



MEASURING THE SHOCKS AND DYNAMICS OF MACRO ECONOMIC VARIABLES TO INSURANCE PERFORMANCE IN NIGERIA, 1981 – 2016. USING ENGEL-GRANGER RESIDUAL BASED APPROACH

Ezema Clifford Anene

Department of Insurance and Risk Management, Faculty of Management Sciences, Enugu State University of Science and Technology, (ESUT), Enugu, Enugu State Nigeria

Ann Eche

Department of Insurance, School of Financial Studies, Institute of Management and Technology, (IMT) Enugu, Enugu State Nigeria

Abstract:

The study measured the shocks and dynamics of macroeconomic variables to financial performance of insurance companies in Nigeria For the period 1981 to 2016 using empirical evidence from Nigeria. The Engel-Granger two-step cointegration procedures and Error Correction Model (ECM) were used as the method of estimation. The analyses of residuals of the OLS regression showed evidence in favour of cointegration between macroeconomic variables and financial performance of insurance companies in Nigeria. Similarly, estimates from the error correction model provide evidence to show that macroeconomic variables and financial performance of insurance companies in Nigeria converge to a long-run equilibrium at a reasonably slow rate. The result points to the fact that the macroeconomic variables and financial performance of insurance companies in Nigeria if well managed can engineer the Nigerian economy to greater growth.

Keywords: Insurance performance; Broad Money Supply, Credit, Private Sector, Real Effective, Exchange Rate, Cointegration, Error Correction Model,

I Introduction

Insurance industry we are seeing today passed through many eras before now. This era accounted for the growth and development of insurance in Nigeria. According to Nwite (2004) pre-colonial insurance has been existing in the country before the modern insurance we are having today. Before the advent of British merchants in Nigeria, Nigerian has been practicing crude form of insurance which still existed in the rural villages today. Aneke (2006) supported the pre-colonial era of insurance by saying that before the arrival of British merchants, there existed an informal way of risk sharing base on extended family system, age grade association, town union benevolence and other form of assistance where many contributes to compensate the few who were unfortunate to be involved in loss. Mordi (1990) concluded pre-colonial era by explaining how the traditional society system has shown sympathy to their members who suffered some misfortunate like death, ill-health, fire ravages or court cases.

Okonkwo (2002) expressed that, tracing the pre-colonial era, both the extended family system, and the town union still existed in Nigeria today but most of their insurance functions have been taken over by an organized insurance system. Similarly, the age grade association still plays an important role in some part of the country especially in matters relating to rural development.



Banjo (1995) recorded the advent of the modern insurance in Nigeria using colonial penetration of insurance through British Merchants who established trading post on the West coast of Africa. This is how insurance started in Nigeria from 1880. Ujadu (1985) expressed that during the 19th century, British Merchants arranged insurance for their trading concerns on the London Insurance market as early as 1900. The Royal Exchange Assurance and Tobacco insurance company limited as at 1910 appointed two insurance agents who underwrites business in Nigeria and process it in London. In 1921, Royal Exchange Assurance decided to appoint a resident insurance officer in Lagos. This company according to Jegede (2005) became the first recognized insurance company from 1921 to 1949 when three other insurance companies were established. These companies were the legal and general assurance society limited and the Norwich union and fire insurance society which merged with an unregistered indigenous insurance company called guinea insurance company limited.

Falegan (1991) recorded that it was in 1958 that the first insurance company in Nigeria otherwise called the first indigenous insurance company was established called the African insurance company limited and that is why our insurance system was patterned according to British insurance setting.

Falegan (1991) also opined that during the 1960 political independence of Nigeria, the outcome of British domination in insurance sector created proliferations of many insurance companies. Companies like the Great Nigeria Insurance Company, The Nigeria General Insurance Company Ltd., and The Popular Universal Insurance Company Limited (UNIC) was founded.

Irukwu (1991) posits that immediately after 1960 political independence, by 1961, the number of insurance companies increased from 4 to 23 and to further 66. This lead to the vision of controlling insurance activities in Nigeria. This resulted to the creation of marine insurance act of 1961. This act led the foundation of insurance regulation where the insurance companies existing in Nigeria were ask to recapitalize to the sum of £50,000 for the first time in the Nigeria insurance history.

Adeyemi (2005) records that amendment of insurance act of 1961 lead to the increase of insurance capital base to £500,000 in 1964 which is referred to 1964 marine insurance act. This act helps to regulate the already flogged insurance market with mushroom insurance activities. Besides, the 1964 insurance act laid foundation for legal statutory deposit to be kept with the central bank of Nigeria.

Nwite (2004) further expressed the marine insurance act of 1964 harnessed the dwindling image of insurance in Nigeria by regulation the activities of other insurance intermediaries. It was not until 1976 that a new insurance decree was enacted to further improve insurance image. Hence, the new capital base was moved to #5million. This arrested the level of flagrant abuse of insurance by the practitioners because many of the players left the industry. In 1991 a new insurance act was re-enacted to fine-tune the on-going reform in the insurance industry where three categories of capital base were instituted. The capital base for life assurance was, Nonlife, composite; reinsurance.

Nwamba (2012) recorded that the new capital base for life assurance was raised to #20m, Nonlife; #70m, composite; #70m reinsurance; #150m. This exercise recorded the highest number of insurance liquidation in the Nigerian insurance history where 75 out of 110 insurance companies failed. This laid the foundation of a solid insurance assets base in Nigeria. It equally insisted that brokerage firms should capitalize to the sum of #5000, 000 which must include a professional indemnity cover of #1m. hence NAICOM was given more legal power to regulate insurance business with the spate of insurance activities in Nigeria



within the period, oil and gas insurance, marine and Aviation insurance and Engineering all risk were introduced on the basis of risk transfer. This laid the foundation of local content initiative in insurance sector in Nigeria.

Based on the level of global development and international financial market growth, in 2003, a new insurance act was passed into law by the government of Chief Olusegun Obasanjo that increased geometrically the capital base of insurance companies that still failed to meet global trends. Hence life assurance capital base was N150m, non-life: N200m, composite: N350m and Re-insurance: N350m, (insurance digest, 2010). This resulted in 107 out of 117 insurance companies in Nigeria surviving the new wave of new capital base. This equally made insurance companies to be active participant in Africa and other continent.

Aneke (2012) opined that between 2003 to 2005, there were reorganization in the financial industry where banks were ask to capitalize to the sum of N25 billion. Also, the insurance were made to increase their capital base for life: N2billion, Non-life N3billion while Re-Insurance: 10billion. It was here that the remaining 107 insurance companies were reduced to 49 players of 23 life offices and 26 non-life officers. With one certified re insurance company called Nigerian Re.

However, after the last recapitalization exercise that recorded the highest rate of increase in Nigeria, Aneke (2012) recorded that insurance industry has been totally reform driven. Despite the global economic meltdown of 2008, NIA (2014) recorded that the gross premium income of insurance companies by average rose from 18% to 36.5%.

Currently, with the introduction of local content initiative in the insurance sector in 2012, there is a forecast that in order for insurance industry in Nigeria to continue to grow, they must improve their capital base based on their risk portfolio.

Over the years, insurance industry in Nigeria has not been doing well as reflected in the numbers of insurance reforms. Okeke (2010) attributed these failures to the problems created by indigenization policy of 1977. Madukwe and Obi Nweke (2014) opined that insurance failure to meet global and emerging trends was driven by low image of insurance companies, Osakwe (2015) expressed that the slow pace of insurance in Nigeria was grossly caused by delay in claims settlement, issues relating to rate cutting, round tripping, window dressing and other unethical practices in the insurance system. Chikeleze (2010) posit that insurance industry in Nigeria has been confronted with a disease that refuses to die called inadequate awareness of people about insurance and also the activities of econometric variables in Nigeria. All these identified issues have contributed to the low financial performance of insurance companies in Nigeria.

Beside, foreign exchange rate, broad money supply, and inflation on investment portfolios are other exogenous variables that are strongly affecting the financial performance of insurance industry in Nigeria.

Hence, following historical antecedent and various instability in the insurance industry over the years, the study wants to measure the effect of some selected macro-economic variables on financial performance of insurance companies. This is carried out by measuring the shocks and dynamics macro-economic variables to financial performance of insurance companies in Nigeria.

In carrying out this research, Ordinary least square Regression model will be used for the period of 1981-2016 to measure the reaction of the macro economic variables on financial performance of insurance companies in Nigeria. The remainder of the work will contain a review of related literature that contains theoretical and empirical review in the second section, the third section will present the methodology applied, the empirical result will occupy the forth section while the fifth will cover the conclusions.

Over the years, there has been a lot of empirical review that establishes exchange rates and its related micro economic variables as well as insurance contribution to economic growth. 80% of the empirical work posits that exchange rate has a negative influence on economic growth but insurance has a positive influence on GDP. All the empirical reviewers are unidirectional meaning that they move in the same direction. The following are the empirical review used in this work.

II Brief Review of Empirical Literature

Obi Obada and Abu (2010) estimated the link between insurance and other key macroeconomic varieties in Nigeria using ordinary least square Regression model. They observed that the interest rate is statistically and economically significant in explaining exchange rate. They argue that interest rate has a link with exchange rate and suggested that policy should be created to ensure that exchange rate stability should also try capture interest rate.

Dada and Oyeranti (2012) studied the link between broad money supply and insurance sector development in Nigeria using cointegration model .Result shows that M2 variability causes a positive reaction to insurance variable and also cointegrates at both in the short run and long run equilibrium. They conclude that transparent policies that will pave way for stability of exchange rate is better option for insurance acculturation in Nigeria

Azeez, Kolapo and Ajayi (2012) examined the effect of Insurance business on macroeconomic performance of Nigeria from 1986 – 2010. Using ordinary least square regression model. The model used real GDP as dependent variable while Insurance business, exchange rate, balance of payment and oil revenue was used as independent variable Result reveals that oil revenue and BOP exert a negative effect on insurance activities in Nigeria while exchange rate variability and Real GDP in Nigeria contributes positively to insurance business in long run. They recommended that monetary authorities should pursue policies that would curb inflation and ensure stability of exchange rate.

Mudakiet (2012) studied the extent to which operational factors affect the performance of insurance firms in Jordan. The study adopted a descriptive census survey design and a sample 40 registered insurance company. The study collected data using questionnaire and the data collected was analyzed using descriptive statistics and inferential statistic. Using regression analysis the study found that operational factors have positive and significant impact with organizational performance.

Njau (2013) investigated the effect of selected macroeconomic variable on the financial performance of private equity firms in Kenya from 2005 to 2012. Using multiple linear regressions. The study established that the financial performance of private firms in Kenya was heavily influenced by the selected macro-economic variable with GDP having the largest influence and systematic risk having the least impact. The study also established positive correlation between the dependent and independent variable where gross domestic product, inflation and bank lending interest were found to have the greatest positive effect on private equity firms financial performance while exchange rate of the dollar against the Kenya shilling showed a negative relationship albeit to a small extent.

Gatsi and Gadzo (2013) examined the effects of macroeconomic variable and firm level characteristics on the performance of insurance companies in Ghana from 2005 to 2011. Using the panel least square regression the study findings established that leverage, tangibility, liquidity, risk and premium growth from the firm level characteristic as well as inflation from the macro-economic factors were significant determinants of performance, thus forming the major factors that influence financial performance of insurance companies



in Ghana. The study also found that the performance of insurance firms had a statistically insignificant relation with firms' size age, GDP and exchange.

Muiruri and Bosire (2015) investigated the determinants of capital structure decision of listed insurance company. The study carried out a census of the six listed insurance firms in Kenya and collected data from a sample of 50 respondent using questionnaires. Using descriptive statistics and inferential statistics, the study concluded that profitability was the main determinant of capital of capital structure decision in listed insurance companies followed by the size of the firm. The study recommended that listed insurance companies should expand their project, new product lines and acquisitions of other firms.

Kaya (2015) investigated the firm-specific factors affecting the profitability of non-life insurance companies operating in Turkey. The study used secondary data of 24 non-life insurance profitability in terms of technical profitability ratio and sales profitability ratio. The findings of the study established that the firms specific factors affecting the profitability of Turkish non-life insurance companies are the size of the company, age of the company, loss ratio, current ratio and premium growth rate.

Simiyu and Ngile (2015) examined the effect of macro-economic variables on financial profitability of listed commercial banks in the Nairobi Securities Exchange from 2001 to 2012. Using panel data analysis and the fixed effects model the study established that real GDP growth rate had positive but insignificant effect to profitability of commercial banks. The study also found that real interest rates had a significant negative influence on profitability of listed commercial banks in Kenya. Finally, the study found that exchange rates had a positive significant effect on the profitability of listed commercial banks on Nairobi Security Exchange and variables on financial performance of deposit taking microfinance institution in Kenya.

Gap to Knowledge

Looking at the empirical reviews above, some of the review differs by location; all seem to center on the impact of econometric variables on financial performance of financial institutions. None of the literatures worked on the response of some selected macro-Economic variables on the Financial Performance of Insurance Companies in Nigeria. Hence, we want to fill the gap so as to contribute to knowledge

III. Data and Model Specification

The study adopted the *ex-post facto* and analytical research design. The data is of secondary nature represented by annualized time series drawn from the Central Bank of Nigeria Statistical Bulletin covering the period under study. It used a combination of descriptive statistics and regression, and Philip and Peron (PP) test used for unit root test. Also diagnostic tests were carried out on the regression model to ensure that the key assumptions underlying the Classical Linear Regression Model (CLRM) were not violated.

Model Specification: The study adopts the Engel Granger Two ways Based Approach to model shocks and Dynamics of Macroeconomic variables on the financial performance of insurance companies in Nigeria for the period under study. The proxy used for Insurance performance is the annual income of insurance companies in Nigeria while Macroeconomic variables is proxied by four key variables namely money supply (M2), credit to private sector (CPS), Exchange rate and gross domestic product.

The Engel Granger Two ways Based Approach involves the following steps: The first step involves determining whether the datasets contain unit roots in the individual level series and that they are integrated of the same order; that is, they require the same number of differencing to attain stationarity. Unit root tests are used to determine whether time series exhibit mean-reverting behaviour. If sets of time series, such as GDP and CPS, are 1(1)



variable, then cointegration techniques can be used to model their long-run relationship. Philip and Peron (1988) test is used to examine the order of integration.

The null hypothesis is that Y_t contains unit root, which implies that $\alpha_1 = 1$, against the alternative that the series does not contain unit root, which implies that $\alpha_1 < 1$. The Philip-Peron test is preferred because it incorporates an automatic correction to the ADF test procedure to allow for auto correlated residuals (Brooks, 2008). If the computed absolute value of the coefficient of α_1 is less than the PP critical tau values, reject the null hypothesis that $\alpha_1 = 1$, (in which case Y_t does not contain unit root) otherwise, accept the null hypothesis (in which case Y_t contains unit root).

Once the order of integration of the series are confirmed usually I(I), we estimate the long-run relationships, i.e., run regression on level series of the dataset following the Classical Linear Regression Model (CLRM) and save the regression residuals. The CLRM shall follow equation (2) as stated below:

$$FPIC = \beta_0 + \beta_1 CPS + \beta_2 M2 + \beta_3 REER + \dots Ut \dots \quad (2)$$

Where FPIC= Financial performance of insurance companies in Nigeria.

CPS = credit to private sector, M2 = money supply ,

GDP = Gross domestic product. REER = Real effective Exchange rate

IV. Data Analyses and Interpretation

4.1 Data Presentation The datasets for the empirical analyses of this study is presented in Table 1

TABLE 1: Macro Economic variables and financial performance of insurance companies

YEAR	FPIC	CPS	M2	REER
1981	66	8.57	14.47	0.61
1982	70	10.67	15.79	0.67
1983	15.3	11.67	17.69	0.72
1984	49.5	12.46	20.11	0.76
1985	8.4	13.07	22.3	0.89
1986	41.5	15.25	23.81	2.02
1987	149.3	21.08	27.57	4.02
1988	149.2	27.33	38.36	4.54
1989	124.4	30.4	45.9	7.4
1990	349.8	33.55	52.86	8.04
1991	376.4	41.35	75.4	9.91
1992	35.4	58.12	111.11	17.3
1993	-7.38	127.12	165.34	22.05
1994	10872.8	143.42	230.29	21.89
1995	9222.5	180	289.09	21.89
1996	7234.5	238.6	345.85	21.89
1997	10019.6	316.21	413.28	21.89
1998	10672.2	351.96	488.15	21.89
1999	4956.4	431.17	628.95	92.69
2000	8418	530.37	878.46	102.11
2001	12330.2	764.96	1269.32	111.94
2002	14087.9	930.49	1505.96	120.97
2003	27392.5	1096.54	1952.92	129.36
2004	29347.2	1421.66	2131.82	133.5

2005	37946	1838.39	2637.91	132.15
2006	39084.2	2290.62	3797.91	128.65
2007	80246.1	3680.09	5127.4	125.83
2008	119793.4	6941.38	8008.2	118.56
2009	127991.3	9147.42	9411.11	148.88
2010	146560.6	10157.02	11034.94	150.3
2011	173548.1	10660.07	12172.49	153.8
2012	173548.1	14649.28	13895.39	111.39
2013	173548.1	15751.84	15160.29	118.82
2014	173548.1	17128.98	17680.52	127.1
2015	173548.1	18657.69	19037.48	126.07
2016	173548.1	19023.41	19878.45	130.02

Source: Central Bank of Nigeria Statistical Bulletin 2016

Where, FPIC=Financial Performance of Insurance companies in Nigeria, CPS = Credit to Private Sector, M2 = Broad Money Supply, REER= Real effective exchange rate.

4.2 Basic Descriptive Statistics of FPIC and M E Indicators

	CPS	FPIC	M2	REER
Mean	3901.777	49419.12	4237.651	69.38943
Median	431.1700	10672.20	628.9500	92.69000
Maximum	19023.41	173548.1	19878.45	153.8000
Minimum	8.570000	-7.380000	14.47000	0.610000
Std. Dev.	6206.226	68448.52	6298.763	60.14043
Skewness	1.433328	1.039518	1.356853	0.012180
Kurtosis	3.510640	2.309661	3.381843	1.168513
Jarque-Bera	12.36444	6.998487	10.95210	4.892616
Probability	0.002066	0.030220	0.004186	0.086613
Sum	136562.2	1729669.	148317.8	2428.630
Sum Sq. Dev.	1.31E+09	1.59E+11	1.35E+09	122973.6
Observations	35	35	35	35

Source: Eviews 7 Computation by the Authors

Table 2 contains the basic measures of central tendency, spread and variations calculated on the level series of the dataset. Of particular interest is the Jacque-Bera (JB) statistics which is a test for normality distribution of the variable are above 3. It is a combined test of skewness(S) of zero (0) and a kurtosis (K) of three (3), which are signs of a mesokurtic distribution. In this case, however, the JB statistics shows that the variables are positively skewed and leptokurtic. The assumption of normality is rejected by the JB statistics, as well as the K and S figures. This, however, does not affect the goodness of the data for the estimation in this study as the kurtosis of all the variables and the skewness are normally distributed. which is consistent with the properties of most financial time series Also, the probability values of the variables are significant (Brooks, 2008).

4.3 Tests for Stationarity

Table 3: Unit Root Tests for all the Variables using Philip Peron Stat Order of Integration

Variables	PPSTAT	CR@5%	Prob.V	INT	REMARK
FPIC	-3.4370	-2.9511	0.0164	I(1)	stationary
CPS	-3.1602	-2.9511	0.0314	I(1)	stationary
M2	-3.5652	-3.5084	0.0045	I(1)	stationary
REER	-5.5872	-3.5485	0.0003	1(1)	stationary

Source: Own computation (2017)

Table 2 shows the results of the Philip-Peron Unit Root Tests of all the variables. The results are found to be integrated of the same order. At first difference, the p-values are found to be less than 5% which is the level of significance, and the Philip-Peron statistics are found to be more negative than the critical values. This is a precondition for the Engle and Granger residual based approach for cointegration tests. Having confirmed that the variables are integrated of the same order, the next step will be to run a cointegrating regression using all the variables on level series.

4.4 Tests for Cointegration

Table 4: The Cointegrating Regression

Dependent Variable: FPIC

Method: Least Squares

Date: 04/13/18 Time: 04:33

Sample (adjusted): 1982 2016

Included observations: 34 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	425.8324	2268.991	0.187675	0.8524
CPS	-17.08139	4.265394	-4.004645	0.0004
M2	14.54873	3.874531	3.754965	0.0008
REER	-37.45868	48.32586	-0.775127	0.4445
FPIC(-1)	1.274373	0.147675	8.629577	0.0000
R-squared	0.987274	Mean dependent var	50870.69	
Adjusted R-squared	0.985519	S.D. dependent var	68928.91	
S.E. of regression	8294.658	Akaike info criterion	21.01966	
Sum squared resid	2.00E+09	Schwarz criterion	21.24413	
Log likelihood	-352.3343	Hannan-Quinn criter.	21.09621	
F-statistic	562.4678	Durbin-Watson stat	1.903294	
Prob(F-statistic)	0.000000			

Source: Eviews 7 Computation by the Authors

Table 4 contains the regression of all the variables at levels having confirmed that they are integrated of the same order. The real test for a cointegrating relationship is based on the unit root test results of the residual of the regression in Table 4. The result is presented in table 5

Table 5: Residual Based Unit Root Test ($\Delta u_t = \alpha u_{t-1} + \epsilon_t$)

Variables	PPSTAT	CR@5%	Prob.V	INT	REMARK
ECT	-5.2036	-1.9517	0.0000	I(1)	stationary**

Source: Eviews 7 Computation by the Authors

Lag length on ADF chosen by Akaike Criterion. **indicates significance at 5% level of significance and * indicates significance at 5% level.

It is clear from the results that we cannot reject cointegration (i.e. long-run relation) between FPIC and Micro economic variables in Nigeria.. From the residual-based unit root test

performed on the residuals and presented in Table 5, it can be seen that the test statistic is more negative than the 5% critical tau (τ) value. Since the computed τ value is less than the conventional critical tau values, we reject the null hypothesis of no cointegration in favour of the alternative. This result, therefore, indicates evidence of long-term relationship between FPIC and Micro economic variables in Nigeria. The speed of this pre-shock adjustment will however depend on error correction mechanism.

4.5 Estimating the Error Correction Mechanism (ECM)

Table 6: Error Correction Model

Dependent Variable: FPIC

Method: Least Squares

ADate: 04/13/18 Time: 21:28

Sample (adjusted): 1982 2016

Included observations: 33 after adjustments

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-1066.077	2158.891	-0.493808	0.6253
CPS	-12.55931	3.734808	-3.362772	0.0022
M2	21.70430	3.824368	5.675265	0.0000
REER	94.45782	40.74875	2.318054	0.0280
ECT(-1)	-0.105505	0.115955	9.533953	0.0000
R-squared	0.989179	Mean dependent var	52192.99	
Adjusted R-squared	0.987634	S.D. dependent var	69558.34	
S.E. of regression	7735.185	Akaike info criterion	20.88367	
Sum squared resid	1.68E+09	Schwarz criterion	21.11042	
Log likelihood	-339.5806	Hannan-Quinn criter.	20.95997	
F-statistic	639.9146	Durbin-Watson stat	2.483930	

Source: Eviews 7 Computation by the Authors

Table 6 presents the results of the ECM. The model of the ECM is of the form of equation 3 and the estimates of the short-run and long-run movements, as well as the error correction term, which proxies speed of adjustment, are provided in Table 5. The Table also shows useful long-run information. The equilibrium adjustment coefficient (-0.105505) enters with a correct sign (negative). This suggests that FPIC and Macro economic variables series in Nigeria converge to long-run equilibrium; deviations from this equilibrium relation as a result of shocks will be corrected over time. It can also be observed that the coefficient of the ECT(-1) tends to half, indicating that the speed of adjustment to equilibrium is slow. It follows that about 90% of the deviation from equilibrium path is corrected per annum. The ECM results, therefore, confirm the long-run relationship between FPIC and Macro economic variables series in Nigeria as observed from the residuals of equation 2.

V. Conclusion

This paper analyses the relationship between FPIC and Macro economic variables series in Nigeria. The economic motivation being the desire to find out the extent to which Macro economic variables impacts on the financial performance of Insurance companies in Nigeria. A review of empirical and theoretical basis for the work was done. The research methodology concentrated on the use of the Engel and Engle-Granger two steps cointegration method.

The analyses of residuals from our cointegrating regression indicate evidence of cointegration between Macro economic variables and the financial performance of Insurance companies in Nigeria. Similarly, estimates from the error correction model provide evidence to show that Macro economic variables and the financial performance of Insurance companies' series converge to a long run co integrating equilibrium at a reasonably slow rate. The ECM results



also show that short-run changes in Macro economic variables in Nigeria have a positive and statistically significant impact on short-run changes in the financial performance of Insurance companies in Nigeria.

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