INSURANCE SERVICE SUB-SECTORS AND OUTPUT PERFORMANCE IN NIGERIA: A GENERALIZED LINEAR MODEL APPROACH

Ernest Simeon O. Odior, PhD
Department of Economics, Faculty of Social Sciences
University of Lagos, Akoka, Lagos, Nigeria
Phone: +23480-62088200; +2347058074040
Email: *odiore@yahoo.com; eodior@unilag.edu.ng*

Abstract
This study examines the insurance services sub-sectors impact on output performance in Nigeria from the period 1981-2017. Using service exports and imports as proxy for insurance services. Methodically, this study test for stationary, test for the cointegration using the Engle-Granger single-equation and use the Generalized Linear Model (GLM) method to analysis the static impact. The results confirm one cointegrating relationship amongst the variables used in the study. The results also reveal that the insurance service exports has a positive significant impact on output performance, while insurance service imports does not have significant impact on output performance in Nigeria in the static analysis. For product innovations in the insurance industry and effective out growth, this study recommends that policy legislation should provide adequate transparency and efficiency. Also, formulation of policy by the government should targeted at providing institutional improvement, especially in risk management.

Keywords: Insurance, Service Sub-Sectors, Output, Nigeria, GLM
JEL classification: G22, E23, C29

1. Introduction

For today modern financial services sector, Insurance remains one of the cornerstones, because in insurance service activities, there has been faster growth, particularly in emerging markets given the process of financial integration and financial liberalization, which raises questions about its effect on countries output performances. With the various activities in the insurance sector, several interesting lines of research have begun to map the specific contributions of insurance to the economic growth process.

The services activity of insurance, both as an institutional investor and a provider of risk transfer and indemnification, in the following ways contribute to output growth (i) helping to mobilise domestic savings losses (ii) encouraging the accumulation of new capital and allowing different risks to be managed more efficiently, (iii) helping to reduce or mitigate losses, (iv) facilitating trade and commerce. This is the most ancient insurance activity, (v) fostering a more efficient allocation of domestic capital, and (vi) promoting financial stability (Arena, 1998; Skipper, 1997). This contribution is magnified by the complementary development of other financial and banking systems

To protect themselves against the risks of daily life, economic agents purchase insurance. Insurance can encourage loss mitigation which can be a substitute for and complement to government security programs. Insurance activities may likely have different effects on output growth either life and non-life insurance (property/liability) given that these two type of insurance protect the corporations and households and from different kind of risks that affect the economic activity in different ways. To avoid excessive risks, insurers monitor management encourage the efficient use of economic resources. For example, it then may be more efficient to insure against flooding rather than the government or community was negatively affected (Zweifel and Eisen, 2012).

However, the impact of insurance services activity on output growth has not been studied as extensively as the role of the stock market and banking sector in ensuring output growth in the econnmy. In this context, the main objective of this study is to empirically assess whether insurance sub-sector service activities influences output performance in an emerging market like Nigeria. Though, it is recognised that insurance services not only would have an effect on economic growth as an indemnification and a provider of risk but also as an institutional investor by mobilizing savings. According to Fukuyama (1995), the social structure of the society will reduce the potential benefits from insurance where the societies are indifferent to risk or risk transfer mechanisms. That is, the ability of insurance to increase economic growth will be likely different across economies, if different socio-cultural determinants of insurance purchasing decisions are taken into account.

The aim of this study is to empirically examine the effect of services of insurance sub-sector in output performance in Nigeria. Considering the present economic situation and the model of insurance services provision, the bold questions to be tackled and answered in this research are: what percentage of output of the Nigerian economy can be credited to the development in the insurance service sub-sector or to what extent can one say the insurance service sub-sector growth is capable of driving a sustainable boost in the Nigerian economy? With special attention to insurance service exports and imports contribution to GDP using data corresponding to the span 1981 to 2017.

2. Literature Review

There are a lot of empirical research and theories which aim at determining the effect of insurance services on the economic performance both in the context of developed and developing countries which Nigeria is among. Anthony and Luke (2011) study the effect of insurance business on economic development in Nigeria" using and random sampling and descriptive methods. The results shown that insurance business helps in capital formation than payment of reparation of loses. The findings also shown that insurance companies provide financial services to some substantial number of people in the economy.

Kjosevski (2011) used life insurance penetration, penetration non-life insurance and total insurance penetration to examine the effect of insurance on performance of the economic in the Republic of Macedonia. Methodically, the study used the OLS method from the period of 1995 to 2010. The result shows that the development of total insurance sector has a positive effects on economic growth. Also, the results show that life insurance affects economic growth negatively, while non-life insurance positively affect economic growth.

Azman-Saini and Smith (2011) used panel data method and employed the life insurance penetration ratio as a proxy for the development of insurance markets to study the effect of insurance sector development on output growth, capital accumulation and productivity improvement for the period 1981-2005, using data from 51 countries (both developed and developing). Azman-Saini and Smith (2011) find evidence that insurance sector development promotes capital formation in developing countries, and affects growth predominantly through productivity improvement in developed countries.

Horng, Chang and Wu (2012) tested for a dynamic relationship amongst insurance demand, financial development and economic performance in Taiwan. These results supported the supply-leading theory' link from financial development to economic performance and the 'demand-following theory' link from economic growth to insurance demand, as they found out that in the short run, financial development Granger causes economic growth and economic performance Granger causes insurance demand. The study use Vector Autoregressive to model three variables with insurance density (premiums per capita) used as the proxy for insurance demand.

Oke (2012) used fixed effect model and co-integration analysis to determine the short run and long run relationship between economic growth and insurance sector development in Nigeria, from the period of 1986 to 2009. The result revealed that insurance sector development has positive and significant effects on economic growth. In a similar way, Eze and Okoye (2013) studied the analysis of the effect of insurance practices on economic growth of the Nigerian Economy from 1980 to 2011. The study found out that insurance premium capital has significant effect on the growth of the economy.

3. Theoretical Framework and Specification of Model

3.1.Theoretical Framework

The neoclassical theory of economic growth improved on the analysis of the classical theory that failed to predict the historical record of sustained output growth and productivity growth. The neoclassical theory of economic growth as basically represented by the Solow-Swan model (Solow, 1956), brought in technical progress as a factor, while retaining the assumption of a constant returns to scale (CRS) with respect to labour and capital.

In a cob-douglass style production function, the level of output (Y) was modelled to depend on capital (K), labour (L) and (V), factor of technical progress

$$Y = AK^{\alpha}L^{\beta}e^{vt} \quad \text{where, } \alpha + \beta = 1 \text{(CRS assumption)} \tag{1}$$

Taking natural logarithm of both sides equation (1), it becomes

$$\ln Y_t = \ln A + \alpha \ln K_t + \beta \ln L_t + vt \tag{2}$$

To measure growth, changes in variable due to time needs to be taken, hence the first derivative of (2) above is

$$\frac{d(\ln Y_t)}{dt} = \alpha \frac{d(\ln K_t)}{dt} + \beta \frac{d(\ln L_t)}{dt} + v \tag{3}$$

Noting also that the time derivative of a logged variable approximates its growth rate since,

$$\frac{d(\ln Y_t)}{dt} = \frac{1}{Y_t}\left(\frac{\Delta Y}{\Delta t}\right) = \dot{Y} \tag{4}$$

Then we may write equation (3) as

$$\dot{Y} = \alpha \dot{K} + \beta \dot{L} + v \tag{5}$$

where $\dot{Y}$, $\dot{K}$ and $\dot{L}$ are growth of output, capital and labour respectively.

Like the classical model, the neoclassical also assumes that Labour growth ($\dot{L}$) depends on population growth (n), but unlike the classical, the neoclassical assumes that investment or growth in capital stock is financed out of national income. This leads to a situation where the growth of capital approaches the growth of national income and, therefore, national income growth is independent of capital or investment.

$$\dot{Y} = \alpha\dot{Y} + \beta n + v$$
$$\dot{Y} = \frac{(\beta n + v)}{(1-\alpha)} \tag{6}$$

So, we are left with only labour growth and technical progress as the only factors that determine economic growth. Further algebraic manipulation of equation (6) shows that

$$\dot{Y} = n + \frac{v}{(1-\alpha)} \tag{7}$$

Recall $\alpha + \beta = 1$;

Since labour has constant productivity, effective growth (positive changes in the welfare of the citizens), then depends only on technical progress.

$$\dot{Y} - n = \dot{y} = \frac{v}{(1-\alpha)} = \Omega \tag{8}$$

This means that economic development depends ultimately and exclusively on the exogenous technical progress or the "Solow residual". The residual explains the GDP rate of growth that is left unexplained and exogenously determined in the Solow growth equation as well as the factors that determine the size of Ω in the model. The exogenous growth theorists allow for the introduction of policy variables to affect output growth, which include financial sector stability and business risk coverage such as insurance services.

3.2 Specification of Model

With inferences from the reviewed extension of the Endogenous growth model, an empirical model to dilate the relationship between insurance sector service and output performance in Nigeria, would be specified to include only the variables as shown in Equation (8).
In measuring the insurance services and output performance in Nigeria, the simple empirical model adopted in this study is thus specified as;

$$LOGOPP_t = \beta_0 + \beta_1 LOGISE_t + \beta_2 LOGISI_t + \mu_t \tag{9}$$

LOGOPP$_t$ is the level of output performance at time t is the independent variable. The GDP at current basic prices (N' Billion) is adopted as a proxy for the OPP. *LOGISE$_t$* at time t, is the proxy for insurance services exports. This is a percentage of insurance and financial services exports on the level of BOP. *LOGISI$_t$* at time t, is the proxy for insurance services imports. This is a percentage of insurance and financial services imports on the level of BOP.

It is defined as insurance and financial services cover various types of insurance provided to nonresidents by resident insurance enterprises and vice versa, and financial intermediary and auxiliary services (except those of insurance enterprises and pension funds) exchanged between residents and nonresidents. This also, cover freight insurance on goods exported and other direct insurance such as life insurance (IMF, 2017).

The a-priori assumptions for the above model based on Equation (9) are: $\beta_0 > 0$, $\beta_1 > 0$, $\beta_2 > 0$. $\beta, s > 0$ implies a positive relationship between the dependent variable. $\beta, s < 0$, it implies a negative relationship between the independent and dependent variables.

4. Estimation Technique and Sources of Data
4.1 Estimation Technique

The study use the formulated models in equation (9) to carried out the model estimations. The first approach is the test for stationary of the variables in model this is to the determination integration order. The second approach is to use the Engle-Granger single-equation to test for the cointegration. The third step is to run the impact relationship between insurance services and output performance in Nigeria using the GLM. This study hypothesis were tested using the GLM. The GLM provides a general theoretical framework for many commonly encountered statistical models and also simplifies the implementation of these different models in statistical software.

The Structure of Generalized Linear Models begins by considering the familiar linear regression model, $Y_i = X_i^{'}\beta + \varepsilon_i$, where $i = 1, ..., N$, Y_i is a dependent variable, X_i is a vector of k explanatory variables or predictors, β is a k-by-1 vector of unknown parameters and the ε_i are zero-mean stochastic disturbances, are assumed to be independent across observations and normally distributed with constant variance (σ^2)

4.2. Sources of Data
Annual time series data is used for this study, they are generated in line with the study objectives from the period 1981 - 2017. This choice of this scope is predicated by the research method adopted for this work. The data are obtained from the publications of International Monetary Fund, Balance of Payments Statistics Yearbook and data (2017) and CBN Statistical Bulletin (CBN, 2017) to establish our empirical investigation of our formulated model.

5. Analysis of Results

(a) Stationarity Test

Table 1 shows the Augmented Dickey-Fuller (ADF) - Fisher Chi-square statistic unit root test for the variables in the model. The results show LOGOPPP, ISE and ISI were stationary at first difference. Comparing the variables probabilities values and with their levels and first difference (the ADF unit root test statistic), the test statistics show that all the variables are integrated at order of one. While, LOGOPP is statistically significant a 10%, level of significance in differences.

Table 1: Stationarity Test Result

Series: LOGOPP, ISE, ISI				
Method:	ADF - Fisher Chi-square			
Series	t-Stat	Prob.	Order of integration	Maximum Lag
D(LOGOPP)*	-3.2335	0.0945	I(1)	1
D(ISE)	-6.9278	0.0000	I(1)	1
D(ISI)	-7.8934	0.0000	I(1)	1
	1% level	-4.243644		
	5% level	-3.544284		
	10% level	-3.204699		

Source: Author's Computation: Note: *significant at 10% critical values

(b) Single-Equation Cointegration Test

Table 2: Engle-Granger Cointegration Test Results

Series: LOGOPP ISE ISI					
Cointegrating equation deterministics: C					
Dependent	tau-statistic	Prob.*	z-statistic	Prob.*	Long-run residual variance
LOGOPP	-3.780958	0.1694	-17.17780	0.3132	0.020772
ISE	-3.373943	0.3063	-18.99402	0.2250	2.810111
ISI	-4.954103	0.0180	-28.75278	0.0197	0.945296

Author's Computation

The Engle t-statistic and normalized auto-correlation coefficient term the z-statistic both do not reject the null hypothesis of no cointegration at the 5% significance level. With the small sample size of the probabilities and critical values there is evidence of one cointegrating equations at the 5% level of significance using the tau-statistic and the z-statistic. On the all using the tau-statistic and the z-statistic, the evidence clearly suggests that only ISI is cointegrated at 5% level of significance. This implies that there exists a long-run relationship or cointegration between output performance and ISI (see Table 2).

(c) Interpretation of Estimated Coefficients

In the estimated regression line above, the value of β_0 (the constant term) is -0.698 which means that holding the value of LOGISE and LOGISI constant or with no contribution of these variables to output performance (OPP), the value of OPP will decline by 0.698 % in Nigeria annually. This percentage of contribution to output will be zero if insurance services activities are held constant.

The two important variables included and estimated in the model are Insurance Services Exports ($LOGISE$) and Insurance Services Imports ($LOGISI$). The estimated regression line in Table 3 shows LOGISE is positively related to total output performance in Nigeria during the period under review. The regression coefficient LOGISE (0.1041), which implies that 10.41% of the increase in total output growth in Nigeria within the period under study was attributed to the changes in the Insurance Service Exports. The result shows high percentage impacts and highly significant, it implies that this variable is a major contributor to total output performance in Nigeria. For example, insurance service exports such freight insurance on goods exported and other direct insurance such as life insurance etc.

Table 3: Coefficients impacts Estimate

Dependent Variable: OPP					
Method: Generalized Linear Model (Newton-Raphson / Marquardt steps)					
Variable	Coefficient		Std. Error	z-Statistic	Prob.
C	β_0	-0.697901	0.260910	-2.674867	0.0118
LOGISE	β_1	0.104077	0.016477	6.316717	0.0000
LOGISI	β_2	-0.035337	0.036681	-0.963374	0.3428
a-priori assumptions: $\beta_0 > 0$, $\beta_1 > 0$, $\beta_2 > 0$					

Source: Authors' Computation

The result of the analysis in Table 3 also shows that Insurance Services Imports (LOGISI) has negative impact on total output performance and not statistically significant. ISI result does not support the hypothesis and not in line with both theories and the previous researches that an increase in ISI will increase total output growth in the developing countries. The regression coefficient of ISI in the estimated regression line is -0.0353 which implies that 3.53% of the decrease in total output performance within the period under study was attributed to the 100% changes in the level of ISI.

6. Implication of Findings and Conclusion

Evidences from the empirical inquiry of this study helps to draw safe conclusion that, using Nigerian data, there indicate partial conformity with the postulated exogenous growth theory that insurance sector services growth explains the level of output performance particularly through its influence on exports and imports services on the level of balance of payment.

The empirical findings above have several key policy and research implications. Above all, they provider clear understanding of different links through which insurance services sub-sector influences the levels of output growth in Nigeria. The deductions that could be made from these empirical findings are predicated on the sizes and magnitude of the slope coefficient produced by the GLM estimation of the fitted regression model.

Looking at the findings in the analysis of the results above, the findings reveals that insurance services (exports) of the included variables is highly statistically significant in explaining the output performance, while insurance services (imports) are not statistically significant in the explanation of the variations in output performance in Nigeria. This implies that there exists a transmission link through government regulatory efforts on the contribution of insurance services (imports) sub-sector to economic performance. This conformation to this expectation is due to the general macroeconomic realities of Nigeria, as reflected by its conduct of in the insurance sector and regulations that have been executed to coordinate the practice of insurance business in Nigeria.

In view of the potential of the insurance services sub-sector to boost output growth, the issue of lack of confidence in the import services policies currently offered by insurance companies must be tackled. The implication is that average importer in Nigeria will not be encourage to about insurance services, with the suspicion that claims would not be paid which limits growth of the insurance service imports in Nigeria as they have to improve their business practice in this regards.

The significant negative estimated slope parameter of the insurance service imports variable is indicative of this. On the flip side of the coin, insurance companies are encouraged to sensitize the masses via the masses via advertisement, periodic conference and seminars to create public awareness for their products and other policies aim at massive education of insurance consumers on the importance of buying insurance products. The findings implication is that insurance services exports would contribute meaningful to the growth of Nigeria economy in long run, while imports will not. The fact is that output gain from insurance services mostly depend on the cultural context of a given economy.

7. Policy Recommendations

The level of output performance has been revealed to be less significantly influenced by insurance services sub-sector. This impact on output performance can be traced through it less significant impact on output performances in terms of the service imports. The study therefore, recommends that:

Government should put in place a well-developed insurance service sub-sector that can provide the necessary long-term fund for investment and absolving risks. Government can achieve this by providing appropriate environment for insurance business like massive investment in the

infrastructure facilities especially in the area of ICT and appropriate legislation that will ensure the prospect of growth of the industry in terms of import services. This is in order to boost insurance sector growth as it appears to be a significant catalyst of robust economic performance in Nigeria.

The role of industry regulators cannot be over emphasized in achieving sustainable sector led growth in Nigeria. Therefore, policy makers should empower NAICOM to impose stricter sanctions on insurance firms who provide sub-standard services to its policy holders or those who carry on businesses that violate the provisions of the Insurance Act in Nigeria. As a recommendation for further studies, a better estimation technique can be employed like the use of Instrumental variables, to capture better the sociological end of the identified problem.

References

Anthony, A. & Luke, O. (2011). The Effect of Insurance Business on Economic Development in Nigeria. Journal of Emerging Trends in Economics and management Sciences, 2(4): 275-280

Arena, M. (2008). "Does insurance market promote Economic Growth? A cross-country Study for Industrialized and developing countries". Journal of Risk Insurance, 75(4): 921 -946.

Azman-Saini, W. & Smith, P. (2011). "Finance and Growth: New Evidence on the Role of Insurance", South African Journal of Economics, vol. 79, no. 2, pp. 111-127.

Central Bank of Nigeria (2017). Statistical Bulletin, Vol. 27, December, Abuja, Nigeria

Eze, R. & Okoye V. (2013). Analysis of Insurance Practices and Economic Growth in Nigeria: Using Co-Integration Test and Error Correction Model. Global Advanced Research Journals 2(1) 063-070

Fukuyama, F. (1995) Trust: The Social Virtues and the Creation of Prosperity. London: Penguin books. 458 p.

Horng, M. S, Chang, Y.W. & Wu, T.Y. (2012)."Does Insurance Demand Or Financial Development Promote Economic Growth? Evidence from Taiwan." Applied Economics Letters, Vol. 19, No. 2, Pp. 105-111.

International Monetary Fund (2017), Balance of Payments Statistics Yearbook and data

Kjosevski, J (2011). The Impact of Insurance on Economic Growth: The case of republic of Macedonia, Stopanska Banka AD, Vol 4

Oke M.O. (2012). Insurance Sector Development and Economic Growth in Nigeria. African J. Business Management. 6(23): 7016-7023.

Skipper, H. D. (1997). Foreign Insurers in Emerging Markets: Issues and Concerns, Occasional Paper 97-2, Center for Risk Management and Insurance.

Solow, R. M. (1956). "Technical Change and the Aggregate Production Function", Review of Economics and Statistics.

Zweifel, P. & Eisen, R. (2012). Insurance Economics, 1st ed. Berlin: Springer New York, Page 451