Investigating the Causal Relationship between Insurance and Economic Growth in Nigeria.

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Abstract: The insurance sector's contribution to economic growth in an economy cannot be understated, as recent empirical studies have demonstrated that, in addition to serving the primary functions of managing losses and reducing risks, insurance also has the potential to mobilize domestic savings for investment, which in turn fosters economic growth. This hypothesis served as the foundation for this study, which examined the causal relationship between insurance and economic growth in Nigeria from 1998 to 2020. In order to analyze the data, this study used the autoregressive distributed lag model (ARDL) estimation technique. Real gross domestic product (RGDP) was utilized as a proxy for economic growth, while gross insurance premiums (GIP), life insurance premiums (LIP), and non-life insurance premiums (NLIP) served as the predictive factors for the insurance sector. The findings of the causality test demonstrated that, in both the short- and long-run, there is a causal relationship between economic growth and gross insurance premiums, as well as between economic growth and non-life insurance, while a significant causal relationship exists between economic growth and life insurance premiums only in the long run.

Keywords: Economic Growth, Life Insurance Premium, Non-Life Insurance Premium, Investment, and Causal Relationship.

JEL Classification: E22, G22, O40, D92

1. Introduction

The function of the insurance industry in the process of economic growth has recently attracted more study and policy attention. The establishment of a contemporary, highly developed financial system, also known as financial diffusion, is typically preceded by the transition to greater and more persistent economic growth, according to a growing body of research in the growth literature. A central bank, a banking system, a securities market, a good insurance system, and the spread of well-managed public finances are all essential for fostering economic development (Andersson et al., 2010; Billio et al., 2012 Pradhan et al., 2016, Uddin et al., 2013; Durusu- Ciftci et al., 2017; Guru and Yadav, 2019 and Sulemana & Dramani, 2020).

The use of domestic resources, risk management, loss mitigation, and other activities that promote economic growth are all part of the role of insurance in an economy. The amount of investment will unquestionably increase if these tasks are successfully carried out in the economy. Insurance also generates funds by collecting insurance premiums, which are in turn invested in government securities and stocks, which ultimately lead to faster economic development. By facilitating the more effective management of various risks, promoting the accumulation of new capital, and assembling domestic savings into profitable investments, the insurance market, both as a financial intermediary and as a beneficiary of risk transfer and indemnification, may stimulate economic growth. (Olayungbo and Akinlo, 2016).

Numerous researchers, including Avram et al. (2010), Mojekwu et al. (2015), Cristea et al. (2014), Alhassan and Fiador (2014), Olayungbo (2015), Ul Din et al. (2017), and Peleckien et al. (2019), have investigated and explored the relationship between insurance and economic growth and have come to the conclusion that there is a causal and direct link between the two. However, while some studies focused primarily on short- or long-run

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associations, others looked at long- and short-run causality. It is surprising that thorough and in-depth research of this kind is not more prevalent among research subjects, given the significance of the insurance sector in facilitating a wide range of economic transactions. Few studies have examined the connection between insurance and economic growth, with the majority of empirical works on the financial sector concentrating more on the banking industry or the stock market (Ahmed & Bashir, 2016; Bayar & Gavriletea, 2018; Sawadogo et al., 2018; Bayar et al., 2021). This study aims to contribute to the growing empirical inquisitions in the literature by examining the causal relationship between insurance and economic growth in Nigeria. The increasing stake of the insurance industry in the combined global financial sector in developed and developing countries has shifted researchers' attention towards a better understanding of the insurance-economic growth nexus. In this study, we will attempt to examine the nature of causality between gross insurance premiums and economic growth, the nature of causality between life insurance premiums and economic growth, and lastly, the nature of causality between non-life insurance premiums and economic

2. Review of Related Literature

2.1 Insurance and Economic Growth

Over the past two decades, the significance of the insurance sector to economic growth has become more well-known and continues to catch the attention of scholars. Ward and Zurbruegg are two early researchers who examined this relationship in 2000. The benefits that emerge from the insurance business acting as a broker for risk transfer and indemnity, they claim, as well as the advantages that result from the insurer acting as a financial intermediary, are the key reasons why insurance is crucial to economic development. In line with Ward and Zurbruegg (2000), Haiss and Sümegi (2008) claim that the insurance industry is crucial to economic growth because it may be employed as a means of risk transfer, saving, and investment. They found that between 1993 and 2004, there was a 20% increase in the total amount of investment made by insurance companies compared to GDP in their analysis of 29 European nations. They continued by noting that an important portion of the contribution of insurance firms to the growth of the gross domestic product stems from their assets, their investment activities, and the structure of the companies. Thus, the involvement of insurance companies in the economy leads to an increase in market volume, an expansion of the investment horizon, and an improvement in market conditions.

The latter body of research concentrates on how the expansion of the insurance industry encourages investment, innovation, and financial development. The proponents of this theory contend that by offering protection, insurance companies have the potential to influence economic growth via the channels of capital's marginal productivity, technical advancements, and saving rate (Curak, Lonar, and Poposki, 2009). As a result, insurance companies compensate those who suffer losses and maintain the financial standing of both individuals and businesses. According to Curak, Lonar, and Poposki (2009), insurance companies boost the amount of money available through their cutting-edge products, which shield other financial intermediaries from credit risk. Financial intermediaries will then be more inclined to lend money to finance legitimate initiatives that promote economic growth. Additionally, they claimed that insurance may influence economic growth via the savings rate by providing a variety of life insurance products that combine risk mitigation and financial advantages. They also contend that insurers can lower transaction costs or achieve economies of scale by accumulating funds from scattered economic units that make relatively small premium payments and distributing these accumulated funds to underperforming economic units in order to finance significant projects.

Insurance companies, as financial intermediary agents, add a new level of competition to the market for intermediate savings, which is predicted to increase operational effectiveness, according to Azman-Saini and Smith (2011). The ability to have varied investment portfolios is another benefit of enhanced financial intermediation services, which encourages investors to fund risky but highly productive initiatives. More specifically, the insurance markets increase liquidity, which makes it easier for money to flow to capital-accumulating projects and causes the economy to grow. Furthermore, they claimed that insurance may indirectly affect production growth through its potential influence on the growth of banks and stock markets.

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2.3 Empirical Literature

To determine the relationship between insurance and economic growth, several empirical studies have been conducted. These investigations have generated a range of conclusions among scholars. Ul Din, Regupathi, Abu-Bakar, Lim, and Ahmed (2020) used the pooled mean group estimate technique to study the relationship between long- and short-term insurance and the growth nexus from 1980 to 2015. The study's findings indicated a long-term and short-term positive and substantial association between life insurance and economic growth for each of the countries that were chosen, with the exception of the case where insurance penetration was employed as a proxy. Using information from 36 nations between 1985 and 2018, Senol, Zeren, and Canakci (2020) investigated the connection between insurance and economic growth. The study used a panel causality test, and the findings showed that there is a one-way causation from economic growth to the non-life insurance business as well as a mutual causality between the life insurance industry and economic growth. Using the Granger causality test for data evaluation, Peleckien et al. (2019) investigated the link between insurance and economic growth in the member states of the European Union from 2004 to 2015. In Luxembourg, Denmark, the Netherlands, and Finland, the results indicate a positive statistically significant association between insurance penetration and economic growth, but a negative statistically significant relationship was found in Austria, Belgium, Malta, Estonia, and Slovakia. Using panel data covering the years 1995–2016, Balcilar et al. (2019) investigated the causal association between insurance and economic growth in 11 African nations. Both life and non-life insurance had a favorable long-term effect on growth, according to the findings. Additionally, the research demonstrated a two-way causal relationship between total insurance and growth. They also emphasize that the impact of non-life insurance on growth is greater than the impact of life insurance.

Similar to this, Wanat et al. (2019) used a bootstrap panel Granger causality test to assess the causal relationship between the insurance market and economic progress in ten EU transition nations for the years 1993–2013. Their empirical findings indicated that there are typically no links between the expansion of the insurance industry and economic growth. The growth of the life insurance market and economic growth are only significantly and favorably correlated in Estonia, Romania, and Slovakia. For the non-life insurance market in Slovakia, Hungary, Poland, and Romania, a similar relationship is also suggested. In Estonia, Slovakia, Bulgaria, and Romania, a connection has been established between the overall insurance market and economic growth. Fashagba (2018) examined the causal relationship between the performance of the insurance sector and economic growth in Nigeria for the periods 2007 and 2016. The findings showed that life insurance premiums had a negative association with economic growth, but non-life insurance premiums and total insurance premiums had favorable links with it. However, there was no statistically significant correlation between economic expansion and the activity components of the insurance sector.

Using the EK causality model, Demirci and Zeren (2017) investigated the relationship between insurance and economic growth in 13 OECD nations between 1983 and 2011. For Iceland, Italy, France, and Spain, the study established a single-direction causal association between insurance and economic growth. In addition, the study found that the association between insurance and growth might not hold true even if economies were at the same stage of development because of numerous external factors that could influence it. Pradhan et al. (2017) examined the relationship between insurance market density (IMD) and economic development in 19 Eurozone countries for the period 1980–2014. The study, which applied the Granger causality technique, examined three distinct insurance market density (IMD) variables, including life insurance density, non-life insurance density, and total insurance density.

Five of the eight African countries analyzed by Alhassan and Biekpe (2016) showed a long-term insurance-economic growth association. This relationship was quantified by insurance penetration. In six nations, a one-way causal relationship between insurance and economic growth was found. For Gabon, there is a stated one-way causal relationship from insurance to economic growth, whereas bidirectional causality was discovered in Morocco. For Ghana between 1990 and 2010, Alhassan and Fiador (2014) looked at the long-term causal link between insurance penetration and economic growth. The authors employed Pesaran, Shin, and Smith's cointegration using the autoregressive distributed lag (ARDL) limits technique (2001). The study identified a positive long-term relationship between growth and insurance penetration. There was found to be a one-way causal relationship between growth and both life and non-life insurance penetration, as well as aggregate insurance penetration.

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The asymmetric, non-linear relationship between insurance and economic growth in Nigeria from 1976 to 2010 was examined by Olayungbo (2015). The market for insurance in Nigeria exhibits an asymmetry, according to the conclusion. Unidirectional causality also links rising insurance premiums to declining GDP growth. Low insurance encourages strong growth in Nigeria, according to the robustness results using variance decomposition and impulse response with control variables. The impulsive responses also demonstrate the existence of an asymmetric link in Nigeria between low insurance and rapid growth.

In conclusion, it appears that scholars have reached a consensus over how to describe the relationship between insurance and economic growth. In terms of causality, there are five different hypotheses that might be used to characterize the relationship between the insurance business and the real sector: (1) there is no causal relationship; (2) there is a demand-following causal relationship, where increased demand for insurance services results from increased economic activity; (3) there is a supply-leading causal relationship, where increased activity in the insurance sector drives up overall economic activity; (4) there is a negative causal relationship between insurance and growth; and (5) there is an interdependent relationship (Blum et al. 2002).

3.1 Model Specification and Estimation

First, by differentiating and taking the natural logarithm expressed as follows, we specify the modified Cobb-Douglass production function with the inclusion of insurance:

$$\Delta lnY^{*} = \Delta \ln(A^{*}) + \alpha_1 \Delta \ln(\text{GIP}) + \alpha_2 \Delta \ln(\text{NLIP}) + \alpha_3 \Delta \ln(\text{LIP}) + \varepsilon \quad (3.1)$$

Where A stands for technology and Y* for economic growth; α_1, α_2 *and* α_3, are coefficients of gross insurance premium, non-life insurance premium, and life insurance premium, respectively, while ε is the disturbance term. GIP represents gross insurance premium, LIP represents life insurance premium, and NLIP is for non-life insurance premium. In this study, the autoregressive distributed lag (ARDL) model was used to investigate the causal association. The core statistic underlying the method is the Wald or F-statistic in an extended Dickey-Fuller type regression, which is used to confirm the relevance of the variables taken into account in a conditional unconstrained equilibrium correction model (UECM). In essence, the bounds test approach consists of two elements. The initial step is to

$$\Delta \ln RGDP = \alpha_0 + \sum_{t=1}^{a} \sigma_i \, lnRGDP_{t-1} + \sum_{t=0}^{b} \alpha_i \, lnGIP_{t-1} + \sum_{t=0}^{c} \emptyset_i \, lnLIP_{t-1} + \sum_{t=0}^{d} \partial_i \, lnNLIP_{t-1}$$

$$+ \pi_1 RDGP_{2t-1} + \pi_2 GIP_{t-1} + \pi_3 LIP_{t-1} + \pi_4 NLIP_{t-1} \, \varepsilon_t \quad (3.2)$$

Where α and ε are the drift and white noise components? Here, the term with summation sings is used to simulate the short-run dynamic structure, and the terms with π stand for the long-run multipliers. The optimal lag length is determined using the Akaike Information Criterion (AIC). The test procedure is built upon the F-test, or Wald statistics. This is achieved by removing the lagged level variables from the aforementioned equation, as shown by Narayan & Smyth (2004). Therefore, the null hypothesis test is required to ascertain whether there is no level of link between insurance and economic growth as assessed by RGDP. (H_0: $\pi_1 = \pi_2 = \pi_3 = \pi_4 = 0$) against the alternative (H_1: $\pi_1 \neq \pi_2 \neq \pi_3 \neq \pi_4 \neq 0$). The test which normalizes on *RGDP* is denoted by F_C *(RGDP / GIP, LIP, NLIP).*

The estimated F-statistic is then compared to two sets of critical values presented by Pesaran et al. (2001). The assumption in both sets is that all variables are either I(0) or I(1). In the event that the estimated F-statistic is greater than the upper critical value, the null hypothesis that there is no cointegration will be rejected. If it is below the lower bound, the null hypothesis that there is no cointegration cannot be ruled out. The test is inconclusive if it falls within the boundaries.

The second stage comprises the estimation of the conditional ARDL (*a, b, c, d*) long-run model after cointegration has been established.

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$$\Delta \ln RGDP = \alpha_0 + \sum_{t=1}^{a} \sigma_i \; lnRGDP_{t-1} + \sum_{t=0}^{b} \alpha_i \; lnGIP_{t-1} + \sum_{t=0}^{c} \emptyset_i \; lnLIP_{t-1} + \sum_{t=0}^{d} \partial_i \; lnNLIP_{t-1} + \varepsilon_t \qquad (3.3)$$

For the estimate of equations (3.3), where all variables are as previously defined, selecting the optimal lag orders for the ARDL (a, b, c, and d) is necessary. To obtain the short-run dynamic parameters of the model associated with the long-run estimations, the following error correction model can be estimated:

$$\Delta lnRGDP_t = \alpha_0 + \sum_{t=1}^{a} \sigma_i \; \Delta lnRGDP_{t-1} + \sum_{j=1}^{j} \alpha_1 \Delta lnLIP_{t-j} + \sum_{j=1}^{j} \alpha_2 \Delta lnNLIP_{t-j} + \eta ECT_{t-1} + \varepsilon_{4it} \qquad (3.4)$$

Where Δ is the first difference operator, ect is the error correction term (representing the residual of the co-integrating equation), and (represents its coefficient. The error correction

3.2 Nature Source and Description of Data

Table 3.1 Variable Description

S/N	Variable	Measurement
I	Real Gross Domestic Product	RGDP is calculated by dividing nominal GDP over a GDP deflator
ii	Gross insurance premium	GIP is measured by total sum of premium income from life and non-life insurance business.
iii	Life insurance premium	LIP is measured by total sum of premium income from life insurance business.
iv	Non-life insurance premium	NLIP is measured by total sum of premium income from non-life insurance business.

4.0 Presentation and Discussion of Results

The results of the Autoregressive Distributed-Lag (ARDL) estimations and other test statistics are examined in this section. The regression generally runs over the period of 1998-2020.

4.1 Unit Root Result:

The variables are either I(0) or I(1), which is the foundation for the bounds test (I). Unit root tests must still be used in the ARDL process to make sure that none of the variables are I(2) or higher. We used the traditional Augmented Dickey Fuller (ADF) test (Dickey and Fuller, 1974) and Phillips Perron (PP) test in view of this. The statistics shown in Table 4.1 show that the variables Real Gross Domestic Product (RGDP) and Life Insurance Premium (LIP) became stationary at the first difference while the variables Gross Insurance Premium (GIP) and Non-Life Insurance Premium (NLIP) remained stationary at levels; that is, they are integrated of order one I(0). This suggests that the non-stationarity null hypothesis for RGDP and LIP is thus rejected, while the non-stationarity null hypothesis for GIP and NLIP cannot be rejected. However, the outcomes demonstrate that we can reliably use the ARDL methodology in our model.

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Table 4.1: Summary of Unit Root Test Results

Variables	ADF t-statistics Level	1st Difference	PP t-statistics Level	1st Difference	Conclusion
RGDP	-3.419415**	-	-0.775503	-1.944198	*I(0)*
GIP	1.684073	-3.069043**	1.459302	-3.069043**	*I(1)*
LIP	4.117217***	-	4.750605***	-	*I(0)*
NLIP	0.084797	-3.952440***	0.178432	-4.223990***	*I(1)*

****, **, * indicates statistical significance at 1%, 5% and 10% respectively.*
Source: Author's computation (using Eviews)

4.2 Discussions of Estimation Results

4.2.1 Bounds Cointegration Test Result

Table 4.2 reports the results of the ARDL test to determine whether long-run relationships exist in our model. The maximum lags in the ARDL models were adjusted to 2 (imax = 2) in accordance with Narayan & Smyth (2005) because this study uses annual data. By minimizing the Akaike Information Criterion, the estimated models shown in Table 4.2 are generated. A long-term association between economic growth, insurance, and other included variables is demonstrated by the bounds F-test for the cointegration test. The null hypothesis of no long-run relationship between the tested variables is rejected since the computed F statistic, (FC) = 7.872, is greater than the upper bound of the 1% critical values. Therefore, this data eliminates the chance that the calculated result is fictitious.

Table 4.2: Bounds Test Results for Cointegration Relationship

Critical bounds value of the *F-statistics*						
K	*1% level*		*5% level*		*10% level*	
	I(0)	***I(1)***	***I(0)***	***I(1)***	***I(0)***	***I(1)***
7[PS]	2.96	4.26	2.32	3.5	2.03	3.13
Calculated F-statistics						
F_C(C/RGDP, GIP, LIP, NLIP,) = 7.872						

***Note**: The lag structure was selected based on the Schwartz Criterion. K is the number of regressors. PS Pesaran, et al (2001:300), Table CI(iii), Case III: Unrestricted intercept and no trend.,.*
Source: Author's computation (using Eviews)

4.2.3 ///////Causality Test Result

In considering the causal relationship between economic growth (LNRGDP), gross insurance premium (LNGIP), life insurance premium (LNLIP), and non-life insurance (LNNLIP) at 5% level of significance, this study obtained the short-run causal effect using the Wald Test statistics, while the long-run causal effect was obtained from the ECM term of the ARDL.

Model 1: Causal relationship between LNRGDP, LNGIP, LNLIP and LNNLIP

In our first model, economic growth is the dependent variable, while gross insurance premium, life insurance premium, and non-life insurance premium are the explanatory variables. This model explicitly deals with short-run causality running from gross insurance premiums, life insurance premiums, and non-life insurance premiums to economic growth. The result of the ARDL estimate is presented as follows:

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Table 4.3: Causal relationship estimates for the Selected ARDL Model 1
Autoregressive Distributed Lag Estimates
ARDL (2,0,2,0) selected based on Akaike Information Criterion (AIC)

Dependent variable: LNRGDP
Sample (adjusted): estimation from 1999 to 2020
22 observations after adjustments

Variable	Coefficient	Standard. Error	t-Statistic	Prob.*
LNRGDP (-1)	1.144014	0.219864	5.203285	0.0001
LNRGDP (-2)	-0.292072	0.180782	-1.615601	0.1285
LNGIP	-0.001448	0.003690	-0.392491	0.7006
LNLIP	0.010892	0.016158	0.674095	0.5112
LNLIP(-1)	0.007595	0.016266	0.466910	0.6477
LNLIP(-2)	-0.032859	0.018170	-1.808456	0.0921
LNNLIP	0.081585	0.030104	2.7100.78	0.0169
C	0.372354	0.827285	0.450091	0.6595
R-squared	0.997526	Adjusted R-squared		0.996289
F-statistics	806.471	Durbin-Watson Stat		1.8325
Prob(F-statistic)	0.000000			

Source: Author's computation (using Eviews)

In order to obtain the estimates for the shortrun parameters in the model, we estimated the following system equation, from which we will perform the Wald test for the significance of the shortrun parameters:

Table 4.3.1: System Equation for Model 1

LNRGDP = C(1)*LNRGDP(-1) + C(2)*LNRGDP(-2) + C(3)*LNGIP + C(4)*LNLIP + C(5)*LNLIP(-1) +C(6)*LNLIP(-2) + C(7)*LNNLIP + (8)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	1.144014	0.219864	5.203285	0.0001
C(2)	-0.292072	0.180782	-1.615601	0.1285
C(3)	-0.001448	0.003690	-0.392491	0.7006
C(4)	0.010892	0.016158	0.674095	0.5112
C(5)	0.007595	0.016266	0.466910	0.6477
C(6)	-0.032859	0.018170	-1.808456	0.0921
C(7)	0.081585	0.030104	2.7100.78	0.0169
C(8)	0.372354	0.827285	0.450091	0.6595

Source: Author's computation (using Eviews)

Table 4.3.1 is the system equation from the autoregressive distributed lag model (ARDL), and from the regression result above, C(1) and C(2) are the first and second lags of the economic growth variable (LNRGDP), C(3) is the coefficient of the gross insurance premium variable (LNGIP), C(4), C(5), and C(6) are the coefficients of the level, first and second lags of the life insurance premium variable (LNNLIP), and C(7) is the coefficient of the non-life insurance premium variable in model 1.

Shortrun Causality:

Table 4.3.2: Wald Test

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Panel A: Gross Insurance Premium

Wald Test: Equation: Untitled			
Test Statistic	Value	df	Probability
t-statistic	-0.392491	15	0.7006
F-Statistic	0.154050	(1,14)	0.7006
Chi-square	0.154050	1	0.6947
Null Hypothesis: C(3)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(3)		-0.001448	0.003690
Restrictions are linear in coefficients.			

Source: Author's computation (using Eviews)

Panel B: Life Insurance Premium

Wald Test: Equation: Untitled			
Test Statistic	Value	df	Probability
F-Statistic	1.333757	(3,14)	0.3032
Chi-square	4.001272	3	0.2613
Null Hypothesis: C(4)=C(5)=C(6)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(4)		0.010892	0.016158
C(5)		0.007595	0.016266
C(6)		-0.03286	0.01817
Restrictions are linear in coefficients.			

Panel C: Non-life Insurance Premium

Wald Test: Equation: Untitled			
Test Statistic	Value	df	Probability
t-statistic	2.710078	14	0.0169
F-Statistic	7.344521	(1,14)	0.0169
Chi-square	7.344521	1	0.0067
Null Hypothesis: C(7)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(3)		0.081585	0.030104
Restrictions are linear in coefficients.			

Source: Author's computation (using Eviews)

The results of the Wald tests are presented in table 4.3.2. The Wald test was employed to test the significance of the coefficients for gross insurance premium to economic growth denoted C(3), life insurance premium at level, first and second lag denoted C(4), C(5), and C(6), and non-life insurance premium denoted C(7). The null hypotheses C(3) = 0 for gross insurance premium, C(4) = C(5) = C(6) = 0 for life insurance premium, and C(7) = 0 for non-life insurance premium were tested. The result of the Wald test for gross insurance premium, with a prob-value of 0.7006, is not significant at the 5% level of significance. This therefore suggests that there is no

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short-run causality running from the gross insurance premium to economic growth. Similarly, the probability value of 0.3032 for the F-statistic of life insurance premium is not also significant at the 5% level of significance. This indicates that there is no short-run causal relationship running from life insurance premiums to economic growth. On the other hand, the probability value of 0.0169 for the non-life insurance premium is significant at the 1% level of significance. This indicates a short-run causal relationship running from non-life insurance premiums to economic growth.

Longrun Causality:

Having examined the short-run causal relationship running from the included regressors to the dependent variable (economic growth), we moved further to test for a long-run causal relationship. The error correction estimates are presented in the following sections:

Table 4.7.3: Longrun Causality from LNGIP to LNRGDP
Autoregressive Distributed Lag Error Correction Estimates

ARDL (2,0) selected based on Akaike Information Criterion (AIC)

Dependent variable: D(LNRGDP)
Sample (adjusted): estimation from 1999 to 2020
22 observations after adjustments

Variable	Coefficient	Standard. Error	t-Statistic	Prob.*
C	0.829903	0.31825	2.607752	0.0178
D(LNRGDP(-1))	0.498871	0.18212	2.739254	0.0135
CointEq(-1)*	-0.081769	0.032013	-2.554236	0.0199

Source: Author's computation (using Eviews)

Table 4.3.4: Longrun Causality from LNLIP to LNRGDP
Autoregressive Distributed Lag Error Correction Estimates

ARDL (2,2) selected based on Akaike Information Criterion (AIC)

Dependent variable: D(LNRGDP)
Sample (adjusted): estimation from 1999 to 2020
22 observations after adjustments

Variable	Coefficient	Standard. Error	t-Statistic	Prob.*
C	0.407253	0.256742	1.586235	0.1322
D(LNRGDP(-1))	0.559251	0.176454	3.169392	0.0059
D(LNLIP)	0.017229	0.016545	1.041377	0.3132
D(LNNLIP(-1))	0.035138	0.017179	2.0454432	0.0576
CointEq(-1)*	-0.045380	0.028536	-1.590303	0.1313

Source: Author's computation (using Eviews)

Table 4.3.5: Longrun Causality from LNNLIP to LNRGDP
Autoregressive Distributed Lag Error Correction Estimates

ARDL (2,0) selected based on Akaike Information Criterion (AIC)

Dependent variable: D(LNRGDP)

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Sample (adjusted): estimation from 1999 to 2020 22 observations after adjustments				
Variable	**Coefficient**	**Standard. Error**	**t-Statistic**	**Prob.***
C	0.968944	0.206088	4.701614	0.0002
D(LNRGDP(-1))	0.237347	0.162422	1.461299	0.1612
CointEq(-1)*	-0.234707	0.050795	-4.620695	0.0002

Source: Author's computation (using Eviews)

Long-run causality exists in an autoregressive distributed lag model if and only if the error correction term (ECM) is negative and statistically significant, as can be seen from the results in tables 4.3.3, 4.3.4, and 4.3.5. The ECM term, which is the co-integrating equation for the long-run causality between economic growth and gross insurance premium, is negative and statistically significant at the 1% significant level. This indicates that a long-run causal relationship runs from the gross insurance premium to economic growth. This further indicates that the previous year's deviation from long-run equilibrium is corrected at an adjustment speed of 0.17% annually. The ECM term for the causal relationship between economic growth and life insurance premiums reported in Table 4.3.4 was negative, but not statistically significant. This therefore implies the absence of a long-run causal relationship running from life insurance premiums to economic growth. Finally, the co-integrating equation for the long-run causality between economic growth and non-life insurance premiums reported in Table 4.5.5 is negative and statistically significant at the 1% significant level. We therefore conclude that a long-run causal relationship runs from non-life insurance premiums to economic growth.

In summary, the results from Model 1 indicate that a causal relationship runs from gross insurance premium to economic growth only in the long run. The analysis shows the absence of any causal relationship running from life insurance premiums to economic growth, both in the short run and long run. Conversely, the results indicate the existence of a causal relationship running from non-life insurance premiums to economic growth both in the short run and long run.

Model 2: Causal relationship between LNGIP and **LNRGDP**

In this model, gross insurance premium is the dependent variable while economic growth is the explanatory variables. This model is designed to examine if causality runs from economic growth to gross insurance premium both in the shortrun and longrun. The result of the ARDL estimate is presented thus:

Table 4.4: Causal relationship estimates for the Selected ARDL Model 2

ARDL (1,0) selected based on Akaike Information Criterion (AIC)

Dependent variable: LNGIP Sample (adjusted): estimation from 1998 to 2020 23 observations after adjustments				
Variable	**Coefficient**	**Standard. Error**	**t-Statistic**	**Prob.***
LNGIP (-1)	0.598656	0.175453	3.412065	0.0028
LNRGDP	4.198681	2.067794	2.030512	0.0558
C	-38.44383	19.70989	-1.950484	0.0653
R-squared	0.915787	Adjusted R-squared		0.907366
F-statistics	108.747	Durbin-Watson Stat		1.719331.
Prob(F-statistic)	0.000000			

Source: Author's computation (using Eviews)

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The estimated system equation from which we will perform the Wald test for the significance of the short-run parameters is presented below:

Table 4.4.1: System Equation for Model 2

LNGIP = C(1)*LNGIP(-1) + C(2)*LNRGDP + C(3)				*
	Coefficient	**Std. Error**	**t-Statistic**	**Prob.**
C(1)	0.598656	0.175453	3.412065	0.0028
C(2)	4.198681	2.067794	2.030512	0.0558
C(3)	-38.44383	19.70989	-1.950484	0.0653

Source: Author's computation (using Eviews)

Table 4.8.1 is the system equation from the autoregressive distributed lag model (ARDL), and from the regression result above, C(1) is the first lag of the gross insurance premium variable (LNGIP), while C(2) is the coefficient of the economic growth variable (LNRGDP) in model 2.

Shortrun Causality:

Table 4.4.2: Wald Test

Wald Test: **Equation: Untitled**			
Test Statistic	Value	df	Probability
t-statistic	2.030512	20	0.0558
F-Statistic	4.122981	(1,20)	0.0558
Chi-square	4.122981	1	0.0423
Null Hypothesis: C(2)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(2)		4.198681	2.067794
Restrictions are linear in coefficients.			

Source: Author's computation (using Eviews)

The null hypothesis C(2) = 0 for economic growth was tested. The result of the Wald test for economic growth, with a prob-value of 0.0558, is statistically significant at the 5% level of significance. This therefore suggests that there is a short-run causality running from economic growth to the gross insurance premium.

Longrun Causality:

Having established a short-run causal relationship running from economic growth to gross insurance premiums, we moved further to test for a long-run causal relationship from economic growth to gross insurance premiums. The error correction estimate is presented as follows:

Table 4.4.3: Longrun Causality from LNRGDP to LNGIP
Autoregressive Distributed Lag Error Correction Estimates

ARDL (1,0) selected based on Akaike Information Criterion (AIC)

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Dependent variable: D(LNGIP) Sample (adjusted): estimation from 1998 to 2020 23 observations after adjustments				
Variable	**Coefficient**	**Standard. Error**	**t-Statistic**	**Prob.***
C	-38.44383	16.47450	-2.333536	0.0302
CointEq(-1)	-0.401344	0.169976	-2.361179	0.0285

Source: Author's computation (using Eviews)

From the error correction estimate in table 4.4.3, the ECM term is negative and statistically significant at the 5% significant level. This indicates that a long-run causal relationship runs from economic growth to the gross insurance premium. This further indicates that the previous year's deviation from long-run equilibrium is corrected at an adjustment speed of 40.13% annually.

Summarily, from models 1 and 2, we can conclude that uni-directional short-run causality runs from economic growth to gross insurance premium, while in the long run, a bi-directional causality runs from economic growth to gross insurance premium and from gross insurance premium to economic growth. Thus, a significant causal relationship exists between economic growth and gross insurance premiums, both in the short and long run.

Model 3: Causal relationship between LNRGDP and **LNLIP**

In this model, life insurance premiums are the dependent variable, while economic growth is the explanatory variable. This model is designed to examine if causality runs from economic growth to life insurance premiums both in the short run and long run. The result of the ARDL estimate is presented as follows:

Table 4.5: Causal relationship estimates for the Selected ARDL Model 3
Autoregressive Distributed Lag Estimates

ARDL (2,0) selected based on Akaike Information Criterion (AIC)

Dependent variable: LNLIP Sample (adjusted): estimation from 1999 to 2020 22 observations after adjustments				
Variable	**Coefficient**	**Standard. Error**	**t-Statistic**	**Prob.***
LNLIP (-1)	-0.022875	0.212396	-0.107701	0.9154
LNLIP (-2)	0.427830	0.19805	2.160213	0.0445
LNRGDP	2.053214	1.166524	1.760114	0.0954
C	-11.62510	7.785761	-1.493124	0.1527
R-squared	0.952272	Adjusted R-squared		0.944318
F-statistics	119.7133	Durbin-Watson Stat		1.860958
Prob(F-statistic)	0.000000			

Source: Author's Computation using Eviews

The estimated system equation from which we will perform the Wald test for the significance of the shortrun parameters is presented in Table 4.5.1.

Table 4.9.1: System Equation for Model 3

LNLIP = C(1)*LNLIP(-1) + C(2)*LNLIP(-2) + C(3)*LNRGDP + C(4)				
	Coefficient	**Std. Error**	**t-Statistic**	**Prob.**

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C(1)	-0.022875	0.212396	-0.107701	0.9154
C(2)	0.427830	0.198050	2.160213	0.0445
C(3)	2.053214	1.166524	1.760114	0.0954
C(4)	-11.62510	7.785761	-1.493124	0.1527

Source: Author's Computation using Eviews

Table 4.5.1 is the system equation from the autoregressive distributed lag model (ARDL), and from the regression result above, C(1) is the first lag of the life insurance premium variable (LNLIP), C(2) is the second lag of the life insurance premium variable (LNLIP), and C(3) is the coefficient of the economic growth variable (LNRGDP) in model 3.

Shortrun Causality:

Table 4.5.2: Wald Test

Wald Test: **Equation: Untitled**			
Test Statistic	Value	df	Probability
t-statistic	1.760114	18	0.0954
F-Statistic	3.098000	(1,18)	0.0954
Chi-square	3.098000	1	0.0784
Null Hypothesis: C(3)=0 Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(2)		2.053214	1.166524
Restrictions are linear in coefficients.			

Source: Author's Computation using Eviews

The null hypothesis C(3) = 0 for economic growth was tested. The result of the Wald test for economic growth, with a prob-value of 0.0954, is not statistically significant at the 5% level of significance. This therefore suggests that there is no short-run causality running from economic growth to life insurance premiums.

Longrun Causality:

In the absence of a short-run causal relationship running from economic growth to life insurance premiums, we went further to test for a long-run causal relationship from economic growth to life insurance premiums. The error correction estimate is presented as follows:

Table 4.5.3: Longrun Causality from LNRGDP to LNLIP
Autoregressive Distributed Lag Error Correction Estimates

ARDL (2,0) selected based on Akaike Information Criterion (AIC)

Dependent variable: D(LNLIP)
Sample (adjusted): estimation from 1998 to 2020
22 observations after adjustments

Variable	Coefficient	Standard. Error	t-Statistic	Prob.*
C	-11.62510	4.467253	-2.602294	0.0180

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D(LNGIP(-1))	-0.427830	0.170882	-2.503662	0.0221
CointEq(-1)*	-0.595045	0.221127	-2.690961	0.0015

Source: Author's Computation using Eviews

From the error correction estimate in table 4.5.3, the ECM term is negative and statistically significant at the 1% significant level. This indicates that a long-run causal relationship runs from economic growth to life insurance premiums. This further indicates that the previous year's deviation from long-run equilibrium is corrected at an adjustment speed of 59.5% annually. Summarily, from models 1 and 3, we can conclude that there is no form of short-run causality between economic growth and life insurance premiums, while in the long run, a uni-directional causality runs from economic growth to life insurance premiums. Thus, a significant causal relationship exists between economic growth and gross insurance premiums in the long run.

Model 4: Causal relationship between LNRGDP and **LNNLIP**

This fourth model has non-life insurance premiums as the dependent variable, while economic growth is the explanatory variable. This model is designed to examine if causality runs from economic growth to life insurance premiums both in the short run and long run. The result of the ARDL estimate is presented as follows:

Table 4.5: Causal relationship estimate for the Selected ARDL Model 4
Autoregressive Distributed Lag Estimates

ARDL (1,1) selected based on Akaike Information Criterion (AIC)

Dependent variable: LNNLIP
Sample (adjusted): estimation from 1998 to 2020
23 observations after adjustments

Variable	Coefficient	Standard. Error	t-Statistic	Prob.*
LNNLIP (-1)	0.556538	0.211490	2.631510	0.0164
LNRGDP	3.300495	1.151390	2.847367	0.0103
LNRGDP(-1)	-2.228900	0.901982	-2.471114	0.0231
C	-3.386924	2.131056	-1.589317	0.1258
R-squared	0.980794	Adjusted R-squared		0.977762
F-statistics	323.4310	Durbin-Watson Stat		1.700067
Prob(F-statistic)	0.000000			

Source: Author's Computation using Eviews

The estimated system equation from which we will perform the Wald test for the significance of the shortrun parameters is presented in Table 4.10.1.

Table 4.5.1: System Equation for Model 4

LNNLIP = C(1)*LNNLIP(-1) + C(2)*LNRGDP + C(3)*LNRGDP(-1) + C(4)

	Coefficient	Std. Error	t-Statistic	Prob.
C(1)	0.556538	0.211490	2.631510	0.0164
C(2)	3.300495	1.151390	2.847367	0.0103
C(3)	-2.228900	0.901982	-2.471114	0.0231
C(4)	-3.386924	2.131056	-1.589317	0.1258

Source: Author's Computation using Eviews

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Table 4.5.1 is the system equation from the autoregressive distributed lag model (ARDL), and from the regression result above, C(1) is the first lag of the non-life insurance premium variable (LNNLIP), while C(2) and C(3) are the coefficients of level and first lag of the economic growth variable (LNRGDP)..

Shortrun Causality:

Table 4.5.2: Wald Test

Wald Test: **Equation: Untitled**			
Test Statistic	Value	Df	Probability
F-Statistic	4.062905	(2,19)	0.0340
Chi-square	8.125809	2	0.0172
Null Hypothesis: C(2)=C(3)=0			
Null Hypothesis Summary:			
Normalized Restriction (= 0)		Value	Std. Err.
C(2)		3.300495	1.159139
C(3)		-2.228900	0.901820
Restrictions are linear in coefficients.			

Source: Author's Computation using Eviews

The null hypothesis C(2) = C(3) = 0 for economic growth was tested. The result of the Wald test for economic growth, with a prob-value of 0.0340, is statistically significant at the 5% level of significance. This therefore suggests that there is a short-run causality running from economic growth to non-life insurance premiums.

Longrun Causality:

Having established a short-run causal relationship running from economic growth to non-life insurance premiums, we went further to test for a long-run causal relationship from economic growth to non-life insurance premiums. The error correction estimate is presented as follows:

Table 4.5.3: Longrun Causality from LNRGDP to LNNLIP
Autoregressive Distributed Lag Error Correction Estimates

ARDL (1,1) selected based on Akaike Information Criterion (AIC)

Dependent variable: D(LNNLIP) Sample (adjusted): estimation from 1998 to 2020 23 observations after adjustments				
Variable	**Coefficient**	**Standard. Error**	**t-Statistic**	**Prob.***
C	-3.386924	1.504927	-2.250558	0.0365
D(LNRGDP)	3.300495	0.967635	3.410888	0.0029
CointEq(-1)*	-0.443462	0.195614	-2.267021	0.0353

Source: Author's Computation using Eviews

Also, from the error correction estimate in Table 4.5.3, the ECM term is negative and statistically significant at the 5% significant level. This indicates that a long-run causal relationship runs from economic growth to non-life

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insurance premiums. This further indicates that the previous year's deviation from long-run equilibrium is corrected at an adjustment speed of 44.34% annually.

Summarily, from models 1 and 4, we can conclude that there is bi-directional causality running from economic growth to non-life insurance premiums and from non-life insurance premiums to economic growth both in the short run and long run. Thus, a significant causal relationship exists between economic growth and gross insurance premiums in the short and long run.

5. Conclusion and Recommendations

This employed the autoregressive distributed lag model estimation technique and, using a data set from 1998–2020, investigated the causal relationship between insurance and economic growth in Nigeria. The result showed that uni-directional causality runs from economic growth to gross insurance premiums in the short run. The result further indicated that in the long run, a bi-directional causality runs from economic growth to gross insurance premium and from gross insurance premium to economic growth. Thus, we therefore conclude that a significant causal relationship exists between economic growth and gross insurance premiums, both in the short run and long run.

In terms of causality between economic growth and life insurance premiums in Nigeria, the causality test showed the absence of any form of causality in the short run between economic growth and life insurance premiums. However, the result shows the presence of a uni-directional causality running from economic growth to life insurance premiums in the long run. Thus, we can conclude that a significant causal relationship exists between economic growth and life insurance premiums only in the long run. Lastly, the causality test result between non-life insurance premium and economic growth in Nigeria showed that there is bi-directional causality running from economic growth to non-life insurance premium and from non-life insurance premium to economic growth both in the short run and long run. In light of the foregoing, we therefore conclude that a significant causal relationship exists between economic growth and non-life insurance premiums, both in the short run and the long run.

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