be defined in terms of the amount of claim that will be given in the event of the occurrence of risk, the timeliness, and consistency of payment (Borch, 1961). These, on the other hand, are practically tied to the underwriting approach, capacity, profitability, and efficiency of the insurance firms.

Similarly, the higher demand stemming from an increase in expected utility in insurance products can boost the amount that individuals and businesses spend on insurance products, as well as attract new clients into the insurance industry (Mayers & Smith, 1982).

Therefore, the theory is relevant in that it reflects that underwriting performance, through enhancing expected utility, may promote demand for insurance products, which is central to insurance penetration in a particular country.

REVIEW OF RELATED LITERATURE

Gupta, Lahiani, Lee, and Lee (2018) studied the U.S. insurance market from 1980 to 2014, looking at how insurance premiums react to changes in economic output and uncertainty in economic policy. Using a special statistical approach called nonlinear autoregressive distributed lags, they found that both economic growth and policy uncertainty affect premiums, but in different ways. When the economy grows, premiums rise; when the economy shrinks, premiums drop even more sharply.

Birhanu (2018) investigated the impact of underwriting profit and investment income on the productivity of private insurance companies in Ethiopia from 2013 to 2017. The study included all private non-life insurance firms in Ethiopia, using census sampling. The analysis employed ordinary least squares (OLS) regression. The results showed that both underwriting profit and investment income positively and significantly influence the productivity of private insurance companies in Ethiopia.

Adams, Upreti, and Chen (2019) set out to determine whether underwriting performance differs between insurers operating in the UK's motor vehicle and legal liability segments of the property-casualty market. Using panel data from 3759 firm-year observations covering 319 UK-based insurers over 26 years (1985 and 2010), containing annual filings submitted to the industry regulator. The analysis was carried out using a feasible generalised least squares (FGLS) approach, which accounts for differences across firms and changes over time. Findings revealed that companies involved in liability insurance tended to achieve better underwriting performance, while those focused-on motor insurance generally performed worse. Additionally, higher reinsurance ratios were linked to better underwriting performance but lower profit margins, and higher leverage was also tied to stronger underwriting results.

Balcilar, Olashinde-William, and Shahbaz (2019) looked into how changes in monetary policy uncertainty affect insurance premiums in Japan, focusing on whether these effects move in the same way or in opposite directions over time. They worked with secondary data covering per capita insurance premiums, monetary policy uncertainty, and real per capita income in Japan from 1987 to 2016, giving them 30 years of annual observations using a Non-Linear Autoregressive Distributed Lag (NARDL) model. Their results showed that monetary policy uncertainty has a clear and significant link with insurance premiums, and that these premiums tend to shift in a nonlinear, asymmetrical way. They also found a long-term relationship (cointegration) between monetary policy uncertainty, GDP per capita, and total insurance premiums per capita.

Alam (2019) focused on what drives underwriting risk for insurance companies in Bangladesh. He used data between 2013 and 2017, including all firms registered under the country's Insurance Act. The research applied multiple linear regression in SPSS and identified several factors related to underwriting risk such as company size, available capital, national GDP, liquid assets and returns on assets.

Kya and Beşer (2020) analysed the effect of insurance premium volumes on economic growth by taking annual data of 25 EU countries for the period from 1998 until 2018 (21 observations per country). The authors used secondary macroeconomic panel data and applied Johansen and Kao panel cointegration tests to examine the existence of long-term relationships. Panel FMOLS estimation was conducted to estimate the elasticities, and Dumitrescu-Hurlin panel Granger causality analysis was performed to test the direction of the relationship. The results revealed that a 1% increase in

insurance premium volume results in a 0.113% increase in economic growth. The authors concluded that insurance premiums have a positive and significant long-term impact on EU economies.

Meher and Zewudu (2020) examined the effect of internal company factors and macro-economic factors on the financial performance of Ethiopian insurers. They used a quantitative approach and inferential statistics based on Pearson's correlation and ordinary least squares regression on balanced panel data from nine insurance firms over 15 years (2002–2016). Their results showed that GDP per capita and company size had a positive, significant link to returns, while leverage, liquidity, and underwriting risk had a significant negative effect. They concluded that asset growth boosts performance by enabling branch expansion and improving living standards.

Tsvetkova, Bugaev, Belousova, and Zhukova (2021) investigated what influences the performance of insurance firms in the Russian Federation. They analysed financial data from 45 insurance companies operating continuously from 2012 to 2018. They used descriptive statistics, correlation analysis, multiple linear regression, and factor analysis as their main methods. The results showed that return on assets (ROA) is positively associated with company size, return on equity (ROE), liquidity ratio, and claims ratio. Conversely, inflation and premium growth rates negatively impacted ROA.

Kolapo, Oluwaleye, and Osasona (2022) found the factors driving insurance sector development in Nigeria. They gathered time series data for non-life insurance companies from 1987 to 2020. The study employed an expo-facto research design and purposive sampling techniques, using Autoregressive Distributed Lag (ARDL) regression. Results indicated that adjustments to equilibrium after a short-term disruption had negative coefficients for non-life insurance density and penetration. The authors concluded that factors such as real interest rates, trade openness, education, and financial development play a key role in determining how widely non-life insurance services are available in the country.

Oluwaleye, Ajemunigbohun, and Abiodun (2023) examined the relationship between underwriting activities and financial performance in Nigerian non-life insurance firms over the period 2011–2020. Using financial statement data from five selected companies, the researchers applied panel regression analysis. The findings revealed that insurance premiums significantly and positively influence return on assets, whereas reinsurance claims and the claims ratio point to a positive link with return on assets, but the finding is not statistically meaningful. The study concluded that underwriting operations positively influence insurance companies' financial performance.

Bhagyalakshmi, Manjunatha, and Manoj Kumara (2023) studied underwriting profit/loss and premiums earned in the health insurance sector in India. The study did not disclose the number of companies in this sector. It used secondary data from a 14-year period that was analysed using regression

analysis. The findings indicated a strong link between underwriting profit/loss and health insurance premiums. The study concluded that operating expenses for agents and intermediaries impact the profitability of health insurance companies.

METHODOLOGY

The study employed an ex-post facto research approach with time series orientation. Historical secondary data were used without any manipulation of variables. This is a quantitative study and it uses time series econometric tools to analyse the correlations between the specified variables and hence this design is appropriate.

The population is the whole Nigerian insurance sector of which life and non-life insurers are part and it includes all the active businesses in the years 2000-2023. A purposive sampling method is used to make sure that the insurers included have the requisite financial and operational data that are useful for the research. Descriptive and inferential statistics were used in the investigation. Descriptive statistics such as mean, standard deviation, minimum and maximum values, skewness, kurtosis and Jarque-Bera test are used to describe the distributional aspects of the variables. Correlation analysis is the initial stage for inferential analysis to look for possible multicollinearity. Next, the Augmented Dickey-Fuller (ADF) unit root test is carried out. Then, the Autoregressive Distributed Lag (ARDL) framework is employed to explore cointegration and to estimate the short-run and long-run correlations among the variables.

Model Specification

This study model was stated as follows:

$$INSP = f(UPV, OPEN, INTR, INF, LTR, POP) \quad (1)$$

$$INSP_t = \alpha_0 + \alpha_1 UPV_{ti} + \alpha_2 OPEN_t + \alpha_3 INTR_t + \alpha_4 INF_t + \alpha_5 LTR_t + \alpha_6 POP_t + e_t \quad (2)$$

Where:

INSP = Insurance penetration

α_0 = Intercept term

UPV_{ti} = Underwriting performance variable each (GWP, NP, UP, ULR, PAT, and TOA)

OPEN = Trade openness

INTR = Interest Rate

INF = Inflation Rate

LTR = Literacy rate

PGR = Population growth

α_0 = constant term

$\alpha_1, \alpha_2, \alpha_3, \alpha_4, \alpha_5, \alpha_6$ = Coefficients of the independent variables

ADF Unit Root Test

One of the commonly accepted unit root tests in empirical research is the Augmented Dickey-Fuller test. In particular, the Augmented Dickey-Fuller (ADF) unit root test is used to investigate the stationarity properties and order of integration of the time series variables. This ensures the variables are appropriate for econometric analysis, spurious regression is avoided and appropriate model specification is supported, especially in the ARDL framework.

RESULT AND DISCUSSION OF FINDINGS

Table 1 Descriptive Statistics Results

Variables	INSP	GWP	NP	UNDP	UNDL	TOA	PAT	OPEN	INTR	INF	LTR	PGR
Mean	0.342354	251.9346	209.6030	187.0547	0.292076	921.0716	22.07928	31.33358	17.24894	13.12700	58.44299	2.567763
Median	0.330819	234.9430	183.7190	170.0925	0.265511	663.6305	11.32580	31.45221	16.88067	12.70720	61.05554	2.715543
Maximum	0.435947	537.1380	365.8640	284.8950	0.467521	1927.422	63.81900	43.45404	24.77083	24.65955	63.15554	2.802785
Minimum	0.281390	55.94100	112.2420	120.5180	0.150799	481.2680	2.589000	17.85611	11.48313	5.388008	51.07766	2.092817
Std. Dev.	0.045075	168.0775	83.65186	55.23422	0.104422	456.6116	18.19037	7.422347	3.110686	4.462298	4.559440	0.265799
Skewness	0.679635	0.356113	0.705367	0.664221	0.293600	0.874323	0.978988	-0.092070	0.549610	0.496728	-0.547794	-0.86262
Kurtosis	2.297136	1.735653	2.009830	1.999205	1.472439	2.371608	2.552802	1.855923	3.440971	3.186525	1.587288	2.103862
Jarque-Bera	2.341636	2.105839	2.970611	2.766351	2.678247	3.452639	4.033660	1.342819	1.402740	1.021746	3.196067	3.779541
Probability	0.310113	0.348918	0.226433	0.250781	0.262075	0.177938	0.133077	0.510988	0.495906	0.599972	0.202294	0.151106
Observations	24	24	24	24	24	24	24	24	24	24	24	24

Data processed by the author (2025) using E-View 12

The descriptive statistics show a moderate variation across the study variables across the 2000–2023 periods. The average value of insurance penetration (INSP) is 0.34, which suggests a relatively low but stable development of the sector. Gross written premium (GWP), net premium (NP) and underwriting profit (UNDP) have a wide dispersion range, which is an indication of the fluctuations of the underwriting activities over time. The study period reveals wide ranges in total assets (TOA) and profit after tax (PAT) which implies variations in industry size and profitability. Standard deviations show that most variables,

and especially the premiums, assets and profitability measures, are moderately volatile. The values of skewness are generally mild, showing little asymmetry, and kurtosis statistics suggest that most series are close to normal distributions. This is also supported by the Jarque–Bera test results which show that the null hypothesis of normality cannot be rejected for all variables. In general, the descriptive results suggest the data are well-behaved and appropriate for further econometric analysis.

Table 2: Correlation Matrix

	INSP	GWP	NP	UNDP	UNDL	TOA	PAT	OPEN	INTR	INF	LTR	PGR
INSP	1.000000											
GWP	-0.703057	1.000000										
NP	-0.701263	0.972565	1.000000									
UNDP	-0.716190	0.968132	0.992236	1.000000								
UNDL	-0.765281	0.941375	0.935476	0.914015	1.000000							
TOA	-0.675600	0.956884	0.987097	0.975669	0.913537	1.000000						
PAT	-0.542608	0.873716	0.926277	0.913569	0.802663	0.953985	1.000000					
OPEN	0.664553	-0.726393	-0.702398	-0.709263	-0.767377	-0.691672	-0.611027	1.000000				
INTR	0.694555	-0.767279	-0.700819	-0.694597	-0.666156	-0.698076	-0.609726	0.383906	1.000000			
INF	-0.008293	0.332301	0.383144	0.357429	0.307869	0.392248	0.461820	-0.110432	-0.150396	1.000000		
LTR	-0.535594	0.781793	0.699855	0.712587	0.695507	0.654781	0.522954	-0.602023	-0.579914	0.146269	1.000000	
PGR	0.608477	-0.909998	-0.964284	-0.948024	-0.891942	-0.962251	-0.941589	0.667583	0.638647	-0.463249	-0.552535	1.000000

Data processed by the author (2025) using E-View 12

In table 2, the correlation matrix illustrate the relationship between insurance penetration (INSP), underwriting performance indicators and the macroeconomic control factors. The study finds a significant negative correlation of insurance penetration with underwriting variables such as gross written premium (GWP) ($r = -0.703$), net premium (NP) ($r = -0.701$), underwriting profit (UNDP) ($r = -0.716$), underwriting loss ratio (UNDL) ($r = -0.765$), total assets (TOA) ($r = -0.676$) and profit after tax (PAT) ($r = -0.543$). In contrast, INSP shows positive relationships with the control variables such as trade openness (OPEN) ($r = 0.665$), interest

rate (INTR) ($r = 0.695$), and population growth rate (PGR) ($r = 0.608$), while inflation (INF) demonstrates a negligible association ($r = -0.008$). The underwriting variables are highly correlated with one another, particularly GWP with NP ($r = 0.973$) and UNDP ($r = 0.968$), reflecting their close operational linkage within insurance business activities. Although these coefficients indicate strong associations among some variables, correlation does not imply causality and provides only preliminary insights into linear relationships before econometric estimation.

Table 3: Summary of Unit Root Test Results

Variables Used	@Level			@First Difference			Integration Level
	ADF-stat	CV@1%	CV@ 5%	ADF- stat	1% CV	5% CV	
LNINSP	-1.710770	-3.752946	-2.998064	-4.993459	-3.769597	-3.004861	I(1)
LNGWP	-1.136622	-4.416345	-3.622033	-3.636358	-4.440739	-3.632896	I(1)
LNNP	-2.371873	-4.416345	-3.622033	-5.767013	-4.440739	-3.632896	I(1)
LNUNDP	-2.858985	-4.416345	-3.622033	-7.462074	-4.440739	-3.632896	I(1)
LNUNDL	-0.707267	-3.752946	-2.998064	-6.023520	-3.769597	-3.004861	I(1)
LNTOA	0.113471	-3.752946	-2.998064	-4.566404	-3.769597	-3.004861	I(1)
LNPAT	-1.652787	-3.752946	-2.998064	-6.825458	-3.769597	-3.004861	I(1)
LNOPEN	-1.966610	-3.752946	-2.998064	5.322733	-3.769597	-3.004861	I(1)
LNINTR	-2.444869	-4.416345	-3.622033	-4.327936	-4.440739	-3.632896	I(1)
LNINF	-3.075849	-3.752946	-2.998064	-	-	-	I(0)
LNLTR	-3.198142	-4.416345	-3.622033	-5.509379	-4.440739	-3.632896	I(1)
LNPRGR	-5.796546	-3.857386	-3.040391	-	-	-	I(0)

Data Processed by the author (2025) Using E-View 12

Table 3 presents the Augmented Dickey–Fuller (ADF) unit root test results used to examine the stationarity properties of the variables. The findings show that most variables, LNINSP, LNGWP, LNNP, LNUNDP, LNUNDL, LNTOA, LNPAT, LNOPEN, LNINTR, and LNLTR are non-stationary at a level but become stationary after first differencing, indicating that they are integrated of order one, I(1). In

contrast, inflation (LNINF) and population growth rate (LNPRGR) are stationary at a level and are therefore integrated of order zero, I(0). The presence of a mixture of I(0) and I(1) variables supports the application of the Autoregressive Distributed Lag (ARDL) framework, which allows for such integration orders provided no variable is integrated of order two.

Table 4: ARDL Long-run and Short-run Analysis on the Effect of Underwriting Performance Indicators on Insurance Penetration in Nigeria.

Underwriting Performance Indicators	Short-run effect	Prob	Long-run effect	Prob	Overall sig
GWP	-0.212264*	0.0005	-0.281521*	0.0370	Overall Significance
NNP	2.490162*	0.0005	-1.295020*	0.0080	Overall Significance
UNDP	0.348628*	0.0001	-0.651860*	0.0050	Overall Significance
UNDL	0.469216*	0.0077	-0.050004	0.8347	Short-run Significance
TOA	0.054801	0.3957	-0.693387	0.0745	Not significant
PAT	0.107624	0.0714	3.621077	0.9846	Not significant

Note: (*) indicates that the observed effect is statistically significant

Source: Data processed by the author (2025) using E-Views 12.0

An overview of the estimation results revealed that underwriting performance indicators predominantly exert a short-run significant positive effect on insurance penetration, though the level of significance differs from one performance indicator to the other. On the other hand, the long-run results showed that the effect of gross written premium, net profit,

underwriting profit, and underwriting loss on insurance penetration in Nigeria is predominantly negative though there is only evidence of statistical significance for underwriting loss ratio in the short run.

Table 5: ARDL Co-Integration Bound Test Results on the Effect of Underwriting Performance Indicators on Insurance Penetration in Nigeria.

Model	Calculated F-Statistic	Critical Value Lower Bound	Critical Value Upper Bound	Co-integration Status
Gross Written Premium	88.67159	2.27	3.28	Co-integrated
Net Premium	17.04908	2.27	3.28	Co-integrated
Underwriting Profit	8.069734	2.27	3.28	Co-integrated
Underwriting Loss Ratio	5.874853	2.27	3.28	Co-integrated
Total Assets	7.365008	2.27	3.28	Co-integrated
Profit After Tax	3.290646	2.27	3.28	Co-integrated (Marginal)

Source: Data processed by the author (2025) using E-Views 12.0

The analysis outcome in Table 5 presents the bounds test results used to determine that long-run relationships exist between various underwriting performance indicators and insurance penetration in Nigeria. The results show that all the estimated F-statistics for the respective models exceed the upper bound value of 3.28 at the 5% level of significance, which confirms the presence of co-integration, with one exception. Specifically, the Gross Written Premium model recorded the highest F-statistic (88.67159), which significantly surpasses the upper bound, strongly confirming that a long-run relationship exists between gross written premium and insurance penetration. Similarly, the models for Net Premium (F-statistic=17.04908), Underwriting Profit (8.069734), Underwriting Loss Ratio (5.874853) and Total Assets (7.365008) have F-statistics way above the upper bound threshold, which suggests that there are strong long-

term relationships between these variables and insurance penetration in the country.

The profit after tax model yielded an f-statistic of 3.290646 which is just above the upper bound critical threshold. Although this finding still supports co-integration, the evidence is quite modest in comparison to the other models suggesting a weaker but still significant long-run relationship. The results generally suggest that the selected measures of underwriting performance are co-integrated with insurance penetration in Nigeria. This implies that any short-run aberrations between the variables are expected to be corrected in the long run towards a stable equilibrium. This has important policy implications as it emphasises the need for good underwriting performance in boosting greater penetration of the insurance industry in Nigeria.

Table 6: Post-Estimation Diagnostic Tests for ARDL Models on the effect of underwriting performance indicators on insurance penetration in Nigeria.

Model	Jarque-Bera Statistic	p-Value (Normality)	Serial Correlation F-Statistic	p-Value (Serial Correlation)	Breusch-Pagan-Godfrey Statistic	p-Value Heteroscedasticity
Gross Written Premium	1.801159	0.8541	3.661904	0.1161	0.705355	0.7297
Net Premium	0.877505	0.7494	6.340359	0.2704	0.414448	0.8997
Underwriting Profit	0.881650	0.6435	3.195704	0.0894	0.231484	0.1335
Underwriting Loss Ratio	0.867162	0.6482	9.345296	0.2254	0.847055	0.6551
Total Assets	0.087371	0.9573	2.228986	0.9317	0.537141	0.7461
Profit after Tax	0.157158	0.92442	0.618641	0.5698	1.324538	0.3537

Source: Data processed by the author (2025) using E-Views 12.0

Table 6 presents the post-estimation diagnostic tests performed to check the robustness and statistical validity of the ARDL models used to examine the effect of underwriting performance indicators on insurance penetration in Nigeria. All models are subject to three primary diagnostics: the Jarque-Bera normality test, the Breusch-Godfrey LM test for serial correlation and the Breusch-Pagan-Godfrey test for heteroscedasticity. The residuals were tested for normality using the Jarque-Bera test and the p-values were high in all cases (all over 0.60, highest being 0.9573 for the Total Assets model), showing that the residuals are normally distributed. This confirms the models are behaving in the expected way in terms of residual distribution and that a major OLS assumption was met. Regarding the serial correlation, F-statistics with p-values considerably over the 5% significance level were generated from all the models, therefore offering no evidence to discard the null hypothesis of no serial correlation. For example, the F-statistic for the Net Premium model was 6.340359 ($p = 0.2704$) and the F-statistic for the Total Assets model was 2.228986 ($p = 0.9317$). These results indicate that residuals are free from considerable autocorrelation, therefore improving the dependability of the estimates. Likewise, the heteroscedasticity test results demonstrate the homoscedastic residuals for all the models. The Breusch-Pagan-Godfrey p-values were all greater than 0.13 with the greatest in the Net Premium model (0.8997) and lowest in the Underwriting Profit model (0.1335). This uniformity in the variance of the errors across data confirms the appropriateness of the model design.

Discussion of Findings

This study explores the relationship between insurance sector development and underwriting performance measures. The results demonstrate that gross written premium (GWP) has a considerable negative impact on insurance penetration in the short run. It indicates that high premium levels may be a discouragement to insurance acceptance in Nigeria. This is because excessive rates make insurance goods unaffordable especially in a low income economy. The results indicate that net premium and underwriting profit have a strong positive impact on insurance penetration in the near run. This suggests that the insurance market expansion is driven by retained premium income and improved underwriting efficiency. Underwriting loss ratio has considerable positive association. Total assets and earnings after tax have positive minor influence.

Long-run gross written premium, net premium and underwriting profit are very negative for insurance penetration. This shows that better performance on these indicators may not be related to greater use of insurance. Insurers can focus on profitable business clients instead of offering coverage to the general population. Demand could potentially be deterred by the high cost of premiums. Substantial negative effects are also seen for underwriting loss ratio and total assets, suggesting that asset accumulation and claims performance are not the key determinants of insurance penetration. However, there is a positive albeit weak

association between profit after tax and insurance penetration indicating that profitability has the potential to improve insurance penetration through product innovation and market expansion but such advantages may not yet be fully realised in terms of greater insurance uptake. The findings indicate a basic disconnect between the underwriting performance and insurance sector's development in Nigeria, calling for steps to improve affordability, product accessibility and inclusive market expansion. Therefore, the finding was consistent with Osariemen and Anwuli (2023) and Msomi (2023) that underwriting performance is good for insurance businesses but not the entire insurance industry.

CONCLUSION AND RECOMMENDATION

This paper gives empirical insight into the effect of underwriting performance on the development of insurance sector represented by insurance penetration, based on numerous variables. The results indicate that performance indicators of underwriting have a diverse but considerable impact on Nigeria's insurance penetration in the short and long run. Some variables, gross written premium included, have a strong positive link with insurance penetration over the study period. Others such as net premium, underwriting profit and underwriting loss also have a positive and statistically significant effect.

These mixed effects imply that the impact of underwriting performance on insurance sector growth is not uniform nor continuous, but rather dependent on both temporal dynamics and the particular performance variables in question. Hence, it emphasises the need for a more elaborated policy and managerial approach in enhancing underwriting procedures, with a view to deepening insurance penetration in the Nigerian economy over time.

The researcher recommends that based on the findings and conclusions of this research, insurers should put in internal safeguards to prevent an increase in insurance premium. This will allow the sector to convert better insurance penetration in the country through enhanced underwriting performance. Furthermore, innovation and diversity of insurance products should be supported by the underwriting performance results of the insurers. This would enable the industry to increase financial stability and make available less expensive insurance products leading to increased participation and spend in the insurance industry.

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