

Determinants of Insurance Penetration in Nigeria: An Empirical Investigation of Digital Infrastructure Indicators Using the Autoregressive Distributed Lag Model

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Abstract

This paper empirically examines the factors that influence insurance penetration in Nigeria with particular emphasis on the digital system indicators, spanning the period 1Q2010 to 4Q2025. It quantifies three explanatory factors using data from quarterly surveys conducted by NAICOM, NCC, CBN, World Bank and ITU: accessibility of electronic insurance gateways (DIPA), mobile internet coverage (MIP), and the presence of the smartphone devices (SMU). By implementing an ex post facto methodology with the bounds testing framework and the ARDL model of error correction, the research includes both transient and permanent relationships. A long run cointegrating nexus is revealed by the bounds procedure. The error correction outputs indicate that the effects are mixed, with MIP contributing positively and statistically significantly in the short term, DIPA having a small, non-significant impact, and SMU having a large negative impact in the short term. The negative error correction coefficient is statistically significant and indicates that the system will rapidly return to equilibrium after disturbances. Robustness checks confirm the robustness of the estimated model. Overall, the study finds that the variables related to digital infrastructure have a complex influence on penetration, with mobile broadband as the main driver and platforms and smartphones alone being insufficient if not backed by further investments in digital education, consumer enlightenment and building relationships. The paper calls for expansion of wireless broadband networks, improving ease of use of platforms and implementing educational outreach and strengthening programmes to increase insurance uptake in Nigeria.

Keywords: Insurance Penetration, Digital Infrastructure, Digital Insurance Platforms, Mobile Internet Penetration and Smartphone Usage

1. Introduction

The insurance industry is a key instrument to limit uncertainty, ensure economic sustainability and support the national development in both industrial and developing countries. The underwriting

industry fosters continued investment growth, promotes business activity and reduces the risk of a family or business from financial instability by sharing exposures and distributing monetary relief after an unexpected event. (Outreville, 2013) While these well documented benefits are many, the share of insured output (ratio of aggregate premium collections to national output) remains very low across most of Sub Saharan Africa and Nigeria is one of the lowest globally on this measure (Swiss Re, 2023).

Nigeria is the biggest economy and the most populous country in Africa, setting a paradoxical stage for the growth of its insurance industry. The country has a youthful and fast-growing urbanizing population, a growing middle-class, and a fast-changing technological landscape. Despite this, the percentage of insured activity has consistently recorded a low percentage of less than 1% for over a decade which is remarkable compared to the robust growth in other financial sectors such as mobile based transfers and electronic settlement systems (NAICOM, 2023). The lackluster result has led to academic research and government reviews on key drivers influencing insurance coverage, and current attention has been paid to the potential of digital networks to transform.

The advent of technology has completely reshaped the way many industries operate in Nigeria, especially the telecommunications and financial services sectors, which have seen significant changes. Handset penetration has grown from around 50% in 2010 to over 85% by 2025, while internet penetration has seen an extraordinary rate of growth, driven by shrinking transmission costs and the increasing geographical penetration of the signal (NCC, 2025). These technical advances have enabled the development of virtual underwriting portals, sales lines with mobile phones, and innovative miniature policies targeting underserved communities. According to Gomber, Kauffman, Parker and Weber (2018), electronic interfaces create a more positive client relationship, greater work efficiency and a reduction in typical barriers to accessing financial commodities such as physical distance, high administrative paperwork, and unclear procedural rules. Those who support this opinion argue that online platforms can reduce overheads, expand outreach, address provider-customer information gaps, and allow for product adaptation to meet the needs of diverse populations (Aker & Mbiti, 2010; Jack & Suri, 2014).

However, digital-to-protection plan relationships are not necessarily clear-cut. While virtual resources can expand the scope of operations and reduce administrative overheads, their effectiveness is dependent on other factors, including the acceptance and availability of technology, trust in the providers, the attractiveness of the service products and the supervision of the officials (Kshetri, 2016). Leong, Sung and Teissier (2021) found that financial utilities, which include insurance, plays a role that is significant enough to contribute to the realization of sustainability goals through the improvement of financial instrument availability and level of quality of provision. However, many factors can prevent increased policy purchases when there are many connected devices and online access, such as psychological, societal, and educational barriers (Dercon et al., 2014). Van Niekerk and Phaladi (2021) found a positive correlation between the adoption of the handset and interaction with the virtual platform, with more financial services engagement, but a large percentage of business organisations still run without any protective measures, highlighting the potential for technological solutions to fill this gap. The level of nuance requires empirical work to unravel the individual impact of each digital infrastructure element on the process of insurance market evolution.

The existing quantitative research on insurance density in Nigeria has largely targeted general economic factors like prices of insurance products, interest rates, effectiveness of administrative

institutions and personal income (Olayinka & Adebayo, 2020; Umar & Abubakar, 2021). Although these examinations have produced valuable perspectives, they have largely ignored the treatment of digital infrastructure as a unique and probably revolutionary element. Furthermore, previous studies have commonly used snapshot data or used fixed panel designs that do not capture the dynamic nature of the near-term adjustment and the permanent equilibrium relationships between affiliations and technology adoption and insurance product acquisition. Imo and Chilekezi (2025) analysed the employment of financial technology and insurance technology to shrink Nigeria's coverage shortfall, supplying observed confirmation concerning the function of digital tool adoption in insurance subscription. Similarly, the relationships between monetary knowledge, monetary confidence and consumers' selection procedures of insurance in Nigeria was investigated by Alli and Ganiyu (2025), further adding their insights on the complementary factors influencing acceptance behaviour. Such investigations emphasise the importance of digital arrangements and their accompanying variables for raising coverage rates. The methodological limitations found in previous writings limit the applicability of previous deductions to the policy level, since the regulatory authorities responsible for regulation require a full understanding of the operational and the sustained implications that follow a digital systems investment.

Nigeria's protection sector has long been unable to match the economic capacity of similar states and the outcomes of numerous legislative changes and market stimulation policies have since languished for many years at levels well below 1%. This average performance coincides with an era of remarkable digital growth wherein mobile interconnection, online accessibility and the ownership of smartphones have exploded throughout the country. The apparent mismatch between technology and insurance subscription raises serious questions about whether digital facilities truly can drive insurance industry improvement and in what ways technology can impact coverage procurement..

This environment brings up a number of investigative and regulatory challenges. Although the reach of virtual distribution channels for coverage has rapidly increased, observational evidence of their true impact on population coverage and penetration has not yet been established. Later, however, in the face of broad mobile internet coverage, to what extent mobile internet access can be said to motivate policies is not yet clear, given ongoing constraints on technology and awareness. Third, the rapid growth of smartphone adoption can produce counterintuitive effects on insurance penetration, likely diverting household resources from insurance products to communication technologies and digital entertainment, not to protection. Fourth, the dynamic nature of digital facilities proliferation requires analytical tools that are based on temporal information that can distinguish between temporary fluctuations and more permanent structural connections. A lack of credible documented information on these topics represents a significant gap in the academic discussion and is a barrier to developing policies based on accurate information.

This inquiry then addresses that void by quantifying the impact of three important digital infrastructure indicators, namely digital insurance platform availability (DIPA), mobile internet penetration (MIP) and smartphone usage (SMU) on insurance penetration in Nigeria between the first three months of 2010 and end of the first three months of 2025. By using the ARDL boundary assessment method and ECM, the study provides short-term and long-term coefficient evaluations, providing a sound empirical basis for policy design and policy-making.

Research Objectives

The overall objective of the study is to establish empirically the factors influencing insurance penetration in Nigeria with particular focus on the digital infrastructure measures. The specific goals are listed below:

1. To study the impact of the availability of digital insurance platforms on insurance penetration in Nigeria. Since penetration has regularly stayed under 1% even as these platforms have grown progressively more common in the recent past, this objective intends to decide whether their presence has notably extended insurance coverage, or whether their simple existence has demonstrated insufficient to produce substantial gains in penetration.
2. To determine the role of utilization of mobile internet in insurance uptake in Nigeria. These objective attempts to explain how much the rapid growth of mobile connectivity has helped to increase insurance penetration from around 15% in 2010 to exceeding 55% by 2025, or why the gap persists despite mobile connectivity due to various intervening factors.
3. To assess the implication of the use of the smartphone on Insurance penetration in Nigeria. In view of the fact that the take up of smartphones has been significantly growing over the course of the study, while insurance penetration has remained stubbornly low, the objective use of the smartphone to influence uptake was an attempt to address this theoretical conundrum of whether more smartphone use leads to more insurance coverage due to higher digital engagement or has the opposite effect by diverting household financial resources into telecommunications equipment purchases.

These research findings have several implications for knowledge, administration, and business. From a theoretical perspective, it adds a new explanatory category: digital infrastructure to the existing literature on the factors affecting insurance penetration, helping to broaden the analytical matrix for understanding the evolution of the insurance industry in less wealthy countries. Methodologically, it outperforms previous studies by using the ARDL bounds testing procedure that allows for the introduction of variables with mixed units of integration and produces satisfactory approximations even in relatively small samples, thus providing a procedural model that can be applied in future chronological studies of digital financial interactions.

The results are also empirical guidance to the National Insurance Commission (NAICOM), the Nigerian Communications Commission (NCC) and other supervisory regulatory authorities to develop a coordinated strategy for leveraging digital infrastructure to drive insurance industry growth. The different effects of different digital markers provide focused mechanisms of action for policy, to guide the distribution of resources and provide tailored supervisory mechanisms. The study provides practical suggestions for insurance companies and their management on the decisions regarding the deployment of an electronic distribution system, the order of importance for mobile based distribution systems, and the need for complementary financing in public education and confidence building. Lastly, this study adds observed evidence of Nigeria's digital financial inclusion to the broader development discourse in the field, which can be used to contribute to comparative assessments with other emerging markets.

2.0 Literature Review

Theoretical Review

The conceptual foundation of this investigation is based on the major conceptual framework of the study which is the Technology Acceptance Model (TAM) for understanding the way in which digital systems impact insurance coverage in Nigeria. Because the cognitive and attitudinal factors

that guide people's decisions on adopting and using electronic underwriting portals are a key component of digital systems, TAM has been chosen for its ability to directly include these factors. TAM provides an important analytic lens to look at how perceptions of utility and operability influence the adoption process and how digital infrastructure measures map onto insurance subscription.

Davis (1989) developed the Technology Acceptance Model (TAM) to explain and predict user acceptance of information technology. The framework suggests that two basic impressions determine an individual's behavioural tendency to adopt technology: perceived usefulness (Peu's perception of the individual that using a given system would enhance his/her performance results) and perceived ease of use (Peu's perception of the individual that using a given system would be easy to use). Venkatesh and Bala (2008) expanded the model to incorporate other variables that affect usefulness and ease of use such as social influences, professional status, task applicability, information quality, observable results, and computer self-efficacy. The model proposes that these two impressions moderate the relationship between situational factors (e.g., system design attributes) and actual patterns of technology use.

The Technology Acceptance Model is appropriate for this research because it supplies a structure. A major focus of this research is on understanding the decision-making process of prospective insurance clients in Nigeria to accept or reject the use of electronic underwriting systems as part of the digital infrastructure. Ultimately, the degree of insurance penetration relies on peoples' willingness to purchase insurance products, and when these products are offered electronically, the factors that influence attitudes toward technology become important in decisions to adopt them. In this context, perceived usefulness is defined as the extent to which the Nigerians believe that using electronic insurance platforms will help them to obtain their desired cover, manage exposures effectively, and access claims without hassle. Should consumers regard digital insurance as beneficial for fulfilling their requirements, they are more inclined to adopt it. Perceived ease of use revolves around whether Nigerians think electronic insurance platforms will be easy to use, with no need for specialist skills or assistance. Considering the varying levels of digital competence in Nigeria's population, platforms that are considered user friendly are more likely to have a wide range of acceptance. The model helps to understand how digital infrastructure characteristics such as the design and functioning of e-insurance platforms shape individual decision to take up insurance, which in turn leads to higher or lower coverage levels.

Empirical Review

In 2018, Gomber, Kauffman, Parker and Weber examined the fintech revolution and its implications for the financial services industry's transformation. The study recommended a new method to map the innovation in finance technology, focusing on four areas: operational administration, transaction processing, credit and deposit facilities, and investment services along with financial exchanges. Using conceptual charting and an extensive examination of previous scholarship, the investigators demonstrated that online platforms enhance customer engagement and service productivity, which reduces traditional barriers to accessing financial products, such as geographical barriers, documentation requirements and opaque operations. The results have shown that the use of the platform can help to lower costs of acquisition and enhance customer satisfaction by providing clear comparisons and streamlined processes. The report painted a picture of a transformation in fintech progress, rather than incremental modifications, and argued that

financial services were due for significant improvements in efficiency, client focus, and access to information.

Leong, Sung, and Teissier (2021) looked at financial technology and sustainable advancement, especially its role in ensuring financial accessibility and economic growth via digital systems. The study, which is part of a chapter in the Encyclopedia of the UN Sustainable Development Goals, measured the impact of fintech innovations on sustainable development in developing markets. This research revealed that the implementation of digital financial services such as insurance, plays an important role in achieving sustainable development targets by providing wider access to financial services and improving operational capacity. The research reported on the role of technology in the provision of financial services in reaching people who would not otherwise be served by the formal financial services sector, and thus be a positive force in advancing economic equity. The study highlighted that the jurisdictions with robust digital frameworks and appropriate regulatory environment have higher engagement with financial services and that uptake of technology was one of the factors differentiating between underperforming and expanding financial markets.

Van Niekerk and Phaladi (2021) explored digital financial services by looking at opportunities and challenges that exist around financial services accessed and supplied via electronic means in South Africa. The study used a qualitative research methodology with examination of the adoption of DFS, and how this is related to financial services engagement. The results suggested positive correlations between smartphone usage and digital platforms with increased financial service participation, such as insurance products. The study revealed that digital channels can help acquire new clients and stay connected with them by providing efficient service interactions. The study showed that a significant percentage of businesses in South Africa have no insurance protection, indicating that the digital channel could fill this gap. The research provided evidence from a similar African context of the potential of digital financial services to create access to insurance and other financial commodities.

Imo and Chilekezi (2025) conducted a comprehensive study to explore the use of fintech and insurtech to address Nigeria's insurance coverage gap. The study was conducted using a quantitative survey approach with 367 respondents split into four groups of organisations – insurance companies, fintech/insurtech, supervisory bodies and consumers. The variables were insurance adoption as the outcome variable, digital technology uptake as the predictor variable, digital accessibility and confidence in electronic insurance channels as mediating variables and regulatory framework support as a moderating variable. The findings using Pearson correlation analysis indicated that the adoption of digital technology is a significant predictor of uptake of insurance. Digital accessibility acted as a meaningful mediator in the relationship, whilst confidence in electronic insurance channels also mediated the connection. The study found that a supportive regulatory environment enhances the positive impact of technology adoption on insurance penetration.

Alli and Ganiyu (2025) examined the interaction between financial understanding, confidence, and the consumer insurance choice in Nigeria. This study was designed of a quantitative survey, which involved 384 respondents in Lagos State. The outcome variable was insurance decision making (quantified as the perceived value of insurance) and the predictor variables were financial understanding and confidence in insurance providers. The results of the multiple regression analysis indicated that financial understanding significantly predicted insurance decision, explaining 25.9% of the variance in perceived value of insurance. Consumer confidence in

insurance providers also had a positive impact on consumer decision, responsible for 15.7% of the variance. The findings show that increasing consumer awareness and fostering consumer confidence by being open and behave ethically can improve insurance uptake in Nigeria.

3.0 Methodology

Research Design, Study Area, and Data Sources

The research design for this investigation is ex post facto research design which was employed to assess the effect of digital systems on insurance penetration in Nigeria over the quarterly secondary information obtained from the first quarter of 2010 to the last quarter of 2025. Nigeria has been selected as the study country because of the combination of its unique position as the leading economy in Africa but low insurance penetration (less than 1% of output) and the fact that it is experiencing significant growth in digital systems (NCC, 2024; NIA, 2025). The secondary data is sourced from the National Insurance Commission (NAICOM), Nigerian Communications Commission (NCC), GSMA Intelligence, Nigerian Insurers Association and the World Bank.

Model Specification and Analytical Techniques

The functional model is adapted from Imo and Chilekezi (2025) and specified as: $IP = f(DIPA, MIP, SMU)$

In this formulation, IP denotes insurance penetration, DIPA represents digital insurance platform availability, MIP indicates mobile internet penetration, and SMU signifies smartphone usage.

The regression equation is expressed as: $IP_t = \beta_0 + \beta_1 DIPA_t + \beta_2 MIP_t + \beta_3 SMU_t + \epsilon_t$

The research employs the Autoregressive Distributed Lag (ARDL) bounds examination procedure to explore both immediate and extended associations, since this technique can accommodate variables with differing orders of integration (Pesaran, Shin, & Smith, 2001). Analytical procedures encompass descriptive statistical summaries, Augmented Dickey Fuller unit root assessments, ARDL bounds examination for cointegration, error correction modelling, and diagnostic checks. All hypotheses are evaluated at the 5% significance threshold.

4.0 Results

This segment conveys the study's empirical outputs regarding the relationship between digital infrastructure and insurance penetration in Nigeria, using quarterly data from 2010Q1 to 2025Q4. Digital infrastructure is measured via three variables: online insurance platform presence, mobile internet coverage, and smartphone adoption rates. The presentation includes descriptive statistics, correlation estimates, unit root tests, ARDL bounds testing for cointegration, short run and long run parameter estimates from the error correction model, and diagnostic checks that confirm the validity of the findings.

Descriptive Statistics: Table 4.1 Summary of Descriptive Statistics Result

	DIPA	IP	MIP	SMU
Mean	18.26563	0.681563	62.71406	38.15156
Median	7.500000	0.685000	62.15000	33.35000
Maximum	85.00000	0.990000	114.4000	87.50000
Minimum	0.000000	0.380000	14.50000	4.200000
Std. Dev.	23.89012	0.181591	31.55908	27.12447
Skewness	1.467421	-0.010217	0.068745	0.354999
Kurtosis	3.902566	1.806545	1.712679	1.741744
Jarque-Bera	25.14113	3.799342	4.469601	5.566150
Probability	0.000003	0.149618	0.107013	0.061848
Sum	1169.000	43.62000	4013.700	2441.700
Sum Sq. Dev.	35956.48	2.077444	62746.46	46351.44
Observations	64	64	64	64

Source: Author's Computation

The descriptive statistics indicate that DIPA recorded a mean of 18.27 platforms, ranging from 0 to 85, tracing gradual expansion over time. IP averaged 0.68% of GDP, fluctuating between 0.38% and 0.99%, signalling persistently low yet modestly improving coverage. MIP posted a mean of 62.71 subscriptions per 100 inhabitants, spanning 14.5 to 114.4, reflecting substantial connectivity gains. SMU averaged 38.15%, climbing from 4.2% to 87.5%, highlighting rapid smartphone adoption. Skewness shows positive skew for DIPA and SMU, whereas IP is approximately symmetrical. Jarque-Bera tests confirm normality for IP, MIP, and SMU ($p > 0.05$), with DIPA slightly deviating due to recent growth. Collectively, the variables possess sufficient variation for further econometric modelling.

Stationarity Test: Table 4.2 Augmented Dickey Fuller Unit Root Result

Variable	Level	Prob.	1st	Prob.	Order	of	Decision
	ADF		Difference		Integration		
	Statistic		ADF				
	Statistic						
DIPA (Digital Insurance Platform Availability)	0.7766	0.0928	-3.2114	0.0244	I(1)		Stationary at First Difference
IP (Insurance Penetration)	0.0830	0.9619	-7.9448	0.0000	I(1)		Stationary at First Difference
MIP (Mobile Internet Penetration)	-2.0956	0.2472	-13.1372	0.0000	I(1)		Stationary at First Difference
SMU (Smartphone Usage)	-4.4007	0.0008	—	—	I(0)		Stationary at Level

Source: Author's Computation

Stationarity properties were examined through the Augmented Dickey-Fuller procedure. The empirical outcomes reveal that DIPA, IP, and MIP exhibit unit roots at their levels ($p > 0.05$), yet achieve stationarity upon first differencing ($p < 0.05$), classifying them as $I(1)$ series. By contrast, SMU is found to be stationary in its level form ($p < 0.05$), denoting an $I(0)$ process. Given this blend of integration orders, the ARDL estimation framework emerges as the appropriate methodological choice for assessing how digital infrastructure shapes insurance penetration across Nigeria.

ARDL Bound Test for long Run-Relationship: Table 4.3 ARDL Bound Test Output

F-Bounds Test

Null Hypothesis: No levels relationship

Test Statistic	Value	Signif.	I(0)	I(1)
F-statistic	12.57467	10%	2.72	3.77
K	3	5%	3.23	4.35
		2.5%	3.69	4.89
		1%	4.29	5.61

Source: Author's Computation

We then turned to the ARDL bounds test to see if a stable long-run relationship exists among our variables, with results displayed in Table 4.3. The F-statistic we obtained, 12.57467, is well above the upper bound critical value of 4.35 at the 5% level, prompting us to reject the idea that no cointegration exists. The t-bounds statistic of -7.286496 backs this up, falling comfortably outside the critical boundaries. So, we can confidently say that insurance penetration is tied to the three digital infrastructure measures digital insurance platform availability, mobile internet penetration, and smartphone usage in a long-term equilibrium. This outcome justifies our use of the ARDL framework to estimate both how things adjust in the short run and what the equilibrium effects look like over time.

ARDL Error Correction Model: Table 4.4 ARDL Error Correction Model Output

ARDL Error Correction Regression

Dependent Variable: D(IP)

Selected Model: ARDL(1, 1, 1, 1)

Case 3: Unrestricted Constant and No Trend

Date: 03/07/26 Time: 10:01

Sample: 2010Q1 2025Q4

Included observations: 62

ECM Regression

Case 3: Unrestricted Constant and No Trend

Variable	Coefficient	Std. Error	t-Statistic	Prob.
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C	0.003356	0.001095	3.063362	0.0034
D(DIPA)	-0.000122	0.000501	-0.243606	0.8085
D(MIP)	0.009236	0.001203	7.680221	0.0000
D(SMU)	-0.003104	0.000838	-3.704715	0.0005
CointEq(-1)*	-1.034292	0.141946	-7.286496	0.0000
R-squared	0.789151	Mean dependent var	0.000000	
Adjusted R-squared	0.774355	S.D. dependent var	0.005121	
S.E. of regression	0.002433	Akaike info criterion	-9.122332	
Sum squared resid	0.000337	Schwarz criterion	-8.950789	
Log likelihood	287.7923	Hannan-Quinn criter.	-9.054980	
F-statistic	53.33394	Durbin-Watson stat	1.797647	
Prob(F-statistic)	0.000000			

Source: Author's Computation

Table 4.4 presents the error correction results from our ARDL estimation, shedding light on short-run interactions and the pace at which the system reverts to equilibrium aftershocks. The coefficient for the error correction term stands at -1.034292 and is statistically significant at the 1% level, which not only affirms the existence of a stable long-run relationship but also indicates that any deviations from equilibrium are corrected at a rapid clip of about 103% per quarter. In terms of short-run effects, mobile internet penetration stands out as having a positive and significant influence on insurance uptake, implying that improved connectivity encourages greater participation in insurance. Interestingly, smartphone usage exerts a significant negative influence over the short run, whereas digital insurance platform availability shows no appreciable short-term effect. The model demonstrates strong explanatory power, with an R-squared value of 0.789, suggesting that these three indicators of digital infrastructure collectively account for roughly 78.9% of the variation in insurance penetration. Altogether, these outcomes underscore the heterogeneous ways in which digital infrastructure components shape insurance penetration patterns.

Residual Diagnostic Test: Table 4.5 Breusch-Godfrey Serial Correlation LM Test

Breusch-Godfrey Serial Correlation LM Test:

F-statistic	0.077804	Prob. F(2,52)	0.9253
Obs*R-squared	0.184979	Prob. Chi-Square(2)	0.9117

Source: Author's Computation

We conducted Breusch-Godfrey LM test on the residuals to check for autocorrelation problem in our model. The results were clean with both F statistic (0.077804, $p = 0.9253$) and the Obs R-squared (0.184979, $p = 0.9117$) being well above 5% significance level; there does not seem to be any serial correlation in the residuals. This is reassuring as it suggests that the error terms are independent in time, a key requirement for proper ARDL estimation. Auxiliary regression

confirmed this: The lagged residuals had no predictive power for the current residuals, with an R-squared of almost zero (0.002984). In fact, past mistakes are not affecting current mistakes and that means that our model is well specified and our coefficient estimates are reliable for policy decisions in Nigeria for the present and the future.

Discussion

The ARDL bounds testing indicated that insurance penetration trends with the three digital infrastructure indicators in the long run, a result that is in line with the central tenet of the Technology Acceptance Model. People adopt new technologies when they are useful to them and easy to use, TAM says. The error correction coefficient of -1.034 stands out in particular and it implies that errors from the state of equilibrium are corrected at a very high rate of approximately 103% per quarter! In simple terms, insurance penetration turns back to its long run path very rapidly when it gets off track. The model also performs well in terms of explaining the determinants of insurance penetration with an R-squared of 0.789, which implies that these three digital indicators explain almost 79% of the volatility in insurance penetration. This reinforces the notion that digital transformation is one of the key factors transforming Nigeria's insurance landscape. Zooming in on short-run effects, mobile internet penetration emerges as a clear winner it has a positive and significant impact on insurance uptake. This is an intuitive choice and plays right into TAM's logic, when people can access the internet readily, they will be able to check out insurance coverage choices, do a comparison, and make an educated choice without a great deal of trouble. Our findings are congruent with those of earlier studies by Van Niekerk and Phaladi (2021) which showed a positive relationship between the use of smartphone and engagement in financial services in South Africa and Imo and Chilekezi (2025) which indicated that digital technology adoption is a strong predictor of insurance uptake in Nigeria.

However, the story is different in the short-run with smartphone usage, as it reveals a strong negative effect. Looked at superficially, that may sound like a contradiction, but looked at through TAM's eyes, it is logical. People do not necessarily find their smartphone to be useful and usable in insurance contexts; this has to be made sure. People do not necessarily find their smartphone to be useful and usable in insurance contexts, this has to be made sure. For many Nigerians, their smartphones are more of a communication and entertainment tool than a financial instrument. The result is in line with those of Alli and Ganiyu (2025) who found that financial literacy and trust play significant roles in insurance choices. To that end, in order to purchase insurance coverage via mobile, a person must have a smartphone and believe in the insurance provider and its products. However, availability of digital insurance platforms does not reveal any significant short-run impact. This indicates that provision of platforms is not sufficient to drive adoption. If these platforms are to compete with traditional distribution channels, they need to provide real benefits over the more typical channels, such as a lower premium, quicker claims processing, or ease of use. This is somewhat different from the proposed by Gomber, Kauffman, Parker and Weber (2018), who had suggested that digital platforms can break down traditional barriers to financial services. However, in Nigeria's context, the proliferation of platforms seems an insufficient solution to more entrenched challenges, such as low digital literacy, lack of trust by consumers, and poor institutional support. This finding supports the findings of Leong, Sung and Teissier (2021) who emphasized that a supportive regulatory environment is crucial for the growth and success of digital financial services.

5.0 Conclusion and Recommendations

Based on our study we conclude that digital infrastructure has an impact on insurance penetration in Nigeria in multiple and sometimes surprising ways. Mobile internet penetration is the only indicator to have a consistently positive and significant impact among the three indicators analysed, highlighting the critical role of mobile internet for extending insurance access. While digital insurance platforms are now becoming more widespread, they must be backed by other investments in consumer education, trust and user-friendliness in order to realize their potential in terms of increased penetration. The negative short term impact of smartphone usage suggests that Nigeria is likely going through a transitional period in the insurance journey as the number of devices increases, but the skills and confidence to use them for insurance are lagging. However, the bounds test indicates that the first three digital infrastructure indicators do have a substantial long run equilibrium effect on insurance penetration, implying that the impact of these three digital indicators over time is more pronounced. Our findings suggest that policies alone will not achieve success unless they are complemented by a continuous and concerted action plan to develop digital literacy, raise public awareness and improve the regulatory framework.

Based on our findings, we suggest the following recommendations for action:

1. **Digital Insurance Platforms:** Insurance companies and regulators should invest in robust marketing campaigns, to educate the public about the benefits of digital insurance platforms and platforms in general. Concurrently, they must make registration more user-friendly, improve customer support frameworks and implement trust-promoting measures to tackle consumer doubts and concerns regarding electronic transactions.
2. **Mobile Internet Penetration: Government** policy makers and telecom operators need to work together to ensure that mobile broadband is available and affordable in all corners of Nigeria, especially the rural and semi-urban regions where insurance penetration is least, and with the least infrastructure. This would provide a sound basis for insurers to tap into new markets via mobile distribution channels.
3. **Smartphone Usage:** Smartphones need to be viewed as a means to drive insurance uptake, not necessarily as a prerequisite for it, so insurers should ensure that they have comprehensive digital literacy programmes to provide users with the skills required to navigate insurance platforms, understand policy terms and manage claims digitally. In addition, awareness campaigns that emphasise the real benefits of insurance peace of mind, financial protection and family security would also aid to turn 'passive device owners' into 'insurance consumers'..

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