

Regression and Causality Analyses of Insurance and Economic Growth Nexus in Nigeria (1981-2012)

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Abstract

This paper investigated the linear and causal relationships between insurance sector activity and economic growth in Nigeria based on annual data for the period 1981-2012 using Augmented Dickey Fuller test, Phillips-Perron test, Johansen Cointegration test, Pairwise Causality test and Ordinary Least Square Regression Analysis via Microsoft 7.1 econometric software. The overall results show that insurance sector activity exerts a statistically significant positive relationship with economic growth in Nigeria. A one unit increase in insurance consumption (CINSS) would bring about 31.79 units rise in real gross domestic product (RGDP). The causality test conducted revealed that there is a bidirectional causal relationship between insurance sector activity and economic growth. This implies that insurance sector activity granger caused economic growth, and also economic growth granger caused insurance sector activity. Based on the estimated results, government at all levels should provide enabling environment for insurance sector to develop because of the sector's capability to absorb risks of other sectors; and there should be substantial investment on infrastructural development by government at various levels to attract both domestic and foreign investments which can spur economic growth and provide market for insurance services in the economy. In addition, incentives should be given to potential industrialists both local and foreign in form of favorable fiscal policy in order to encourage them to establish various types of industries that would increase economic growth and create demand for insurance services.

Keywords: Insurance sector, economic growth, regression analysis, causality test, unit root, cointegration, Nigeria

Introduction

There are plethora of studies conducted which showed that countries with well developed financial systems enjoy faster and more stable long-run growth and development. Well developed financial markets have a significant positive correlation with total factor productivity, which translates into greater rate of economic growth and development. It needs be mentioned that the relationship between financial development and economic growth has long been one of the hotly debated issues of whether the financial sector actually contributes to the real sector in the process of economic development (Muhsin Kar, 2011). Insurance sector can be regarded as the risk management service provider in financial sectors, which plays a vital role in a myriad of economic transactions through risk transfer and loss compensation, but is also seen to promote financial intermediation, thus contributing to economic growth and development. Insurance sector contributes to economic growth and development through several channels which include promotion of financial stability for both households and firms; mobilization and channeling of savings for potential investors; providing support for trade, commerce, entrepreneurial activity, and social programs; and encouragement of accumulation of new capital.

Over the past two decades, Nigeria had witnessed tremendous increase in the share of insurance sector in the aggregate financial sector. Insurance companies, together with mutual and pension funds, are some of the biggest institutional investors in the stock, bond and real estate markets, and their possible positive impact on the economic growth and development will rather grow than decline, due to issues such as ageing societies, widening income disparity, globalization and the increase in risks and uncertainties in most societies. The growing links between insurance and other financial sectors also emphasize the possible role of insurance activity in economic growth. Despite the potential role that the insurance sector may play in financial and economic development, the assessment of a potential causal relationship between insurance market activity and economic growth in Nigeria has not been extensively studied as other financial sectors, such as bank or stock market. This situation reflects both data availability and the rather arcane reputation of the insurance sector in economic circles (Macro Arena, 2008). Despite the importance of insurance to the stability of financial systems through the provision of risk management services, little is known of its linkage with growth in Africa. The studies examining insurance-growth nexus have mainly been based on data from developed economies (Kugler and Ofoghi, 2005, Han et al. 2010 and Lee, 2011). Most studies that examined the finance-growth nexus in Africa (Adjasi and Biekpe, 2006, Nzue, 2006, Odhiambo, 2007, Seetanah, 2008, Ahmed and Wahid, 2011 and Kagochi et al, 2013) have focused on bank and stock market development. Although few studies have been carried out on insurance industry in Nigeria. None of these studies examined the causal link between insurance penetration and economic growth. They only investigated the relationship between insurance activity and economic growth with varying results. This study therefore pioneers the exploration of the causality between insurance sector and economic growth in the Nigerian context. This study therefore seeks to fill this obvious gap in empirical literature by providing further evidence on

causal link between insurance penetration and economic growth from a developing African country like Nigeria.

This study is motivated by the array of questions begging for answers: What is the relationship or connection between insurance consumption and economic growth in Nigeria? What is the causality link between insurance consumption and economic growth in Nigeria? What impact does inflation exert on economic growth in Nigeria? What policy prescriptions should be given to policy makers to improve the contribution of insurance consumption to economic growth in Nigeria?

Objectives of the Study

The objectives to be achieved by this study are as follows :

- To examine the relationship between insurance consumption and economic growth in Nigeria over the studied period.
- To identify the causality link between insurance consumption and economic growth in Nigeria.
- To recommend policy measures to the government on how to improve the contribution of insurance sector to economic growth in Nigeria.

Research Hypotheses

The hypotheses to be tested by this study are specified below. These are:

1. H_0 : There is no statistically significant positive relationship between insurance consumption and economic growth in Nigeria.
2. H_0 : Insurance consumption does not granger cause economic growth in Nigeria over the studied period.
3. H_0 : Economic growth does not granger cause insurance consumption in Nigeria over the studied period

Review of Related Literature

Several theoretical and empirical studies have been conducted on the relationship between insurance consumption (life and non-life) and economic growth in both developed and developing countries of the world. But the assessment of a potential causal relationship between insurance consumption and economic growth has not been as extensively studied as other financial sectors, such as bank or stock market. Webb, Grace, and Skipper (2002) stated that the development of the banking sector may facilitate the development of the insurance activity through a much more effective payment system allowing an improved financial intermediation of services. Blum et al. (2002) highlighted the link between the insurance and the real sector of the economy, he posited that following economic growth is the rise in demand for insurance and such growth in insurance smoothens short-term economic volatility and thus induces economic growth in the long run. Furthermore, growth in investment by insurance companies induces economic growth. He further established negative linkage between insurance to economic growth, he opined that growing insurance causes more reckless behavior, resulting in a less efficient and more volatile economy. Impavido, et al. (2003) argued that the conjoint effect with the stock market, the development of the insurance activity, in particular life insurance companies, could promote stock market development by investing funds (savings) raised through contractual saving products in stocks and equities.

Macro Arena (2008) opined that insurance market activity may not only contribute to economic growth by itself but also through complementarities with the banking sector and the stock market. In the first case, the joint effect with the banking sector, the development of insurance activity could encourage bank borrowing by reducing cost of capital, which influences economic growth by increasing the demand for financial services. Levine (2004) posited that financial systems influence savings and investment decisions and hence long-run growth rates through lowering the costs of researching potential investments; exerting corporate governance; trading, diversification and management of risk; mobilization and pooling of savings; conducting exchanges of goods and services; and mitigating the negative consequences that random shocks can have on capital investment. Arena (2008) opined that insurance is one of the cornerstones of modern-day financial services sector. In addition to its traditional role of risk management, insurance market activity, but as an intermediary and as provider of risk transfer and indemnification, may promote growth by allowing different risks to be managed more efficiently, promoting long term savings and encouraging the accumulation of capital, serving as a conduit pipe to channel funds from policy holders to investment opportunities, thereby mobilizing domestic savings into productive investment. Kagochi et. al. (2013) posited that a thriving insurance sector is not only evidence of an efficient financial service sector, but it is also a key barometer for measuring a healthy economy. Merton (2005) noted that in the absence of a financial system that can provide the means for transforming technical innovation into broad implementation, technological progress will not have significant and substantial impact on the economic development and growth.

Beenstock, Dickinson and Khajuria (1986) found that nonlife insurance demand is associated with GDP per capita in a sample of twelve industrialized countries between 1970 and 1981. Qutreville (1990), Browne, Chung, and Frees (2000) obtained similar empirical results using the data from OECD Countries over the 1986-1993 period. Browne and Kim (1993) found that life insurance consumption per capital is positively associated

with GDP per capita for a sample of 45 countries in the period of 1980 to 1987. Qutrville (1996) found that life insurance demand is positively associated with GDP per capita, but not with financial development, in a sample of 48 developing countries for the year 1986. Ward and Zurbruegg (2000) studied the potential causal relationship between economic growth and insurance market activity for nine OECD countries for the period 1961-1996, using annual real GDP as a measure of economic activity and annual real total written premiums as a measure of insurance activity. Long-term relationships for five countries (Australia, Canada, France, Italy and Japan) are found using a vector autoregression error correction model on a country-by-country basis. Macro Arena (2008) employed the generalized method of moments (GMM) for dynamic models of panel data for 55 countries between 1976 and 2004 to test whether there is a causal relationship between insurance market activity and economic development, finding that both life and nonlife insurance have a positive and significant causal effect on economic growth. Chang (2012) applied the bootstrap panel Granger causality test to test whether insurance activity promote output using data from twelve OECD countries between 1979 and 2008. Empirical results indicated a one-way activity for most of these countries with the exception of Japan, Netherlands and Sweden, and a feedback between output and insurance activity in both Italy and the United Kingdom.

Research Methodology and Sources of Data

Methodology : In estimating the model for the study, three steps methodology was used. These steps include :

1. Univariate statistical analysis of time series (test for unit root). This test ascertains the stationarity and non-stationarity status of the data series.
2. Cointegration analysis and the estimation of the long-run equilibrium models on life insurance, nonlife insurance, inflation and their impact on economic growth using Johansen cointegration test.
3. Short run analysis using the ordinary least squares regression method to see the impact of the independent variables on the dependent variable.

Therefore, this study specifies the following multiple regression equation using aggregate data for the variables.

$$RGDP = b_0 + b_1 CINSS + b_2 INFR + U$$

where

RGDP = Real Gross Domestic Product of the economy

CINSS = Contribution of Insurance Sector

INFR = Inflation Rate

U = Stochastic or error term

The apriori expectation of the model is that insurance sector's contribution (CINSS) is expected to have positive relationship with economic growth, while inflation rate (INFR) is expected to have an inverse relationship with growth of an economy.

Data – Annual time series data were collected on real GDP proxied for economic growth, insurance sector and inflation. The annual data covers the period 1970 to 2011. The choice of this period was guided by data availability consideration. The data were obtained from the Central Bank of Nigeria Statistical Bulletin and publication of National Insurance Commission (NAICOM) Annual Report.

Table 1 Stationarity Test

VARIABLES	AUGUMENTED DICKEY FULLER STATISTICS	PHILLIPS-PERRON TEST STATISTICS	ORDER OF INTEGRATION	MAXIMUM NO. OF LAG
RGDP	-5.322592	-5.655312	I(1)	2
CINSS	-4.945936	-4.966304	I(1)	2
INFR	-5.831692	-7.965520	I(1)	2

Source : Author's Computation using E-view 7.1

Unit root tests are conducted for the variables using the Augumented Dickey Fuller test and the Phillips-Perron test and the results are presented in table 1. Note that the Mackinnon (1996) critical values for the Augumented Dickey Fuller test and the Phillips-Perron test estimation at 1%, 5% and 10% significance levels are : -2.644302, -1.952473 and -1.610211 respectively. Stationarity (unit root) test conducted for the set of variables enumerated above revealed that all the variables are I(1) variables (Integrated of order 1). That is, they are not stationary at levels but are all stationary at their various first differences. Since all the variables are stationary in the first level, this supports performing the cointegration test.

Table II Cointegration Test
 Unrestricted Cointegration Rank Test (Trace)

Hypothesized No. of CE(s)	Eigenvalue	Trace Statistic	0.05 Critical Value	Prob.**
None *	0.503057	35.76838	24.27596	0.0012
At most 1 *	0.388275	14.78997	12.32090	0.0189
At most 2	0.001525	0.045783	4.129906	0.8609

Trace test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Unrestricted Cointegration Rank Test (Maximum Eigenvalue)

Hypothesized No. of CE(s)	Eigenvalue	Max-Eigen Statistic	0.05 Critical Value	Prob.**
None *	0.503057	20.97840	17.79730	0.0161
At most 1 *	0.388275	14.74419	11.22480	0.0116
At most 2	0.001525	0.045783	4.129906	0.8609

Max-eigenvalue test indicates 2 cointegrating eqn(s) at the 0.05 level

* denotes rejection of the hypothesis at the 0.05 level

**MacKinnon-Haug-Michelis (1999) p-values

Johansen Cointegration test is performed in order to explore the cointegration relationship. This test allows estimating the cointegration relationships among the variables using Trace and Maximum Eigenvalue tests. The information about the existence of the long-run relationships among real GDP, CINSS and INFR is shown in table II. The table shows both Trace and Maximum Eigenvalue tests. The results from Table II indicate that the null hypothesis of no cointegrating vector is rejected by both the Trace and Maximum Eigenvalue tests. Thus, RGDP, CINSS and INFR are cointegrated, and there is a long-run relationship among them. Having confirmed that the variables are cointegrated, the study proceeded to run the regression analysis of both the endogenous and exogenous variables specified in the econometric equation. The results of the regression analysis are shown and presented in table (III) and table (IV) below.

Table III

Dependent Variable: RGDP

Method: Least Squares

Date: 04/18/16 Time: 13:16

Sample: 1981 2012

Included observations: 32

Variable	Coefficient	Std. Error	t-Statistic	Prob.
\hat{C}	10.73144	0.377297	28.44298	0.0000
CINSS	0.317984	0.048810	6.514686	0.0000
INFR	-0.213459	0.004575	-0.756117	0.4557
R-squared	0.623278	Mean dependent var		12.82374
Adjusted R-squared	0.597297	S.D. dependent var		0.740129
S.E. of regression	0.469677	Akaike info criterion		1.415518
Sum squared resid	6.397307	Schwarz criterion		1.552931
Log likelihood	-19.64829	Hannan-Quinn criter.		1.461067
F-statistic	23.98993	Durbin-Watson stat		1.834823
Prob(F-statistic)	0.000001			

Table IV Presentation of Regression Result

Variables	Estimated Coefficient	T-Value	Apriori Expectation	Inference
Constant term	10.73144	28.44298	$b_0 > 0$	Correct sign and significant
CINSS	0.317984	6.514686	$b_1 > 0$	Correct sign and significant
INFR	-0.213459	-0.756117	$b_2 < 0$	Correct sign and significant
Significant at 5%		$R^2 = 0.62$		DW = 1.8

Source : Author's Computation, 2016

The short run result in table III shows that there is a positive relationship between insurance sector and economic growth in the Nigerian economy, given the coefficient of 0.317984, which is statistically significant with a t-value of 6.514686. This can be interpreted as a one unit increase in insurance consumption would bring about 31.79 units increase in real gross domestic product. This implies that insurance sector is a significant variable that can transform the growth of an economy. When the citizens of a country consume various services being rendered by the insurance sector, there will be significant improvement in her real gross domestic product (RGDP). From the estimated result, there is an inverse relationship between inflation and economic growth in Nigeria, given the coefficient of -0.213459 which is statistically insignificant with a t-value of -0.756117. This suggests that a one unit rise in inflation rate would reduce real gross domestic product by 21.3 units. This confirms apriori theoretical expectation that there is an inverse relationship between inflation rate and real gross domestic product.

The coefficient of determination (R^2) indicates that over 62 percent changes in the real gross domestic product (RGDP) are explained by contribution of insurance sector (CINSS) and inflation (INFR) taken together. This is a nice fit as the unexplained variation is just 38 percent. The remaining 38 percent could be attributed to some other factors affecting real gross domestic product outside this model. This model as specified is statistically significant given its F-test to be 23.98993. The F-statistic value of 23.98993 is high enough, this shows the overall significance of the model and this indicates that collectively, all the explanatory variables are important determinants of economic growth. The value of Durbin-Watson is 1.834823 for the model. This falls within the determinate region and this implies that the model is free from autocorrelation problem. Since insurance sector exerts a statistically significant positive relationship with economic growth in the model, thus, null hypothesis is rejected while alternative hypothesis is accepted which states that there is a significant positive relationship between insurance sector contribution and economic growth in Nigeria.

Table V

Pairwise Granger Causality Tests

Date: 04/18/16 Time: 13:19

Sample: 1981 2012

Lags: 2

Null Hypothesis:	Obs	F-Statistic	Prob.
CINSS does not Granger Cause RGDP	30	8.72176	0.0013
RGDP does not Granger Cause CINSS		3.28636	0.0541

From table V above, the result indicates that there is a bilateral causality between insurance sector contribution and economic growth in Nigeria. For both hypotheses, their F-statistic values are greater than their respective probability values ($8.72176 > 0.0013$ and $3.28636 > 0.0541$). This implies that insurance sector contribution granger caused the economic growth, and also economic growth granger caused the insurance sector contribution. The result indicates that insurance sector activity could accelerate economic growth, and also economic growth could stimulate insurance sector activity. Policies that would stimulate insurance sector activity and accelerate economic growth should be pursued by government at various levels.

Conclusion and Recommendations

This paper investigated the linear and causal relationships between insurance sector activity and economic growth in Nigeria based on annual data for the period 1981-2012 using Augumented Dickey Fuller test, Phillips-Perron test, Johansen Cointegration test, Pairwise Causality test and Ordinary Least Square Regression Analysis via Microsoft 7.1 econometric software. The model was found to be significant and most of its estimates are as expected. The overall results show that insurance sector activity exerts a statistically significant positive relationship with economic growth in Nigeria. The study further revealed that there is an inverse relationship between inflation and economic growth. The causality test conducted revealed that there is a bidirectional causal relationship between insurance sector activity and economic growth. This implies that insurance sector activity granger caused economic growth, and also economic growth granger caused insurance sector activity.

Based on the estimated results, the following recommendations are made :

-Government at all levels should provide enabling environment for insurance sector to develop because of the

sector's capability to absorb risks of other sectors and also its ability to provide the necessary long term fund for investment.

–There should be substantial investment on infrastructural development by government at various levels to attract both domestic and foreign investments which can spur economic growth and provide market for insurance services in the economy.

–Incentives should be given to potential industrialists both local and foreign inform of favorable fiscal policy in order to encourage them to establish various types of industries that would increase economic growth and create demand for insurance services.

References

- Adjasi, C. K., & Biekpe, N. (2006). Stock market development and economic growth : the case of selected African Countries. *African Development Review*, 18(1), pp. 144-161.
- Ahmed, A. D., & Wahid, A. N. M. (2011). Financial structure and economic growth link in African Countries : a panel cointegration analysis. *Journal of Economic Studies*, 38(3), pp. 331-357.
- Arena, M. (2008). Does insurance market activity promote economic growth? A cross- country study for industrialized and developing countries. *Journal of Risk and Insurance*, 75(4), pp. 921-946.
- Beenstock, M., Dickson, G., & Khajuria, S. (1988). The relationship between property-library insurance penetration and income: An international analysis. *The Journal of Risk and Insurance*, 55 (2), pp. 259-272.
- Blum, D., Federmaier, K., Fink, G., & Haiss, P. (2002). The financial real-sector nexus : Theory and empirical evidence, IEF Working Paper No 43, Research Institute for European Affairs, University of Economics and Business Administration Vienna, <http://fgr.wu-wien.ac.at/institut/ef/nexus.html>.
- Browne, M. J., & Kim, K. (1993). An international analysis of life insurance demand. *The Journal of Risk and Insurance*, 60(4), pp.616-634.
- Browne, M. J., Chung, J. W., & Frees, E. W. (2000). International property-liability insurance consumption. *The Journal of Risk and Insurance*, 67(1), pp. 73-90.
- Chang, T. Y., & Hsieh, W. K. (2012). Does insurance activity promote output? Further evidence based on bootstrap panel granger causality test, Working Paper, Feng Chia University.
- Dickey, D. A. & Fuller, W. A. (1979). Distributions of the estimations for autoregressive time-series with a unit root. *Journal of American Statistics Association*, 75, pp. 427-831.
- Engel, R. F. & Granger, C. W. J. (1987). Cointegration and error correction : representation, estimation and testing. *Econometrica*, 55(2), pp. 251-276.
- Han, L. et al. (2010). Insurance development and economic growth. *The Geneva Papers on Risk and Insurance*, 35(3), pp. 183-199.
- Impavido, G., Musalem, A. R., & Tressel, T. (2003). The impact of actual savings institutions on securities markets. The World Bank, Policy Research Working Paper 2948.
- Kagochi, J. M., Omar, M., Nasser, O. M., & Kebele, E. (2013). Does financial development hold the key to economic growth? The case of Sub-Saharan African. *Journal of Development Areas*, 47(2), pp. 61-79.
- Kugler, M., & Ofoghi, R. (2005). Does insurance promote economic growth? Evidence from the United Kingdom. Paper presented at the Money, Macro and Finance (MMF) Research Group Conference. Available at : [http://repec.org/mmfc05/paper 8. Pdf](http://repec.org/mmfc05/paper%208.Pdf) (Accessed on sept. 2008).
- Lee, C. C. (2011). Does insurance matter for growth? Empirical evidence from OECD countries. *The Journal of Macroeconomics*, 11(1), Article 18.
- Merton, R. C. (2005). Financial innovation and economic performance. *Journal of Applied Corporate Finance*. 4(4), pp. 12-22.
- Nzue, F. F. (2006). Stock market development and economic growth : evidence from Cote'Divoire. *African Development Review*, 18(1). Available at <http://dx.doi.org/10.1111/j.1767-8268.2006.00135x>.
- Odhiambo, N. M. (2007). Supply-leading versus demand following hypothesis : empirical evidence from the Sub-Saharan African Countries. *African Development Review*, 19(2), pp. 257-280.
- Outreville, J. F. (1990). The economic significance of insurance markets in developing countries. *The Journal of Risk and Insurance*, 57(3), pp. 487-498.
- Outreville, J. F. (1996). Life insurance markets in developing countries. *The Journal of Risk and Insurance*, 63(2), pp. 263-278.
- Seetinah, B., Ramessar, S. T., & Rojid, S. (2008). Financial development and economic growth : New evidence from a sample of Island economies. *Journal of Economic Studies*, 36(2), pp. 124-134.
- Ward, D., & Zurbrugg, R. (2000). Does insurance promote growth? Evidence from OECD economies. *The Journal of Risk and Insurance*, 67(4), pp. 489-506.
- Webb, I. P., Grace, M. F., & Skipper, H. D. (2002). The effect of banking and insurance on the growth of capital and output. Centre for Risk Management and Insurance, Working Paper No. 02-1, Robinson College of Business, Georgia State University, Atlanta.