Global Journal of Management and Business Research: C Finance
Volume 15 Issue 11 Version 1.0 Year 2015
Type: Double Blind Peer Reviewed International Research Journal
Publisher: Global Journals Inc. (USA)
Online ISSN: 2249-4588 & Print ISSN: 0975-5853

Effects of Life and Non-Life Insurance on Economic Growth in Nigeria: An Autoregressive Distributed Lag (ARDL) Approach

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GJMBR - C Classification : *JELCode : C11, G22, O11*

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I. Introduction

Life insurance is a contractual agreement between an insurer (insurance company) and the insured (insurance holder), that a specified amount will be paid to a beneficiary after the death of the insured consequent upon the payment of premium. Non-life or general insurance, on the other hand, deals with insurance of properties other than life where the benefit goes to the insurance holder. As a result of the different risks and benefits involved in the two insurance policies, their impacts on economic growth might be different. In the literature, many complementary effects of life and non-life insurance on economic growth have been identified such as (Webb, Grace, and Skipper, 2002; Arena, 2008; Azman-Saini and Smith, 2011).

The life and non-life insurance market have been different in Nigeria given the volume of premium they attract. For instance, in 1980, non-life premium was US$661 million while life premium was US$175 million. By 1990, non-life premium fell to US$199 million that of life premium was US$37 million. In the year 2000, they have both slightly increased. Non-life premium was US$199 million while life premium was US$43 million. By 2013, non-life has tremendously increased to US$1.4 billion while life premium has increased to US$457 million. Nigeria is chosen as a sample country in this paper for two reasons. The first reason is that Nigeria has now been ranked ahead country like South Africa as the largest economy in Africa given the recent rebasing of the economy with a GDP of US$522.638 billion (World Development Indicator, 2014). This also ranks Nigeria to be the 23rd largest economy in the world and to be ahead of countries like Poland, Norway, Belgium Austria and Denmark. Secondly, the insurance market, which is currently still very small, has significant room for expansion in the medium to long term. The recapitalization directive of a minimum of ₦5 billion (US$25 million) from ₦150 million (US$750 thousand) in 2005 has greatly improved the premium capacity of the insurance market in Nigeria (see Figure 1).

In the same vein, the real gross domestic product (GDP) growth rate has been increasing on the average of 5.9% from 2005. It reached 8.6% by 2010 and fell slightly to 6.2% in 2013 (International Monetary Fund, 2015). The Nigerian economy has been growing and the recent rebasing of her GDP suggests that significant contributions to growth are coming from other service sectors that were initially neglected in the previous calculation of the GDP. This development motives the investigation of the contributions of insurance sector to the Nigerian economy. This paper intends to verify whether life and non-life act as complements or substitutes in terms of their contributions to growth. Previous studies on the relationship between insurance and economic growth in Nigeria are Eze and Okoye (2013), Mojekwu, Agwuegbo and Olowokudejo (2011), Akinlo (2013), Amoke (2012), Yinusa and Akinlo (2013), Akinlo and Apanisile (2014) and Olayungbo (2015). All these studies have used total insurance premium in their analysis of the relationship between insurance and economic growth in Nigeria. This study contributes to the existing literature by examining separately the effects of non-life and life insurance premium on economic growth in Nigeria. This paper is as follows, section 2 gives the stylized facts about insurance development in Nigeria. Section 3 deals with the literature review while section 4 deals with the empirical analysis. Finally, section 5 and 6 gives the discussion of result and conclusion respectively.

II. Stylized facts about Insurance Development in Nigeria

There is quite a large difference between life and non-life insurance in Nigeria. From Table 1 majority

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of the insurance companies in Nigeria involve in non-life insurance activities. This implies that Nigerians have more preference for non-life (General or property) insurance than life insurance. Figure 1 shows that the premium on non-life insurance is higher than life insurance.

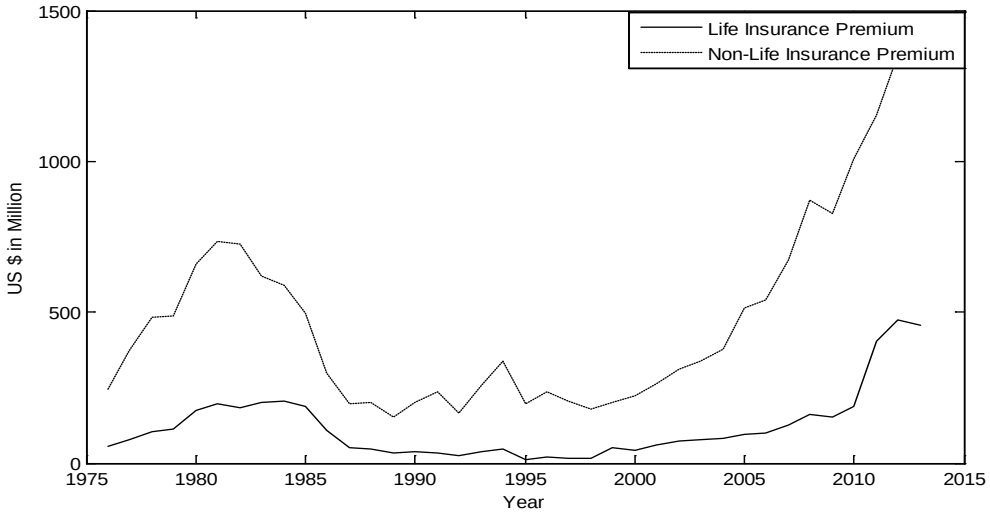

Figure 1 : The trend of Life and Non-life Insurance Premium in Nigeria

Table 1 : Gross written premium in US Dollars (Million) of Insurance companies in Nigeria

Insurance Companies	Life	Non-Life
Leadway	29	126.7
Custodian and Allied		65
AIICO	64.7	54.5
NEM		53.1
Mansard	15.3	49.4
Industrial and General	25.4	43.1
STACO		41.9
Sovereign Trust		41.4
Royal Exchange		38.1
Zenith General		36.5
Niger Insurance		30.8
Mutual Benefit		29.7
Capital Express		21.7
Standard Alliance Life Assurance		13.9
African Alliance		11.8

Source: AXCO Information Insurance Service (2012)

III. Literature Review

Most literature on the relationship between insurance and economic growth are panel analysis due to unavailability of long time series data for single country. Earlier study like Beenstock, Dickinson, and Khajuria (1986) find that nonlife insurance demand is associated with GDP per capita in a sample of 12 industrialized countries between 1970 and 1981. Outreville (1990) finds that nonlife insurance demand is associated positively with GDP per capita and a measure of financial development (M2/GDP) for a sample of 55 developing counties between 1983 and 1984. Browne and Kim (1993) find that life insurance consumption per capita is positively associated with GDP per capita for a sample of 45 countries for the years 1980 and 1987. Outreville (1996) finds that life insurance demand is associated positively with GDP per capita but not with financial development in a sample of 48 developing countries for the year 1986. Browne, Chung, and Frees (2000) find that nonlife insurance consumption is associated positively with the income level for a sample of OECD countries over the period of 1986-1993.

Ward and Zurbruegg (2000) examine the relationship between economic growth over the period of 1961 to 1996 for nine OECD countries. The long-term and short-term dynamics between insurance and economic growth were examined. Long-term

relationships are found for Australia, Canada, France, Italy and Japan. On the other hand, Webb, Grace and Skipper (2002) examine the impact of financial intermediaries (banks, life and non-life insurers) on economic growth in the context of a neo-classical Solow-Swan model. The result shows that insurance and banking promote capital stock productivity and drive the level of output and investment.

Arena (2008) tests whether there is a causal relationship between insurance market activity (life and nonlife insurance) and economic growth. Using the generalized method of moments (GMM) for dynamic models of panel data for 55 countries between 1976 and 2004 both life and nonlife insurance have a positive and significant causal effect on economic growth. For life insurance, high-income countries drive the results, and for nonlife insurance, both high-income and developing countries drive the results.

In Nigeria, Mojekwu *et al.* (2011) examine the impact of insurance contributions on economic growth in Nigeria over a twenty seven year period, between 1981 and 2008 using a dynamic factor model. The proposed technique describes a number of methods designed to analyze a functional but unobservable random quantities called factors. The factor loadings indicate which common trend is related to which set of time series. The result obtained shows a positive relationship between insurance contribution, measured the volume of premium and economic growth in Nigeria. Akinlo (2012) examines the effects of insurance on economic growth in Nigeria during the period of 1986 to 2010. The structure, growth of insurance sub-sectors and the direction of causality between insurance and economic growth in Nigeria were addressed in the study. An error-correction model analysis and co integration technique was adopted in the analysis. The co integration technique shows that all the variables apart from premium are highly significant. The coefficient of premium was significant at 10%. The findings of the study indicate insurance measured as premium, has a positive significant influence on economic growth and that there is a long run relationship between insurance and economic growth in Nigeria.

Omoke (2012) makes use of insurance density (premium per capita) as a measure for insurance market activity and real GDP for economic growth in Nigeria between 1970 and 2008. The study also employs control variables such as inflation and savings rates as other determinants of growth. The Johansen cointegration and vector error correction approach were used to estimate the relationship among the variables. The finding of the study is that insurance does not reveal any positive and significant effect on economic growth in Nigeria within the period of study. The result shows low insurance market activity and development in Nigeria.

Eze and Okoye (2013) in their paper use cointegration test and error correction model to examine the impact of insurance practice on the growth of Nigerian economy. Insurance premium capital, total insurance investment and insurance sector development are used as measures of insurance development. The paper concludes that there is a significant positive effect of insurance practice on the growth of Nigerian economy. In addition, Yinusa and Akinlo (2013) analyzed both the long and short run relationship between insurance development and economic growth in Nigeria over the period 1986 to 2010. Using error correction model (ECM), the study finds that insurance development is co integrated with economic growth in Nigeria. There is a long run relationship between insurance development and economic growth in Nigeria. The results also show that physical capital and interest rate both at contemporary and one lagged value have significant positive effect on economic growth in Nigeria while physical capital and inflation have negative long run relationships with economic growth. The results generally indicate statistically significance contribution of insurance to economic growth in Nigeria. In contrast, Olayungbo (2015) investigated the asymmetric non-linear relationship between insurance and economic growth in Nigeria from 1976 to 2010. The conclusion is that asymmetric effect is present in Nigeria's insurance market. Also, unidirectional causality runs from positive GDP growth to negative insurance premium growth. In addition, the robustness results, using variance decomposition and impulse response with control variables, show that low insurance promotes high growth in Nigeria. The impulse responses also show the presence of an asymmetric relationship between low insurance and high growth in Nigeria.

a) Theoretical Model

Starting from the neo-classical growth model of Solow (1956), the Cobb Douglas production function can be written in Hick's neutral form as:

$$Y = AK^{\alpha}L^{1-\alpha} \qquad 0 < \alpha < 1 \tag{1}$$

Where Y is the output representing economic growth, A is the technology, K is the capital stock, while L is labour.

Taking log and linearizing give:

$$\log y = \log a + \alpha \log k + (1-\alpha)\log l \tag{2}$$

Writing in econometric term and introducing non-life and life premium, eq.(2) becomes:

$$\log y_t = \log a + \beta_1 \log k_t + \beta_2 \log l_t + \beta_3 \log life_t + \beta_4 \log nonlife_t + \varepsilon_t \quad (3)$$

From eq.(3), $\log A$ is assumed to be given and exogenous since technologies are imported from developed countries to African countries and Nigeria is not an exception. $\log A$ is treated as the constant term and ε_t is the error term. The a priori expectation is that $\beta_1 > 0, \beta_2 > 0, \beta_3 > 0$ and $\beta_4 > 0$.

b) Sources of Data and variable definitions

This paper uses time series annual data which ranges from 1976 to 2013. This length of the time series is informed by data availability. One of the major reasons for dearth of papers in this area for Nigeria is due to lack of data availability on insurance premium for African countries. The lack of data has limited the examination of long time series analysis in this area for African countries. Both the life and non-life premium are sourced from Swiss Reinsurance Company, Sigma Publication (2015) in US dollars after adjusting for inflation. The real gross domestic product (GDP) is sourced from World Development Indicator (WDI, 2014). The real GDP is the monetary values of all final goods and services produced in Nigeria and computed using 2005 base year in US dollars. Capital and labour are the two control variables that are also sourced from WDI (2014). Investments on gross fixed capital formation such as plants, machinery, equipment and infrastructure in US dollars are used to measure capital stock while the working population of residents in Nigeria from 15 years to the retirement age of 65 years is used as measure for labour.

c) Methodology

i. *Autoregressive Distributed Lag (ARDL) Model*

The ARDL model proposed by Pesaran, Shin and Smith (2001) is adopted in this paper. This model is advantageous as it can be applied on a time series data irrespective of whether the variables are integrated of order zero or one. In addition, a dynamic error correction model (ECM) can be derived from the model, which makes the estimation of both the short run dynamics and long run equilibrium possible simultaneously after a multivariate cointegration test. Lastly, the test is relatively more efficient in small sample data as is the case in this paper. The unrestricted error correction model (UECM) of ARDL model used to examine the long run and the short run relationship takes the following form:

$$\Delta \log y_t = \beta_0 + \beta_1 \log k_{t-1} + \beta_2 \log l_{t-1} + \beta_3 \log life_{t-1} + \beta_4 \log nonlife_{t-1} + \sum_{i=1}^{k} \alpha_i \Delta \log y_{t-i} + \sum_{i=1}^{k} \omega_i \Delta \log k_{t-i} + \sum_{i=1}^{k} \tau_i \log l_{t-i} + \sum_{i=1}^{k} \phi_i \Delta \log life_{t-i} + \sum_{i=1}^{k} \varphi_i \Delta \log nonlife_{t-i} + \varepsilon_t \quad (4)$$

The variables are as earlier defined. In eq.(4), $\beta_1, \beta_2, \beta_3, \beta_4$ refer to the long run coefficients while $\alpha_i, \omega_i, \tau_i, \phi_i, \varphi_i$ are the short run coefficients. The null hypothesis of no co-integration $H_0 : \beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$ and the alternative hypothesis $H_1 : \beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq 0$ implies co-integration among the variables in eq.(4). The model in eq.(4) is estimated using Ordinary Least Square (OLS) to test for the existence of a long run relationship among the variables by conducting an F-test for the joint for the joint significance of the coefficients of the lagged levels of variables i.e. H_0 as against H_1. If the computed F-statistics is less than the critical values, then the null hypothesis of cointegration is rejected. However, if the computed F-statistics is greater than the upper boundary critical values, then the null hypothesis of cointegration is accepted In the next step once the co-integration is established, the ARDL long run model for $\log y_t$ is estimated. In the final step, we estimate the short run dynamic parameters by estimating an error correction model (ECM) model with the long run estimates as specified as follows:

$$\Delta \log y_t = \mu + \sum_{i=1}^{k} \alpha_i \Delta \log y_{t-i} + \sum_{i=1}^{k} \omega_i \Delta \log k_{t-i} + \sum_{i=1}^{k} \tau_i \log l_{t-i} + \sum_{i=1}^{k} \phi_i \Delta \log life + \sum_{i=1}^{k} \varphi_i \Delta \log nonlife_{t-i} + \lambda ECM_{t-1} + \varepsilon_t \quad (5)$$

Where $\alpha_i, \omega_i, \tau_i, \phi_i, \varphi_i$ are short run dynamic coefficients to equilibrium and λ is the speed of adjustment coefficient to equilibrium.

IV. Empirical Analysis

The results of the empirical analysis such as the descriptive statistics, unit root test, the autoregressive distributed lag (ARDL) and the discussions of the results are presented.

Table 2 : Descriptive Statistics

	rgdp	capital (K)	labour(L)	life	nonlife
Mean	8.45E+10	1.29E+10	36481922	120.9394	487.303
Median	6.24E+10	3.78E+09	36175721	77	336
Maximum	1.91E+11	6.66E+10	53142173	474	1406
Minimum	4.37E+10	2.02E+09	21856253	12	152
Std. Dev.	4.39E+10	1.86E+10	9358897	121.7256	353.0534
Skewness	1.126702	2.006411	0.144395	1.69618	1.196592
Kurtosis	2.844606	5.561853	1.942159	5.266198	3.49614
Jarque-Bera	7.01522	31.16552	1.653338	22.88516	8.213543
Probability	0.029968	0	0.437504	0.000011	0.016461
Sum	2.79E+12	4.26E+11	1.20E+09	3991	16081
Sum Sq. Dev.	6.15E+22	1.11E+22	2.80E+15	474147.9	3988695
Observations	38	38	38	38	38

Table 2 shows the descriptive statistics of the variables of interest. The mean and median of each variable are relatively close. The closeness suggests that the distribution is nearly symmetrical. The presence of symmetry indicates the existence of low variability and normal distribution. The values of the skewness, kurtosis and the standard deviation being equal to and close to zero also provide useful information about the symmetrical nature of the distributions.

a) Unit root test

After the descriptive statistics of the data, it is necessary to determine the stationarity properties of the variables of interest in order to avoid spurious result. The Augmented Dickey fuller (1979) test is employed. The unit root is done after the series have been transformed into natural logs.

Table 3 : The results of the Unit root test

	Intercept			Trend and Intercept	
Variables	Levels	First diff	Variables	Level	First diff.
life	-1.1554	-4.3646	life	-2.2854	-4.2232
non-life	-1.9093	-4.6708	non-life	-2.9892	-4.5083
labour	-4.2045	-	labour	-4.8012	-
capital	0.0919	-4.5160	capital	-2.2609	-5.0705
real GDP	-0.8028	-46638	real GDP	-3.0148	-4.4731

ADF critical values at levels for both the intercept at levels and first difference are -3.7241(1%), -2.9862(5%),-2.6326(10%) and -3.7379(1%),-2.9919(5%),-2.6355(10%) while that of the trend and intercept at level and first difference are -4.3743(1%), -3.6032(5%) -3.2380(10%). and -4.3943(1%), -3.6122(5%) and -3.2431(10%).

Table 3 shows that all the variables are I(1) i.e. they are stationary at first difference except labour which is stationary at levels i.e. I(0). The different order of stationarity of our variables leads to the use of autoregressive distributed lag (ARDL) model to estimate the effects of life and non-life premium on economic growth in Nigeria. The bound test in Table 4 shows the evidence of long run relationship among the variables. This is because the F-Statistic of 5.97 is greater than the upper bound at 1 percent, 2.5 percent, 5 percent and 10 percent. For the ARDL results in Table 5 and 6, the ARDL (4,4,4,3,4)[1] model selection criteria is found to be optimal through the Akaike Information Criteria (AIC) (see Appendix 1).

[1]The ARDL (4, 4, 4, 3, 4) model is automatically determined at the estimation level and found to be optimal.

Table 4 : ARDL bounds Test Result

Test Statistic	Value	K
F-Statistic	5.97	4
Critical Value Bounds		
Significance	lower bound	upper bound
10%	2.45	3.52
5%	2.86	4.01
2.50%	3.25	4.49
1%	3.74	5.06

Table 5 : Estimated Long Run Coefficients with ARDL (4,4,4,3,4) (Dependent variable: rgdp)

Regressors	coefficient	std. Error	t-Statistics	Prob.
capital	0.5451	0.1182	4.611	0.01
labour	-0.8032	0.2278	-3.5266	0.02
life	0.2764	0.1002	2.7583	0.05
non-life	0.2203	0.0831	2.6523	0.06
constant	14.0169	3.9526	3.5462	0.02

Co-integration=rgdp-0.5451(capital)-0.8032(labour)+0.2764(life)+0.2203(nonlife)+14.0169

The estimated long run relationship in Table 5 shows that all the variables of interest significantly affect economic growth. In the long run, 1 per cent increase in capital significantly increases economic growth by 0.54 percent at 5 percent significant level. However, labour is found to negatively affect growth. This can be as a result of increase in unskilled workers relative to skilled workers which then reduce the total labour contribution to the economy. Considering life insurance, we found 0.27 percent of life premium to significant increase economic growth at 5 percent significant level. In addition, non-life insurance contributes significantly 0.22 percent to economic growth during the period of study at 10 percent level of significance. This result implies that life and non-life insurance are complements in the long run to the Nigerian economy. This positive and complementary effects support the previous work of Outreville (1990), Outreville (1996), Webb *et a.l* (2002) and Arena (2008).

Table 6 : Estimated Short Run Coefficients with ARDL (4,4,4,3,4) (Dependent variable: rgdp)

Regressors	coefficient	std. Error	t-statistics	prob.
D(LRGDP(-2))	-0.58576	0.272582	-2.14893	0.0981
D(LRGDP(-3))	-2.09916	0.533624	-3.93378	0.017
D(LCAPITAL(-1))	0.429556	0.100881	4.258044	0.0131
D(LCAPITAL(-2))	0.334018	0.094618	3.530157	0.0242
D(LCAPITAL(-3))	0.479233	0.116706	4.106327	0.0148
D(LCAPITAL(-4))	0.154995	0.06643	2.33322	0.0800
LLABOUR(-1)	45.23678	18.70111	2.418936	0.0728
LLABOUR(-3)	-56.3961	14.04749	-4.01468	0.0159
LLABOUR(-4)	45.58605	11.56361	3.942198	0.0169
D(LLIFE(-1))	0.21263	0.083813	2.536966	0.0642
D(LLIFE(-3))	0.258856	0.088011	2.941159	0.0423
D(LNLIFE(-1))	-0.34748	0.115792	-3.00091	0.0399
D(LNLIFE(-2))	0.528445	0.196376	2.690988	0.0546
D(LNLIFE(-4))	0.380196	0.145552	2.612094	0.0593
Constant	38.1028	11.28866	3.375318	0.0279
ECM(-1)	-2.7184	0.5655	-4.8067	0.0086

Significant p-value < 0.05 $R^2=0.95$ Durbin Watson= 2.64

Considering the short run dynamics in Table 6, the R^2 shows a reasonable good fit of the model with a value of 95 percent. The Durbin Watson, with a value of 2.64 which is greater than 2, shows that the model is free of autocorrelation. From the analysis, both the lag 2 and 3 of real GDP are found to negatively and significantly affect the current real GDP over the period of study. For capital, all the lags have positively and significantly affect economic growth over the period of study. This confirms the long run positive and significant effect of capital on economic growth in Table 5. For labour variable, lag 3 has negative and significant effect on growth while lag 1 and 4 of labour have positive and significant effects on growth. For life insurance, we found both the first lag and third lag of life insurance to have positive and significant effects on growth at 10 percent and 5 percent significant level respectively. The non-life on the other hand has its first lag to be negative and significant on growth at 5 percent, while its second lag and fourth lag have positive and significant effects on growth over the period of study. Table 6 also shows that the coefficient of ECM (-1) is significant at 1 percent level of significant. This indicates that the speed of adjustment for a short run to reach long run is significant. Furthermore, the error correction term is -2.72 with the expected sign, suggesting that when the GDP is above or below its equilibrium level, it adjusts by almost 272 per cent to converge to equilibrium.

V. Conclusion

In this paper, the different effects of life and non-life insurance on economic growth have been examined unlike in previous studies done for Nigeria where the effects of both life and non-life have been examined together on growth. However, we depart from the previous studies to examine the separate effects of life and non-life insurance on growth and it is found that both life and non-life insurance have positive effects on growth both in the long run and short run. The results show that they complement each other rather than substitutes for each other.

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Appendix

Automatic optimal ARDL model selection