An Empirical Analysis of the Determinants of Capital Adequacy in the Insurance Sub-sector of the Nigerian Economy

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Abstract
The paper examines the impact of capital adequacy in the Insurance sub-sector and the growth of the Nigeria economy. It specifically seeks to ascertain the effect of insurance companies' capital base and macroeconomic variables on the economy. Data used for the study were extracted from the Central Bank of Nigeria's statistical Bulletin (2009). It employed the error correction framework and co-integration techniques to test the relationship between the insurance capital base and macroeconomics variables, also the adopted Granger causality test. Results reveal that political stability may reduce financial distress and bankruptcy while the total investment for the industry will affect insurance companies' capital in most developing economies in the period of financial crisis. However, the study also establishes that there is a negative relationship between inflation and insurance companies' capital base. The results suggest that the Nigerian government should regulate investment policy while insurance companies' regulators should strive to keep inflation at a minimum level, if possible below 5% for them to be more efficient to be globally competitive.

Keywords: Capital adequacy, Macroeconomics Variables, insurance premium

1.0 Introduction

The concept of insurance from the legal, economic and social viewpoints tends to bring out the function and purpose from those viewpoints. For instance, a lawyer sees insurance strictly as a contract embodied in an insurance policy document. An economist sees it as a device for transferring economic risks from the insured to the insurer for a periodic payment of premium, while a social scientist sees insurance as a device, which provides financial assistance or compensation to a group of people in case of misfortunes. Each conception involves an element of risk and a reinstatement to the original position occupied before the loss (Osipitan, 2008).

It is common knowledge, that the Nigerian Insurance Industry is regulated by different substantive laws, regulations and policy guidelines. These laws and regulations are applicable to not only persons carrying on insurance business but also consumers of insurance products legally covered under the insurance policies.

As a result of the signing into law of the insurance reform Act of 2003, a new capital base was initiated for the insurance and reinsurance companies. Under this law, life insurance companies were required to capitalize with ₦150 million, general business insurance companies with N200 million, composite insurance and reinsurance companies with N350 million each. This was the recapitalization regime for insurance and reinsurance companies until September 2005 when the federal government lifted insurance capital base to the billion Naira status following a successful experience in the banking industry. Life insurance, general insurance, business and reinsurance companies were mandated to recapitalize to the levels of N2 billion, N3 billion and N10 billion respectively. (Chiejina, 2006)

The National Insurance Commission (NAICOM) had 18 months to actualize this. Comparing these figures with those of 1997 and 2003, one cannot help but marvel at the geometric proportional increase. However, NAICOM and the operators in the insurance industry were in agreement on the recapitalization trend and determined to have it actualized. These recapitalization exercises helped to put the Nigerian insurance industry ahead of other countries in Africa. For instance with the 350 million naira capital base in 2003, the Nigerian Insurance Industry was better capitalized than the South African Insurance Industry by as much as 64.4% in US dollar equivalent. (Chiejina, 2006)

The main objective of these recapitalization exercises was to increase the strength and stability of the Nigerian insurance industry in order for it to compete more favourably in the global insurance and financial services markets. Aside from the competition thrown up by globalization, there is a continuous need for growth and expansion in every sector of the local economy.

The Nigerian Insurance Industry has evolved over the past decades following the new capitalization policy for companies operating in the industry. With the conclusion of the consolidation exercise, the number of players dropped from 103 to 49. Activities in the sector have increased noticeably with enhanced public awareness of the sector and its operations, rapid expansion and strategic business acquisitions, improved visibility and strict supervisory regulation. (Ojumah, 2007)

As at August 2005, prior to the announcement of the recapitalization directives, there were 22 insurance companies with a market capitalization of N28.95 billion listed on the Nigerian Stock Exchange. Now there are 26 active companies with a market capitalization of N683.1 billion, a 2,260% growth over three years, with quite a few still expected to be listed. (Obasi, 2007)

The insurance sector is a very key part of the financial sector. In developed markets, the insurance sector accounts for a significant portion of the total economy. In collecting relatively small premiums from many individuals in the economy, insurers are able to accumulate a large pool of funds that could be invested for short- or long-term periods. Insurance businesses are split mainly into Non-life and Life, with Non-life insurance representing short-term funds and Life insurance representing long-term funds. As so many insurers could serve as a means of long-term financing, the sector is therefore important for sustained economic growth and development

A recent experience of some of the recapitalized and consolidated banks poses some questions on the effect of recapitalization on the performances of business organizations. The insurance industry has undergone two rounds of recapitalization and consolidation within the past 6-7 years; and the effect of this recapitalization on the performance of the industry needs some clarifications. For instance, before the mandatory recapitalization/consolidation, the insurance industry was confronted with many challenges.

These challenges were mostly responsible for the sector's inability to attract and retain sufficient businesses both locally and internationally. They also affected its inability to retain a significant proportion of risks emanating from assets domiciled in Nigeria. Insurance premium flight was a key challenge for the sector, as the underwriting capacity of the existing companies was low. The industry at that time had 103 insurance companies — mostly poorly capitalized. Now that the industry has recapitalized, we need to know to what extent it is able to improve its performance based on the extra strength and capital vigour. (Egeme, 2006)

2.0 Theoretical Frameworks

Historical Development of Insurance in Nigeria

The Royal Exchange Assurance Ltd was the first insurance company to have a full office in Nigeria in 1921. It remained the only company with a full branch until 1949. In 1949, other insurance companies, namely, Norwich Union Fire Insurance Society, Tabacco Insurance Company Ltd and Legal and General Assurance Society Ltd were established. By 1987, there were 95 registered insurance companies in Nigeria.

Although the early insurance companies satisfied the requirements of incorporation under the 1922 Company's Ordinance, it was not until 1961 that the first regulatory framework was provided for the insurance industry through the Insurance Act of 1961. The Insurance Act 1961 therefore qualifies as the first legislative effort aimed at regulating the insurance industry. The period 1921-1961 was an era of laissez-faire in the Nigerian insurance industry as there was hardly any regulation governing the

industry. The pre-1961 arrangement gave "rise to the feeling among Nigerians that insurance was less complex and less demanding and could be much more easily run than banking" (Osipitan, 2008).

The policy of successive governments had been to allow insurance companies almost complete freedom of action within the provisions of the ordinary commercial laws of the land. With the establishment of more insurance companies, there was an upsurge in the scope of insurance businesses. Currently, the scope of insurance business include life, health, property, public liability, marine, motor, fidelity, goods in transit, aviation, oil and gas. The growth in the number of insurance companies and in the volume of businesses underwritten by insurers brought about complicated problems especially in areas of claims thereby necessitating regulation of the industry and insurance business. The special nature of insurance contracts justifies regulation of insurance business if the legitimate expectations of consumers of insurance policies are not to be defeated by sharp practices of some insurance companies, brokers, agents, and other intermediaries. (Egeme, 2006)

Evolution of Capital Requirements in the Insurance Sector

The sector has undergone two rounds of recapitalization over the past 6 years; and this trend in our opinion, is additional proof that the insurance industry is closely linked to the general economic growth over the same period. The sector has had to increase capacity to draw level with economic development and expectations. Even with this, there were clear indications that the new capitalization levels were inadequate at each point. Industry statistics reveal that insurance companies lose the opportunity of earning N70 billion in premiums annually from the oil and gas sector as a result of premium flight.

Many companies, especially multinational ones, have resorted to insuring their assets overseas, as the capital base of the local insurance companies is inadequate to carry the risks of insuring their assets. The first of the two rounds of recapitalization occurred in 2003, where in line with the passing of the 2003 Insurance Act, insurance companies were required to increase their capital bases from N20 million to N150 million for Life businesses, N70 million to N300 million for Non-Life businesses, and N150 million to N350 million for Reinsurance businesses. There were 117 insurance companies before the recapitalization in December 2002. Fourteen of them did not meet the recapitalization requirement and were liquidated.

In September 2005, the new capitalization requirement was announced, increasing the capital base to N2 billion for Life Insurance businesses, N3 billion for Non-Life insurance businesses and N10 billion for Reinsurance businesses. Following the completion of the 2005/6 recapitalization exercise, which also involved quite a number of consolidations, the number of insurance companies dropped from 103 to 49. (Yemi, 2009).

Pre-Recapitalization/Consolidation

Before the regulatory induced recapitalization/consolidation, the insurance industry was confronted with many challenges. These challenges were mostly responsible for the sector's inability to attract sufficient businesses both locally and internationally. It also affected its ability to retain a significant proportion of risk emanating from assets domiciled in Nigeria. Insurance premium flight was a key challenge for the sector, as the underwriting capacity of the existing companies was low. The industry at that time had 103 Insurance companies, 4 Reinsurers, 527 Brokers and 28 Loss Adjusting companies. The industry at this point in time was characterized by the following: under-capitalization of existing industry players, dearth of appropriate human capital and professional skills, poor returns on capital, existence of too many fringe players, etc

These factors proved significant in restricting the companies from achieving any potential development. In 2006, Nigeria's total premiums as a percent of world premiums was put at 0.82% (Source: HA, 2006), as World premiums totaled $3.72 trillion (N446.4 trillion) for that year, a pale comparison to other emerging markets such as South Africa, India and Brazil, which contributed 1.09%, 1.16% and 0.82% respectively. The United States had the largest contribution with 31.43%. Total premiums for Nigeria in 2001 were N33.I billion ($283.7 million), and have grown to an estimated N82.3 billion ($705.4 million) as at 2006 representing a 20% AAGR over the past six years. (Uranta, 2005)

3.0 Model Specifications

This applies to the error correction methodology to a regression model based on the traditional determinants of capital adequacy in the insurance sub-sector of the Nigeria economy distilled from the literature. The idea is to subject the variables to a stationary test and subsequently remove the non-stationary trends by differencing before regressing. This removes the possibility of the so-called spurious regression. Any previous studies on the determinants of capital adequacy in the insurance sub-sector of the Nigeria economy if there exist any in Nigeria may not have considered the problem of unit roots in the determinants of capital adequacy and macroeconomics variables. As a result, the econometric methodology used in those studies did not account for non-stationarity in the data. The analysis here is primarily based on Engle (1982). The idea is to determine the order of integration of the variables, that is, we test whether they are stationary in their levels or whether they have to be differenced once or more before they become stationary. Testing for unit roots is carried out by using an Augmented Dickey-Fuller (ADF) test.

In order to account for the determinants of capital adequacy in the insurance sub-sector of the Nigeria economy, the model for the study is hereby specified as follows:

CAB =f (PLI, NLIP, DIR, INFL, TII, POL, ER, OPEN,).

The above model is hereby written in log-linear form as:

(L) $CAB = b_o + b_1PLI(L) + b_2NLIP(L) + b_3DIR(L) + b_4INFL(L) + b_5TII(L) + b_6POL(L) + b_7ER(L) + b_8OPEN(L) + \mu_t$ .....E(1)

apriori, $b_1 > 0$, $b_2 > 0$, $b_3 > 0$, $b_4 < 0$, $b_5 > 0$, $b_6 < 0$, $b_7 > 0$, $b_8 > 0$, $b_9 > 0$, $b_{10} > 0$

Where:

* CAB	=	capital adequacy base
PLI	=	premium of all the life insurance companies
NLIP	=	all non-life insurance company premium
DIR	=	domestic interest rate (real)
INFL	=	inflation rate
TII	=	total investment for the industry
POL	=	political instability dummy = 1 military regime and turbulent years, 0 otherwise
ER	=	exchange rate
OPEN	=	openness of the economy (total trade /gdp ratio)
Ut	=	Error term

Capital adequacy being the dependent variable is the total asset of insurance companies deflated by total number of capitalized insurance companies operating in the economy. The independent variables include the premium of all the life insurance companies and all non-life insurance company premium, while other variables are domestic interest rate, inflation, total investment for the industry, political instability, exchange rate, openness of the economy and error term, which captures other variables not included in the model and takes care of other factors that cannot be observed or computed due to lack of data. U_t is referred to as error term, residual or stochastic term.

The Data Analysis technique consists of an approach designed to capture the long-run relationship between the dependent and independent variables, while avoiding spurious influences. This is the co-integration and error correction techniques, which have received prominent attention in the literature (see Adam, 1992, and Thomas 1993).

The aim of the new framework was to ascertain the time characteristics of data, overcome the problems of spurious correlation often associated with non-stationary time series data, and generate a long-run variable relationship simultaneously. Within this dispensation, an important starting point for research is to assess the degree of integration of the relevant variables and to check whether they are co-integrated or not. It should be noted that an important issue in econometrics is the need to integrate short-run dynamics with long-run equilibrium. The analysis of short-run dynamics is often done by first eliminating trends in the variables, usually by differencing. The theory of co-integration (Engle, 1982) addressed this issue of integrating short-run dynamics with long-run equilibrium.

Similarly, it is important to note that the usual starting point of ECM modeling is to assess the order of integration of both the dependent and independent variables in the model. The order of integration ascertains the number of times a variable will be differentiated to arrive at stationary. Dickey-uller (DF), Augmented Dickey-Fuller (ADF) and Sargan-Rhargava Durban-Watson (SRDW) are the widely used test for stationary for both individual time series and residual from OLS regressions. Co-integration is based on the properties of the residuals from regression analysis when the series are individually non-stationary.

The original co integration regression is specified as follows:

$$A_t = \alpha_0 + \alpha_1\beta_t + \lambda_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\text{E (2)}$$

Where A represents the dependent variables, β stands for the independent variable, and λe is the random error term. α_0 and α_1 are intercept and slope coefficients respectively. To include the possibility of bi-directional causality, the reverse specification of equation 1 is considered.

To provide a more defensive answer to the non-stationarity in each time series, the Dickey-Fuller (1979) regression is estimated as follows for a unit root:

$$\Delta e_t = -\lambda e_{t-1} + w_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\text{E(3)}$$

If X Equ0als zero e is non-stationary. As a result, A and B are not co-integrated. In other words, if X is significantly different from zero A and B is found integrated individually.

Given the inherent weakness of the root test to distinguish between the null and the alternative hypothesis, it is desirable that the Augmented Dickey-Fuller (ADF) (1981) test be applied. The desirability is warranted because it corrects for any serial correlation by incorporating logged changes of the residuals. To be co-integrated, both A and B must have the same order of integration (Eagle and Granger, 1987 and Granger, 1986).

The ADF regression is specified as follows:

$$\Delta\lambda_t = \beta_o\lambda_{t-1} + \sum_{j=i}^{m}\beta_j\Delta\lambda_{t-1} + \mu_t \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\text{E (4)}$$

Where Δ is the first different operator and μ_t is the new random error term. M is the optimum number of lags needed to obtain "white noise". This is approximated when the DW value approaches 2.0 numerically. The null hypothesis of non co-integration is rejected, if the estimated ADF statistics is found to be larger than its critical value at 1 or 5 or 10 per cent level of significance.

If A_t and B_t are found to be co-integrated, then there must exist an associated error-correlation Model (ECM), according to Engle and Granger (1987). The usual ECM may take the following form:

$$\Delta G_t = \sigma_o\, e_{t-1} + \sum_{j=1}^{T}\sigma_1\,\Delta A_{t-j} + \sum_{j=1}^{T}\theta_j\,\Delta B_{t-j} + V_t \ldots\ldots\ldots\ldots\text{E(5)}$$

Where Δ denotes the different operator e_{t-1} is the error correction term, T is the number of lags necessary to obtain white noise and V_t is another random disturbance term. If $\sigma_o\, e_{t-1}$ is significantly different from zero, then A and B have a long-Run relationship. The error-correction term (e_{t-1}) depicts the extent of disequilibrium between A and B. The ECM reveals further that the change in A_t not only depends on lagged changes in B_t, but also on its own lagged changes. It is appealing due to its ability to induce flexibility by combining the short-run and long-run dynamics in a unified system. Also, the estimates of the parameters of the ECM are generally consistent and efficient (Ilendry and Richard, 1983).

4.0 Empirical Results and Interpretation

Table 1: Descriptive Statistics

	Mean	Median	Maximum	Minimum	Std. Dev.	Skewness	Kurtosis	Jarque-Bera
CAB	**30184.24**	**12569.69**	**160143.8**	**214.3328**	**43706.37**	**1.909408**	**5.625268**	**27.73903**

PLI	**257401.1**	**105465.0**	**1651685**	1322.530	391133.2	1.992238	6.579423	37.05573
NLIP	26922141	11091331	1.09E+08	179569.0	36500268	1.276263	3.191150	8.462903
DIR	12.41710	13.06000	23.24000	5.560000	4.056191	0.562145	3.414267	1.854372
INFL	21.86710	14.32000	76.76000	0.220000	19.67447	1.350027	3.751741	10.14657
TII	3495668.	461112.2	19841575	12379.46	4565690	1.736716	6.441869	30.88530
POL	0.516129	1.000000	1.000000	0.000000	0.508001	0.064550	1.004167	5.166689
ER	54.28161	21.89000	149.1100	0.600000	58.06474	0.507263	1.430581	4.510940
OPEN	0.556290	0.584000	0.882000	0.207000	0.170566	0.305387	2.464102	0.852800

Source: Authors' computation (2012)

Table 1 provides descriptive statistics of all the variables used in the study. Most of the variables have high means and also high standard deviation, which suggest more imbedded risk. The skewness and the kurtosis revealed that the data are not normally distributed

Table 2: Stationary Test

Variables	**ADF Test**	**Order of Integration**
CAB	0.04925 (-29969)	1(1)
Log CAB	-3.7333 (-3.0114)	1(0)
PLI	-3.6876 (-2.9798)	1(0)
Log PLI	-2.0299 (-2.9798)	1(1)
NLIP	-3.5063 (-2.9850)	1(0)
Log NLIP	-4.2833 (-2.9798)	1 (0)
DIR	-3.3697 (-2.9798)	1 (0)
Log DIR	-1.3068 (-2.9969)	1(1)
INFL	-40706 (-3.0038)	1 (0)
Log INF	0.8224 (-2.9798)	1(1)
TII	-4.1436 (-2.9850)	1(1)
Log TII	-1.1022(-2.9798)	1(0)
POL	-3.0994 (-2.9850)	1(0)
Log POL	-3.0994 (-2.9850)	1(0)
ER	-1.3168 (-2.9969)	1(1)
log ER	-3.3697 (-2.9798)	1 (0)
OPEN	-3.0994 (-2.9850)	1(0)
Log OPEN	-4.0994 (-2.8851)	1(0)

Source: Authors' computation (2012)

Table 3: Johansen Co-integration Test Results

Sample: 1980 – 2010 **Series: Log CAB, Log ER, Log INFL, Log OPEN, Log NLIP**				
Eigen value	Likelihood Ratio	5%	1%	Hypothesized
		Critical	Critical	No. of CE(s)
		Value	Value	
0.84	114.3228	94.15	103.18	None**

Note:* (**) (denotes rejection of the hypothesis at 5% (1%) significance level.
L. R. test indicates 2 co-integration equation(s) at 5% significance level.
Lags interval: 1 to l

Source: Authors' computation (2012)

Table 4: Long-run Capital Adequacy Determinants Model Estimates:

Modeling Log (CAB) by OLS Sample: 1980 – 2010		
Variable	**Co-efficient**	**t-value**
Log ER	0.6772	3.4397***
Log INFL	-0.1325	-1.2558
Log OPEN	0.2896	5.1303
Log NLIP	0.6427	30.9551***

Notes: Adj. R^2 = 0.72 F = 21.327 a= 0.45
R^2 = 0.85 Prob (F--Statistic) = 0.00000 Dw = 1.87Schwarz information criterion 1.561 * Significant at 1% Level ** Significant at 5% Level *** Significant at 10% Level a = S. E. of regression

Source: Authors' computation (2012)

Table 5: Short-run over — parameterized Capital Adequacy Determinants Model, Model Estimates Log (CAB) by OLS Sample: 1980— 2008

Model	**Log (CAB) by OLS**	**Sample: 1980— 2010**
Variables	Co-efficient	t-value
Constant	1.2840	2.6798
Δ LogCAD(-1)	-0.5866	-3.9531***
Δ LogINFL	-0.2160	-0.8619
Δ LogINFL(-1)	0.1434	0.7085
Δ LogER	0.9177	3.5113***
Δ Log ER (-1)	0.5939	0.7142
Δ DIR	-0.0096	-0.8264
Δ DIR(-1)	-0.0175	-1.5620
Δ LogTII	-0.3253	-1.0929
Δ LogTII(-l)	0.6758	1.8781
Δ Log OPEN	-0.1542	-0.5330
Δ Log OPEN (-1)	-0.1861	-0.6258
Δ Log NLIP	-0.7079	-0.9319
Δ Log NLIP (-1)	3.7842	4.2348***
POL	-0.0933	-0.5043
TL	-0.3155	1.1369
ECM(-1)	-0.5414	2.4385**

Notes: R^2 = 0.97 F=10.61 a=0.215 Adj R^2 = 0.88 Prob (F — Statistic) = 0.007975 DW= 146 Schwarz information criterion = 0.7 13
Source: Authors' computation (2012)

Table 6: Short-run Parsimonious Model Estimates

Modelling Log (CAB) by OLS Sample: 1980 – 2010		
Variables	**Co-efficient**	**t-value**
Constant	1.648	3.9047
Log CAD (-1)	-0.6818	-3.816***
Log INFL	0.0265	0.357
Log ER	0.8227	3.1236***
Log DIR (-1)	-0.0193	-5.0554***
Log TII	-0.1811	-0.5548
Log OPEN (-1)	-0.2630	-1.3896**
Log NLIP (-1)	2.7025	3.3876***
POL	-0.2672	-1.4278
PLI	0.44711	2.2388**
Log ER	0.3498	3.5534***
ECM (-1)	-10.5611	-2.9942***

Notes:R^2 = 0.92 F = 10.09 a = 0.26
*** Significant at 1% Adj R^2:0.83 Prob (F-statistic) = 0.000277
** Significant at 5% DW=2.08 Schwarz information criterion = 1.10
* Significant at 10%

Source: Authors' computation (2012)

It was discovered through this study that there were long-run relationships between Exchange rate, Inflation rate, Political Instability, and All non-life insurance companies premium. Also, the variables employed in this study were all stationary at their first difference, except real domestic interest rate and total investment, which were stationary at their levels. There are some major findings that this study has revealed.

Table 7:Pairwise Granger Causality Tests
Sample: 1980 – 2010
Lags: 2

Null Hypothesis:	Obs	F-Statistic	Probability
PLI does not Granger Cause CAB	29	33.1758	1.2E-07
CAB does not Granger Cause PLI		38.0368	3.6E-08
NLIP does not Granger Cause CAB	29	0.60514	0.55412
CAB does not Granger Cause NLIP		1.16338	0.32943
DIR does not Granger Cause CAB	29	1.63271	0.21637
CAB does not Granger Cause DIR		1.11351	0.34478
INFL does not Granger Cause CAB	29	1.01912	0.37601
CAB does not Granger Cause INFL		8.72914	0.00142
TII does not Granger Cause CAB	29	17.6612	1.9E-05
CAB does not Granger Cause TII		13.9365	9.6E-05
POL does not Granger Cause CAB	29	1.39374	0.26752
CAB does not Granger Cause POL		0.82845	0.44883
ER does not Granger Cause CAB	29	0.80261	0.45983
CAB does not Granger Cause ER		0.60194	0.55581
OPEN does not Granger Cause CAB	29	2.09418	0.14511
CAB does not Granger Cause OPEN		1.49958	0.24341
NLIP does not Granger Cause PLI	29	0.44484	0.64611
PLI does not Granger Cause NLIP		0.49147	0.61775
DIR does not Granger Cause PLI	29	1.75244	0.19481
PLI does not Granger Cause DIR		0.76103	0.47813
INFL does not Granger Cause PLI	29	6.41545	0.00586
PLI does not Granger Cause INFL		2.03755	0.15229
TII does not Granger Cause PLI	29	187.404	2.3E-15
PLI does not Granger Cause TII		0.20417	0.81672
POL does not Granger Cause PLI	29	0.85710	0.43698
PLI does not Granger Cause POL		1.10310	0.34809
ER does not Granger Cause PLI	29	0.53808	0.59075
PLI does not Granger Cause ER		0.72806	0.49320
OPEN does not Granger Cause PLI	29	4.49971	0.02190
PLI does not Granger Cause OPEN		0.52917	0.59581
DIR does not Granger Cause NLIP	29	0.66617	0.52292
NLIP does not Granger Cause DIR		0.04489	0.95619
INFL does not Granger Cause NLIP	29	0.54450	0.58713
NLIP does not Granger Cause INFL		0.84616	0.44146
TII does not Granger Cause NLIP	29	1.36444	0.27464
NLIP does not Granger Cause TII		2.13405	0.14027
POL does not Granger Cause NLIP	29	1.66953	0.20947

NLIP does not Granger Cause POL		1.62701	0.21745
ER does not Granger Cause NLIP	29	7.12333	0.00373
NLIP does not Granger Cause ER		0.20341	0.81733
OPEN does not Granger Cause NLIP	29	0.92375	0.41069
NLIP does not Granger Cause OPEN		1.13523	0.33800
INFL does not Granger Cause DIR	29	2.90210	0.07434
DIR does not Granger Cause INFL		4.08983	0.02962
TII does not Granger Cause DIR	29	1.87074	0.17578
DIR does not Granger Cause TII		2.12072	0.14187
POL does not Granger Cause DIR	29	0.15110	0.86058
DIR does not Granger Cause POL		0.02801	0.97241
ER does not Granger Cause DIR	29	0.07126	0.93141
DIR does not Granger Cause ER		0.65153	0.53022
OPEN does not Granger Cause DIR	29	0.65374	0.52911
DIR does not Granger Cause OPEN		4.80585	0.01757
TII does not Granger Cause INFL	29	3.41101	0.04968
INFL does not Granger Cause TII		2.88350	0.07546
POL does not Granger Cause INFL	29	1.07022	0.35874
INFL does not Granger Cause POL		0.54432	0.58723
ER does not Granger Cause INFL	29	1.03034	0.37214
INFL does not Granger Cause ER		0.74503	0.48538
OPEN does not Granger Cause INFL	29	0.12183	0.88585
INFL does not Granger Cause OPEN		0.92032	0.41200
POL does not Granger Cause TII	29	1.07515	0.35712
TII does not Granger Cause POL		3.10380	0.06326
ER does not Granger Cause TII	29	1.23352	0.30908
TII does not Granger Cause ER		1.27372	0.29803
OPEN does not Granger Cause TII	29	5.50449	0.01077
TII does not Granger Cause OPEN		0.26068	0.77268
ER does not Granger Cause POL	29	3.80103	0.03681
POL does not Granger Cause ER		0.27055	0.76526
OPEN does not Granger Cause POL	29	1.83495	0.18132
POL does not Granger Cause OPEN		0.35207	0.70681
OPEN does not Granger Cause ER	29	1.02385	0.37437
ER does not Granger Cause OPEN		0.69544	0.50863

Source: Authors' computation (2012)

Table 7 above showed the pair-wise granger causality test, which tests whether there is bi-directional, uni-directional or non-directional causality among the capital adequacy base and the macro-variables used in the study. The result reveals that there exist both bi- and uni-directional causality.

These findings include the following:

1. All non-life insurance companies premium is an important determinant of capital adequacy base in Nigeria. Its high coefficient and very strong level of significance even at one percent suggests that increase in premium leads to an increase in insurance capital base. The increase in CAB could also have a feedback effect on economic growth.
2. The real domestic interest rate is also an important determinant of insurance capital adequacy base in Nigeria, since it is statistically significant at one percent level of significance, although it is inversely related to CAB, which suggests that the rise in real cost of capital, informed by an increase in real interest rate, would tend to dampen CAB especially those requiring some degrees of domestic capital.
3. The real exchange rate is another significant determinant of CAB in Nigeria. Although the coefficient is not as expected, existing literature emphasized an inverse relationship

which implies that an increase in the real exchange rate will reduce the flow of foreign direct investment, thereby reducing CAB in Nigeria, and vice versa.

4. The inflation rate erodes CAB, but existing literature has shown that foreign Direct Investment has a negative impact in developing economies during periods of financial crises.
5. The total investment for the insurance industry is not correctly signed and is not statistically significant but may increase CAB via increase in all non-life insurance companies premium.
6. As can been seen, the coefficients that appear on the total investment for the insurance industry have theoretically predicted signs and in general are statistically significant. The result indicated that Investment increases CAB via inflow of foreign direct investments into Nigeria.
7. Lastly, the political dummy used as proxy for political instability was appropriately signed indicating that intermittent coups d'état and incessant political upheaval may serve to scare away potential foreign investors, thereby reducing CAB in Nigeria.

5.0 Conclusion

The aim of this empirical study is to investigate the determinants of capital adequacy patterns in the Banking sub-sector in Nigeria. The study applied the Error Correction Model (ECM) and found empirical support for some conjectures made in the literature. Given the importance of Capital adequacy in any economy and the likely economic effects on banks' capital on growth and development, it becomes expedient to examine how Capital adequacy in Nigeria can better be improved if attention is given to some macroeconomic variables.

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