LIFE INSURANCE, FINANCIAL DEVELOPMENT AND ECONOMIC GROWTH IN SOUTH AFRICA: AN APPLICATION OF THE AUTOREGRESSIVE DISTRIBUTED LAG MODEL

Athenia Bongani Sibindi*

Abstract

The life insurance sector may contribute to economic growth by its very mechanism of savings mobilisation and thereby performing an intermediation role in the economy. This ensures that capital is provided to deficient units who are in need of capital to finance their working capital requirements and invest in technology thereby resulting in an increase in output. In this way, it could be argued that life insurance development spurs financial development. In this article we investigate the causal relationship between the life insurance sector, financial development and economic growth in South Africa for the period 1990 to 2012 by applying the ARDL bounds testing procedure. We make use of life insurance density as the proxy for life insurance development, real per capita growth domestic product as the proxy for economic growth and real broad money per capita as the proxy for financial development. We test for cointegration amongst the variables by applying the bounds test and then proceed to test for Granger causality based on the error correction model. Our results confirm that the variables are cointegrated and move in tandem to each other in the long-run. The results also indicate that the direction of causality runs from the economy to the life insurance sector in the short-run which is consistent with the "demand-following" insurance-growth hypothesis. There is also evidence of bidirectional Granger causality running from the economy to financial development and vice versa, both in the long-run and short-run. The results also reveal that life insurance complements financial development in bringing about economic growth further lending credence to the "complementarity" hypothesis.

Keywords: Life Insurance, Financial Development, Economic growth, Granger Causality, ARDL, Bounds Test, South Africa

University of South Africa, Department of Finance ,Risk Management and Banking, P.O Box 392, UNISA, Pretoria 0003
Tel: +27(0) 12 -429 3757
Fax: +27 (0) 86-569-8848
Email: sibinab@unisa.ac.za

1 Introduction

The relationship between the life insurance sector, financial development and economic growth is an intriguing one and continues to preoccupy the minds of scholars in the field. Hitherto the finance-growth nexus research has largely focused on either the banking sector or the stock market. Scant research has been conducted to unravel the relationship between the life insurance sector, financial development and the real sector. It is imperative to highlight that the life insurance sector plays a critical role to any economy by its very mechanism of promoting savings by way of life policies, and hence fostering intermediation. Moreover its ability to pool funds in the form of premiums enables it to be an important institutional investor. Such funds can be used to buy equity of other firms, which capital will be used by such companies to buy equipment, plant or other technological innovations, resulting in those companies realising economies of scale and hence

increased output. The life insurance sector also increases liquidity in the market as investors who are involved in the securitisation of home loans. Thus they bear the risk and hence allow banks to advance more loans to the population at large. This results in more credit being extended and hence will impact on financial development.

The present study aims to contribute to the finance-growth nexus literature by specifically focusing on the life insurance sector in the context of South Africa. Hitherto the studies that have been conducted focusing on South Africa have largely been of a cross-sectional or panel nature (See for example Han, Li, Moshirian etal, 2010 and Azman-Saini and Smith, 2011). The major disadvantage of panel data methods of analysis is that the country specific effects could be ignored or at worst lost altogether in the analysis. As such it is essential to also interrogate the relationship between life insurance, financial development and economic growth by conducting time series studies based on South Africa. The

motivation in selecting South Africa as the focus of this study lies in its stage of development and the sophistication of its financial sector notwithstanding that it is a developing country.

The impetus behind this study is also to establish the nature of the relationship between the life insurance sector, financial development and economic growth in South Africa in light of the findings by Ward and Zurbruegg (2000) which are later corroborated by Chang, Lee and Chang (2013) to the effect that the insurance-growth nexus varies from country to country. To the best of our knowledge there has been no in-depth study that has focused on South Africa. It is equally impelling that Ward and Zurbruegg (2000) suspect that cultural, regulatory, legal environment and the improvement in financial intermediation amongst other factors may confound the insurance-growth relationship. It could be argued that South Africa presents itself as the best case study as it has a very diverse culture, its financial system has improved vastly over the years and attendant to this the regulatory environment has also evolved over the years.

We thus also hope to chat the way forward for policy makers in South Africa as they grapple with policies that are aimed at recovering her economy and securing the financial sector, specifically targeted at the insurance sector. To this end there has been a raft of reforms that have been proposed. Amongst others, these include the Solvency Assessment Management (SAM) regime whose main aim is to improve the capital and solvency levels of insurance companies as well as the Treating Customers Fairly (TCF) regulations which are aimed at protecting the insurance consumers. We intend to investigate the causal relationship between life insurance, financial development and economic growth by first testing for cointegration amongst the variables for a long run relationship by applying the Johansen procedure. We will then estimate a Vector Error Correction Model (VECM). Lastly we will then conduct Granger Causality/Block Exogeneity tests based on the vector error correction model to determine the nature and direction of flow of causality amongst the variables.

The remainder of paper is arranged as follows: the next section reviews the literature about the insurance-growth nexus. Section 3 reviews the empirical literature. Section 4 gives an overview of the life insurance sector in South Africa. Section 5 describes the data, methodology and presents the empirical results. Section 6 discusses economic and policy implications and then Section 7 concludes.

2 Review of literature: insurance and growth nexus

The finance- economic growth nexus theory has evolved over the years and can be traced to the works of Schumpeter (1912) and later McKinnon (1973). The main argument by Schumpeter was the important role played by financial institutions in spurring technological innovation and economic activities. The financial activities of savings mobilisation, project evaluation, risk monitoring and management facilitate these two functions. On the other hand McKinnon posits that financial development is stunted by restrictive government regulations, interest rate ceilings, loan subsidies and high reserve requirements for the banking sector.

It would seem that there is consensus amongst the scholars when characterising the finance-growth nexus as follows: (1) there is no causal relationship; (2) the causal relationship is demand-following, that is, economic growth leads to a demand in financial services; (3) the causal relationship is supply-leading, that is growth in the financial sector will spur economic growth; (4) negative causal relationship from finance to growth; (5) interdependence.

Hitherto extant studies have interrogated the finance-growth nexus by mainly focusing on the stock markets and the banking sector. There is scant research that focuses on the insurance sector. The importance of the insurance sector in economic development continues to seize the attention of scholars and has gained prominence over the last two decades. Amongst the early scholars who interrogated this relationship include Ward and Zurbruegg (2000). They aver that insurance is important to economic development mainly because of the following two reasons: (1) the benefits that accrue as a result of the insurance company being an agent of risk transfer and indemnification and (2) the benefits that accrue as a result of the insurer undertaking activities as a financial intermediary. Using a sample of nine OECD countries they come to the conclusion that the causal relationships between economic growth and insurance market development may well vary across countries. Further they contend that the influence of insurance market development while channelled through indemnification and financial intermediation is tempered by country specific factors.

Haiss and Sümegi (2008) are in concordance with Ward and Zurbruegg (2000) and contend that the insurance sector is important to economic growth as it can be used as a channel of risk transfer, saving and investment. In their study of 29 European countries they found out that the aggregate investment by insurance companies grew by 20% relative to gross domestic product (GDP) within the time span of 1993-2004. They go on to observe that an essential part of the contribution of insurance companies to GDP growth derives from their assets, their investment activities and the companies' setup. Thus the participation by insurance companies in the economy results in the expansion of the investment horizon, increase of market volume and improvement of market efficiency.

The latter strand of literature emphasises the investment, innovation and financial development that is spurred by the growth of the insurance sector.

According to the proponents of this view, insurance companies by providing protection could affect economic growth through the channels of marginal productivity of capital, technological innovations and saving rate (Ćurak, Lončar and Poposki, 2009). Thus insurance companies indemnify the ones who suffer a loss and stabilise the financial position of individuals and firms. They go on further to note that the possibility of transfer of risks to insurance companies induces risk adverse units to buy goods and services especially those of higher values. In this way insurance sustains demand or consumption of goods and services which encourage production, employment and finally economic growth. Ćurak, Lončar and Poposki (2009) also propound that insurance companies increase the availability of funds through their innovative products which provides protection from credit risk to other financial intermediaries. In that way financial intermediaries become more willing to lend funds for financing real investments that encourage economic growth. They also contend that insurance could affect economic growth through the saving rate channel by offering various life insurance products that combine risk protection and saving benefits. Further they argue that insurers lower transaction costs or achieve economies of scale by collecting funds from dispersed economic units who pay relatively small premiums and by allocating these amassed funds to deficit economic units in order to finance large projects.

According to Azman-Saini and Smith (2011) insurance companies as financial intermediation agents create another dimension of competition in the market for intermediated saving which is expected to promote productive efficiency. Furthermore improved financial intermediation services allow investors to hold diversified investment portfolios, which facilitate a willingness to invest in risky high-productivity projects. Moreover, insurance markets boost liquidity which facilitates a flow of funds to capital-accumulating projects, resulting in the expansion of the economy. Further they posit that insurance may also have an indirect impact on output growth via its potential impact on the development of banks and stock markets. They contend that, for example, the provision of protection services to customers against risks that might otherwise leave them unable to repay their debts may promote bank lending.

In sum the relationship between the life insurance sector, financial development and the real sector could be classified in terms of causality with respect to six possible null hypotheses:

H_1: *Life insurance sector development causes economic growth*

H_2: *Life insurance sector development causes financial development*

H_3: *Financial development causes life insurance sector growth*

H_4: *Financial development causes economic growth*

H_5: *Economic growth causes life insurance sector development*

H_6: *Economic growth causes financial development*

3 Review of the empirical literature

Ward and Zurbruegg (2000) examined the relationship between economic growth and growth in the insurance industry for nine OECD countries. Using annual data they conducted a bivariate cointegration analysis and also tested for causality by regressing the real GDP against the total real premiums in each country from 1961 to 1996. They found out that in some countries the insurance industry Granger causes economic growth, and in other countries economic growth Granger causes the insurance sector development.

Haiss and Sümegi (2008) investigated the impact of insurance investment and premiums on GDP growth in Europe. They conducted a cross-country panel data analysis for 29 European countries for the period 2005 to 2009. The insurance indicators that they used are the gross premium income as a total sum of life and non-life premium income and total investments. They separated the aggregate sample into a group of mature market economies (mainly the "old" EU-15) and the other one consisting of former transition economies mainly the new EU member states from Central and Eastern Europe (CEE). Their results showed evidence for a correlation between insurance investments and GDP growth for EU-15 countries with mature financial markets and a short-run connection between non-life expenditure and GDP for the emerging market-type CEE countries.

Arena (2008) examined the causal relationship between the insurance market activity and economic growth in both developed and developing countries. He employed insurance penetration (insurance premiums as a percentage of GDP) as a proxy for insurance market development. By using generalised method of moments (GMM) for dynamic models of panel data for 55 countries between 1976 and 2004, he found a robust evidence for this relationship. He found that both life and non-life insurance have a positive and significant causal effect on economic growth

Ćurak, Lončar and Poposki (2009) using an endogenous growth model and panel data estimation techniques examined whether life and non-life insurance individually or collectively contribute to economic growth across a sample of 10 transition European member countries for the period 1992 to 2007. The proxy that they used for insurance development is insurance penetration. Their results indicated that insurance sector development positively and significantly promotes economic growth. The results were confirmed in terms of life, non-life insurance as well as total insurance.

Han, Li, Moshirian, et al (2010) investigated the relationship between insurance development and economic growth by employing generalised method of moments (GMM) models on a dynamic panel data set of 27 economies for the period 1994-2005. They used insurance density (premiums per capita) as a proxy for the insurance sector development. They found fairly strong evidence in favour of the hypothesis that insurance development contributes to economic growth. They find out that for the developing countries the overall insurance development, life insurance and non-life insurance development play a much important role than they do for the developed economies.

Ching, Kogid and Furuoka (2010) examined the existence of a causal relationship between the life insurance sector and economic growth in Malaysia by applying the Johansen cointegration test and the Granger causality test based on the Vector Error Correction Model (VECM). They used the total assets of the life insurance sector as an indicator for life insurance. They found out that there existed more than one cointegrating relationship between the real GDP and the total assets of life insurance sector. The study further showed that the real GDP of Malaysia was Granger caused by the total assets of Malaysian life insurance sector in the short run.

Azman-Saini and Smith (2011) investigated the impact of insurance sector development on output growth, capital accumulation and productivity improvement using data from 51 countries (both developing and developed) for the period 1981-2005. They employed the life insurance penetration ratio as a proxy for the development of insurance markets. Making use of panel data methods of analysis they find evidence that insurance sector development affects growth predominantly through productivity improvement in developed countries, while in developing countries it promotes capital accumulation.

Islam (2012) utilised the error correction mechanism to test the causal relationship between the development of non-bank financial intermediaries (NBFIs) and economic growth in Malaysia over the period 1974-2004. He used the financial assets as the proxy for NBFI development. He then conducted Granger causality tests based on the vector error correction mechanism (VECM) and found out that there is a unique long-run causality running from nonbank financial intermediaries to economic growth.

Horng, Chang and Wu (2012) tested for a dynamic relationship amongst insurance demand, financial development and economic growth in Taiwan between 1961 and 2006. They used a three variable Vector Autoregressive (VAR model) with insurance density (premiums per capita) utilised as the proxy for insurance demand. They found out that in the short run, economic growth Granger causes insurance demand and financial development Granger causes economic growth. These results supported the 'supply-leading theory' link from financial development to economic growth and the 'demand-following theory' link from economic growth to insurance demand.

Chi-Wei, Hsu-Ling and Guochen (2013) applied the bootstrap Granger causality test to examine the relationship between insurance development and economic growth in 7 Middle Eastern countries. They used insurance density as the indicator for insurance development. They found evidence for bi-directional causality between the life insurance sector and economic growth in the higher income countries such as United Arab Emirates, Kuwait and Israel. They also found that economic growth Granger causes non-life insurance development in the low income countries of Oman, Jordan and Saudi Arabia.

Chang, Lee and Chang (2013) studied the relationship between insurance and economic growth by conducting a bootstrap panel Granger causality test using data from 10 OECD countries over the period of 1979-2006. They employed the life insurance, non-life insurance premiums and total insurance premiums as the proxies for insurance market activities. Their results were mixed and they found evidence of one-way Granger causality running from insurance activities to GDP in 5 out of OECD countries, namely France, Japan, Netherlands, Switzerland and the UK. Thus insurance is of great importance for economic growth in these countries. Secondly they found evidence of one-way Granger causality running from GDP to insurance activities in Canada (for life insurance activity), Italy (for total and life insurance activities) and the US (for total and non-life insurance activities). This result indicated that economic growth can increase demand of insurance and thus lead to the development of insurance markets. Thirdly they found out that in the US, there was two-way Granger causality (feedback) between life insurance activity and GDP lending credence to both the "supply-leading" and "demand-following" hypotheses. This result suggested that in the US the life insurance market and economic growth are both endogenous indicating that they mutually influence each other. Finally they found no causal relationship between insurance activities and GDP in Belgium (for all insurance activities), Canada (for total and non-life insurance activities), Italy (for non-life insurance activity) and Sweden (for life insurance activity). These results were consistent with the "neutrality hypothesis" for the insurance-growth nexus. This implied that insurance development and economic growth may not influence each other in those sectors and in Belgium.

4 An overview of the life insurance sector in South Africa

The insurance sector in South Africa comprises of 79 long-term insurers and 7 long-term reinsurers, (FSB, 2012). In South Africa the insurance companies that

transact life insurance business are referred to as long-term insurers.

The key metrics of the insurance companies for the period 2011 to 2013 are given in Tables 1 and 2. The gross premiums of long-term insurance companies show a remarkable growth of 43% from about R301 billion registered in 2011 to roughly R430 billion registered in 2013. A similar trend is observed when evaluating the total assets with the long-term insurance industry registering a phenomenon growth in total assets of 32% from roughly R1, 7 trillion in 2011 to R2, 3 trillion in 2013.

The information provided in Table 2 depicts the investment vehicles of the insurance companies. It would seem that for the long-term insurers the top three investment vehicles in order of importance are: equities and collective investment schemes, debentures and loan stock and cash and deposits. Thus it would seem that the long-term insurance companies play a critical role in intermediation, savings and resource mobilisation.

Table 1. The gross premiums and total assets of long-term insurance companies in South Africa

	2011	**2012**	**2013**
Gross Premiums / R'mil	300 650	358 967	429 703
Total Assets / R'mil	1 722 777	2 000 555	2 278 148

Source: author's own compilation, data from FSB (2013)

Table 2. **The investments composition of long term insurance companies in South Africa**

	2011	**2012**	**2013**
Cash and deposits / R'mil	205 790	221 377	193 901
Government and semi-government / R'mil	191 549	173 874	178 194
Equities /R'mil	862 648	1 221 629	1 470 533
Debentures and loan stock / R'mil	128 379	176 585	215 743
Immovable Property / R'mil	58 833	58 152	49 571
Fixed Assets / R'mil	181 838	2 112	2 367
Debtors / R'mil	94 965	118 589	133 930
Outstanding Premiums / R'mil	-	-	-
Other Assets / R'mil	0	28 235	33 909
Total Assets / R'mil	1 724 002	2 000 555	2 278 148

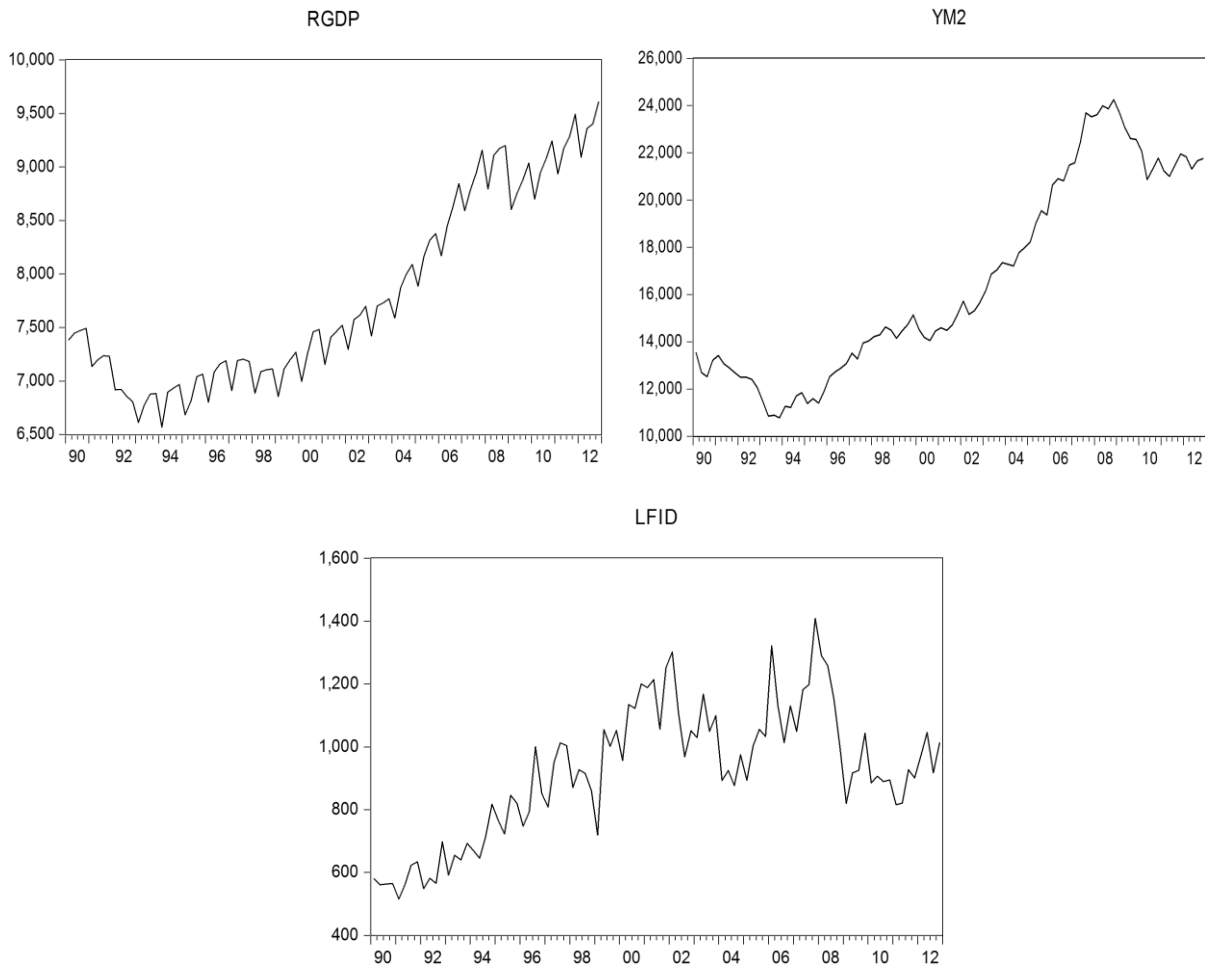Source: author's own compilation, data from FSB (2013)

5 Data and methodology

5.1 *Measures of life insurance and financial development*

In this paper we make use of insurance density as a proxy to gauge the level of insurance sector development in South Africa. Insurance density is defined as premiums per capita, measured by quarterly premium payments divided by the population. This follows the procedure adopted by Han, Li, Moshirian, et al, 2010 and Horng, Chang and Wu, 2012 amongst other. In our model we make use of quarterly data. We employ the real gross domestic product (RGDP) per capita as a proxy for economic growth, long-term insurance density (LFID), as a proxy for life insurance development and real broad money per capita (YM2) as the proxy for financial development. The quarterly, gross domestic product, real broad money and insurance premium data for the years 1990 to 2012 were obtained from the South Africa Reserve Bank (SARB) database. The national population figures were extracted from the International Financial Statistics (IFS) database. A GDP deflator was applied on the nominal values to calculate the real values, with the year 2000 being set as the base year.

Figure 1. Trends of life insurance development indicators in South Africa during the period 1990 to 2012

Source: author's own compilation, data from SARB (2013)

The trends in life insurance development, financial development and economic growth are shown in Figure 1. The gross domestic product per capita (RGDP) shows an upward trend, though it takes a dip between 1991 and 1992. It then peaks at around R9000 at the end of 2008 then declines in 2009 before it ultimately recovers. This is explicable as it corresponds to the period of financial crises. Long-term insurance density (LFID) shows a much steeper sustained upward growth from levels around R560 per capita in 1990 to a peak of around R1400 per capita in 2007. It would then decline to about R820 per capita in 2009 before it recovered to levels around R1020 per capita in 2012. Broad money supply per-capita also exhibits a similar trend starting from a high of R13500 per capita in 1990, it will initially decline to the lowest level of around R10780 in 1994. It would then increase to a pick level of around R24260 per capita at the end of 2008 before it declines to a low level of R20 870 in 2010 before it eventually recovers to levels around R21760 in 2012. Thus it is evident that the series exhibit some form of

co-movement and hence we suspect that they are cointegrated in the long run.

5.2 Empirical model specification and estimation techniques

In order to investigate the relationship between life insurance, financial development and economic growth, we first test for the existence of any long-run cointegrating relationship among [RGDP, LFID, and YM2] by employing the bounds testing approach to cointegration. We will then test for short run dynamics by applying the Granger causality test.

5.2.1 Stationarity tests

The variables were subjected to stationarity tests. These were the Phillips-Perron and Augmented Dickey Fuller tests. The results of the stationarity tests are presented in Table 3. All variables were found to be non-stationary when tested at their levels. They became stationary when differenced once. As such it can be concluded that the variables are integrated and of order one.

Table 3. Stationarity Tests

Variable	Phillips-Perron		Augmented Dickey-Fuller		Order of Integration
	With constant	With constant and trend	With constant	With trend and constant	
LRGDP	0.3262	-3.1439	-0.3595	-3.1781*	I(1)
DLRGDP	-13.7056***	-16.6755***	-2.6323*	-2.6401	I(0)
LLFID	-2.3668	-2.8545	-2.2131	-2.2536	I(1)
DLLFID	-16.1380***	-21.4943***	-13.2318***	-13.2352***	I(0)
LYM2	-2.4912	-5.6073***	0.0113	-2.4185	I(1)
DLYM2	-8.2299***	-8.1793***	-8.2118***	-8.1589***	I(0)

* represents a stationary variable at 10% level of significance.
** represents a stationary variable at 5% level of significance.
*** represents a stationary variable at 1% level of significance.

5.2.2 ARDL bounds test for cointegration

In order to empirically analyse the long run relationships and short run dynamic interactions amongst the variables, we apply the autoregressive distributive lag (ARDL) technique. The ARDL cointegration approach was developed by Pesaran and Shin (1998) and Pesaran et al. (2001). It has three advantages when compared to other previous and traditional cointegration methods. The first is that, the ARDL does not need all the variables under study to be integrated of the same order and can be applied when the underlying variables are integrated of order one, zero or fractionally integrated. The second advantage is that the ARDL test is relatively more efficient in the case of small and finite sample data sizes. The third and last advantage is that by applying the ARDL technique, we obtain unbiased estimates of the long-run model. We test for the existence of any long run cointegrating relationship based on the unrestricted error correction model which can be expressed as follows:

$$\Delta lrgdp_t = a_{01} + b_{11}lrgdp_{t-1} + b_{21}llfid_{t-1} + b_{31}lym2_{t-1} + \sum_{i=1}^{n} a_{1i}lrgdp_{t-1}$$
$$+ \sum_{i=1}^{n} a_{2i}\Delta llfid_{t-1} + \sum_{i=1}^{n} a_{3i}\Delta lym2_{t-1} + \varepsilon_{1t} \tag{1}$$

$$\Delta llfid_t = a_{02} + b_{12}lrgdp_{t-1} + b_{22}llfid_{t-1} + b_{32}lym2_{t-1} + \sum_{i=1}^{n} a_{1i}llfid_{t-1}$$
$$+ \sum_{i=1}^{n} a_{2i}\Delta lrgdp_{t-1} + \sum_{i=1}^{n} a_{3i}\Delta lym2_{t-1} + \varepsilon_{2t} \tag{2}$$

$$\Delta lym2_t = a_{03} + b_{13}lrgdp_{t-1} + b_{23}llfid_{t-1} + b_{33}lym2_{t-1} + \sum_{i=1}^{n} a_{1i}lym2_{t-1}$$
$$+ \sum_{i=1}^{n} a_{2i}\Delta llfid_{t-1} + \sum_{i=1}^{n} a_{3i}\Delta lrgdp_{t-1} + \varepsilon_{3t} \tag{3}$$

Where:
lrgdp = logarithm of the per capita real gross domestic product (economic growth) variable
llfid = logarithm of the long term insurance density variable
lym2 = logarithm of the broad money per capita (financial development) variable
Δ = first difference operator
ε_t= white noise error terms

The bounds test is mainly based on the joint F-statistic whose asymptotic distribution is non-standard under the null hypothesis of no cointegration. The first in the ARDL bounds approach is to estimate the three equations [(1)-(3)] by ordinary least squares (OLS). The estimation of the three equations tests for the existence of a long-run relationship among the variables by conducting an F-test for the joint significance of the coefficients of the lagged levels of the variables, that is; H_0: b_{1i}= b_{2i} = b_{3i}=0 against the alternative one H_A: $b_{1i} \neq b_{2i} \neq b_{3i} \neq 0$ for i =1, 2 and 3. We denote the F-statistic of the test which normalises

on *lrgdp* by $F_{lrgdp}(lrgdp\backslash lym2, llfid)$, similarly the F-statistics for the tests on *lym2* and *llfid* as $F_{lym2}(lym2\backslash lrgdp, llfid)$ and $F_{llfid}(llfid\backslash lrgdp, lym2)$ respectively. Two sets of critical values for a given level of significance can be determined (Pesaran et al., 2001). The first level is calculated on the assumption that all variables are integrated of order zero, whilst the second level is calculated under the premise that the variables are integrated of order one. The null hypothesis of no cointegration is rejected when the value of the test statistic exceeds the upper critical bounds value, while it cannot be rejected if the F-statistic is lower than the bounds value. If the F-statistic falls within the bounds then the cointegration test becomes inconclusive.

Two steps are used in the ARDL bounds testing procedure. Firstly we determine the optimum lag length selection criteria for the unrestricted models. For all three models the optimum lag length is lag 5. In the second step we apply the bounds F-test in order to ascertain whether there exists a long-run relationship between the variables under study. The results of the bounds test are reported in Table 4.

Table 4. Bounds F-test for cointegration

Dependent variable	Optimum Lag Length	F-statistic	Decision
$F_{lrgdp}(lrgdp\backslash lym2, llfid)$	5	4.8344[**]	Cointegration
$F_{lym2}(lym2\backslash lrgdp, llfid)$	5	4.5185[*]	Cointegration
$F_{llfid}(llfid\backslash lrgdp, lym2)$	5	2.9269	No cointegration
Lower-bound critical value at 1%	4.99		
Upper-bound critical value at 1%	5.85		
Lower-bound critical value at 5%	3.88		
Upper-bound critical value at 5%	4.61		
Lower-bound critical value at 10%	3.38		
Upper-bound critical value at 10%	4.02		

Notes: *, ** and *** denote statistical significance at the 10%, 5% and 1% level respectively

Lower and upper-bound critical values are taken from Pesaran, Shin and Smith (2001) Table CI(iv) Case IV.

The results reported in Table 2 show that there is evidence of cointegration when the variables real per capita GDP *(lrgdp)* and real per capita broad money *(lym2)* are taken as dependent variables. However when long term insurance density *(lltid)* is taken as the dependent variable, the results of the bounds-testing procedure show that there is no cointegrating relationship.

5.2.3 Granger causality

Having established the cointegrating relationship between the economic growth, financial development and life insurance variables, we proceed to perform Granger Causality tests based on an error correction model. This follows the procedure adopted by Odhiambo (2009) and Narayan and Smyth (2006). The model is specified as follows:

$$\Delta lrgdp_t = a_{01} + \sum_{i=1}^{n} a_{1i} lrgdp_{t-1} + \sum_{i=1}^{n} a_{2i} \Delta llfid_{t-1} + \sum_{i=1}^{n} a_{3i} \Delta lym2_{t-1} + ECM_{t-1} + \varepsilon_{1t} \qquad (4)$$

$$\Delta llfid_t = a_{02} + \sum_{i=1}^{n} a_{1i} llfid_{t-1} + \sum_{i=1}^{n} a_{2i} \Delta lrgdp_{t-1} + \sum_{i=1}^{n} a_{3i} \Delta lym2_{t-1} + ECM_{t-1} + \varepsilon_{2t} \qquad (5)$$

$$\Delta lym2_t = a_{03} + \sum_{i=1}^{n} a_{1i} lym2_{t-1} + \sum_{i=1}^{n} a_{2i} \Delta llfid_{t-1} + \sum_{i=1}^{n} a_{3i} \Delta lrgdp_{t-1} + ECM_{t-1} + \varepsilon_{3t} \qquad (6)$$

Where ECM_{t-1} = lagged error correction term obtained from the long-run equilibrium relationship.

The existence of a long-run relationship between *rgdp, lfid and ym2* suggests that there must be Granger causality in at least one direction. However it does not indicate the direction of temporal causality between the variables (Odhiambo 2009). The direction of causality can thus be determined by the F-statistic and the lagged error-correction term. The empirical results are reported in Table 5. Our empirical results confirm that financial development and life insurance sector development Granger cause economic growth in the long run. This is supported by the coefficients of the error correction term which is negative and statistically significant. Further there is evidence of bidirectional Granger causality running from economic growth to financial development in the short run as F-statistics in both the economic

growth and financial development equations are statistically significant. The results also provide evidence of unidirectional Granger causality running from the economy to the long term insurance sector in the short run as the F-statistic in the life insurance sector equation is significant. However financial development and life insurance sector do not influence one another.

Table 5. Results of short-run and long-run causality tests

Dependent Variable	F statistics [p-value]			Coefficient [t-statistic]
	ΔLRGDP	ΔLYM2	ΔLLTID	ECM$_{T-1}$
ΔLRGDP	-	2.3069 [0.043]**	1.2964 [0.275]	-0.1190 [-1.9967]*
ΔLYM2	2.9337 [0.018]**	-	0.8859 [0.495]	-1.2008[-4.0071]***
ΔLLTID	1.997 [0.090]*	0.2379 [0.994]	-	-

Notes: *, ** and *** denote statistical significance at the 10%, 5% and 1% level respectively

Our results thus support the following null hypotheses that we set out to probe:

H$_4$: Financial development causes economic growth

H$_5$: Economic growth causes life insurance sector development

H$_6$: Economic growth causes financial development

6 Economic and policy implications

Our empirical results suggest that life insurance, financial development and economic growth are cointegrated, that is they move in tandem to each other in the long run. We also wish to highlight key findings and proffer policy advice. Firstly, we find evidence of one-way Granger causality running from economic growth to the life insurance sector in South Africa in the short run. This is consistent with the "demand following" insurance-growth hypothesis. These findings corroborate that of Sibindi (2014). We also find evidence of bidirectional Granger causality running from economic growth to financial development and vice versa. There is also evidence of neutrality between life insurance and financial development. It is only plausible to postulate that life insurance "complements" financial development in bringing about economic growth in the long-run. The policy implication is that the policy makers must put in place policies that will grow the South African economy. With the growth of the South African economy an enhanced demand for life insurance products will be created and hence leading to the development of the insurance sector. Further the growth of the life insurance sector through its savings mechanism will result in an increase of intermediation and hence stimulating financial development.

7 Conclusion

This paper examines the causal relationship between life insurance, financial development and economic growth in South Africa as understanding the link is critical to policy makers in their quest to grow the economy and regulate the financial services sector. We find evidence that the economic growth spurs the development of the long-term insurance sector as well as influences financial development in South Africa. Our findings lend credence to 'demand-following' insurance-growth hypothesis. Further this is also consonant with our *a priori* expectations, that for developing countries, the demand-following hypothesis subsists. Our empirical findings also lend credence to the "complementarity" hypothesis. Thus, it would seem financial development and life insurance variables complement each other, rather than substitute one another in bringing about economic growth. As the insurance-growth nexus will continue to preoccupy the minds of researchers, we also suggest that in the future the focus of this research should also turn to the interplay of culture, regulation and the influence of other financial intermediaries. It could also be telling to explore the use of other proxies for life insurance sector development such as total assets, or the insurance penetration ratio or a composite thereof.

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