UNIVERSITY OF THE WESTERN CAPE

DEPARTMENT OF ECONOMICS

ANALYSING THE RELATIONSHIP BETWEEN ECONOMIC GROWTH AND THE INSURANCE SECTOR: EVIDENCE FROM SOUTH AFRICA.

By

Mphumzi Makeleni
(3530510)

A full dissertation submitted in fulfilment of the requirement for the degree of Masters of Commerce in the Department of Economics, University of the Western Cape.

Supervisor: Prof Johannes P S Sheefeni

November 2021

DECLARATION

I declare that "***Analysing the relationship between economic growth and the insurance sector: evidence from South Africa.***" is my own work, that it has not been submitted for any degree or examination in any university, and that all the sources that I have used or quoted have been indicated and acknowledged by complete references.

Mphumzi Makeleni

Signature: ....

Date: ....

ANALYSING THE RELATIONSHIP BETWEEN ECONOMIC GROWTH AND THE INSURANCE SECTOR: EVIDENCE FROM SOUTH AFRICA.

Abstract

The connection between the real economy and the financial sector continues to be a subject of debate amongst scholars. There is a plethora of studies dedicated to unravelling the relationship between economic activity and financial progress. However, a large share of those studies has concentrated on banking and the capital market industries; the studies that have undertaken to decipher the connection between the insurance industry and prosperity in the economy are insufficient. An understanding of the connection between the insurance industry and advancement in the economy is immensely important to effect judicious policy making, which will enhance and boost the economy. The primary goal of this study is to establish if there is a connection between the insurance industry and economic advancement in the South African context. This study will attempt to achieve this objective by using a model that is controlled for the effects of important factors which affect economic growth, as endorsed in economic growth theory.

To explore the link between South Africa's insurance industry and economic growth, this study made use of secondary time-series quarterly data and employed times-series techniques of analysis such as unit root tests, ARDL bound test to cointegration, error correction model estimation and Toda-Yamamoto (non-Granger causality) tests. The results of the estimated long-run relationship reveal that long-term insurance positively affects economic growth. Conversely, short-term insurance results showed a dissimilar relationship, short-term insurance and economic growth have a negative relationship. With that being said, the long-run results of total insurance expectedly mirror the results of long-term insurance. Thus, it can be concluded that the cumulative impact of the insurance sector on the South African economy in the long run is positive. Moreover, the results found that long-term insurance results into economic growth and not the other way around. On the contrary, the results of the short-term insurance sector revealed that growth in the economy and the insurance sector have a bi-directional causal relationship; they are interdependent. Furthermore, the results of total insurance show that the relationship is supply leading, meaning that total insurance leads to economic growth and not the opposite way around.

KEYWORDS: Economic growth, Insurance, ARDL, Cointegration, Toda-Yamamoto causality

JEL: G21, G22, G23

ACKNOWLEDGEMENTS

Allow me to convey my appreciation to the following entities and individuals: To begin, I want to convey my gratefulness to God, my anchor, for providing me with the required strength and grit to see this study to completion. The journey has been a challenging one, howbeit, a fulfilling journey indeed. Secondly, my supervisor Prof Sheefeni 'JPS', if it had not been for your patience and continued support, it would have not been possible for me to complete this study, more blessings to you Sir. Thirdly, I would like to show gratitude to the National Research Foundation (NRF) for sponsoring my academic studies to pursue this milestone. Keep on making the dreams of the disadvantaged a reality. In addition, I am thankful to my mother for her sacrifices and support. You have been a peculiar pillar throughout my studies, you should be proud of your strides to ensure that I amount to something in life. I am grateful! Furthermore, I would like to show appreciation to my pastors for their undeserved support. May God continue to bless you; I do not doubt that you are celebrating this academic achievement as though it was your own. Last but not least, I recognise my peers, church and extended family for their unyielding encouragement and everyday backing, I wish you the best— I wish you a hundred and ten.

TABLE OF CONTENTS

LIST OF ABBREVIATIONS

ADF	Augmented Dickey Fuller
ARDL	Autoregressive Distributed Lag
ECM	Error Correction Model
FDI	Foreign Direct Investment
GDP	Gross domestic product
GDT	Government Debt
KPSS	Kwiatkowski-Phillips-Schmidt-Shin
LP	Labour Productivity
LTI	Long Term Insurance
OECD	Organisation for Economic Co-operation and Development
PP	Phillips-Perron
PwC	PricewaterhouseCoopers
SARB	South African Reserve Bank
Stats SA	Statistics South Africa
STI	Short Term Insurance
TI	Total Insurance

LIST OF TABLES

LIST OF FIGURES

CHAPTER ONE: INTRODUCTION

1.1 Finance-growth nexus

The connection between the real economy and the financial sector continues to be a subject of debate amongst scholars. The first to recognise the positive impact of financial innovation on economic progress was Joseph Schumpeter (1911). Financial intermediaries provide essential services which spur innovation in the technological sector, consequently impacting positively on economic growth (Schumpeter 1911). Four decades later, Robinson (1952) made a considerable contribution in the finance-growth nexus; questioning whether financial development induces economic growth or financial intermediation is merely a sprout of industrialisation. Remarkably, Robinson (1952) argued that financial innovation is a result of rapid industrialisation. According to this view, the rapid growth of enterprise creates an increased demand for financial services, promoting the financial sector's growth. Scholars within the finance-growth nexus studies are generally in agreement about the services entailed by financial intermediaries. These services, among others, include transactions facilitation and projects evaluation, monitoring of managers, efficient risk management and savings mobilisation (King and Levine, 1993; Motelle and Sebutsoe, 2010). Subject to the efficiency of the financial system in performing the aforementioned functions, an increased rate of economic growth complemented by decreased transaction and information costs of seeking potential investments will be an outcome (Levine et al., 2000).

The debate continues unabated in empirical literature pertaining to the finance-growth nexus as there is no consensus amongst scholars, especially with regards to the direction of causality. The studies that have been conducted are conflicting, more so in developing countries (Barajas, Chami and Yousefi 2012). More to the point, empirical investigations into the finance-growth nexus in Africa have produced mixed results (Gries, Kraft & Meierrieks 2009). For instance, Agbetsiafa (2004) investigated causality between financial development and economic growth in eight sub-Saharan African countries using different measures to represent financial development. He found contradictory results; in the case of South Africa the study found a unidirectional causality relationship running from financial development to economic growth. On the other hand, when different measures were used the results revealed bidirectional causality. Likewise, Ankilo & Egbetunde (2010) studied the causal relationship between financial development and economic growth in the sub-Saharan Africa region. Their study found mixed results. In the case of South Africa, their study found that there is a bidirectional relationship between financial development and economic growth. Moreover, Adusei (2013) undertook a similar study on a sample of 24 African countries, including South Africa. The findings of the study confirmed the results of the study by Ankilo & Egbetunde (2010).

Furthermore, Sibanda & Holden (2014) examined the impact of financial institutions on financial advancement and economic growth, their study excluded banks. They established that financial advancement and economic growth improves financial institutions and not the other way around. Conversely, Nyasha & Odhiambo (2018) conducted a comparative study, investigating dynamic causality between financial development and economic growth in a mix of six African and Western countries. In the case of South Africa, they found that there is no causal relationship between the two. Still, Opoku, Ibrahim & Sare (2019) studied the pattern of causality between financial development and economic growth in forty-eighty African countries. Even though there is some evidence of demand-following and supply-leading relationships, largely, the results confirm the neutrality hypothesis. Their results hold in the context of South Africa for both the intermediate and long-run period.

In the same vein, Odhiambo (2004) used three measures of financial development to investigate the relationship between financial development and economic growth in South Africa. The study found that causality runs from economic growth to financial development. Also, Odhiambo (2010) employed the autoregressive distributed lag model to investigate the finance-growth nexus in South Africa, the findings confirmed the results of his earlier study. Whereas Adusei (2012) studied the same relationship in the context of South Africa and found that the there is a unidirectional causality pattern from financial development to economic growth. A sect of economics scholars argue that the conflicting findings about the direction of causality are a result of researchers employing different financial development measures and econometric techniques in their investigations (Levine, 2003; Adu, Marbuah and Mensah, 2013).

1.2 Insurance-growth nexus

As previously mentioned, the connection between the real economy and the financial sector continues to be a subject of debate amongst scholars. There is a plethora of studies dedicated to unravelling the relationship between economic activity and financial progress. However, a large share of those studies has concentrated on banking and the capital market industries; the studies that have undertaken to decipher the connection between the insurance industry and prosperity in the economy are insufficient

(Sibindi & Godi, 2014). The important role played by the insurance industry on economic growth cannot be discounted; Merton (1995) suggested a functional approach to explain the positive role occupied by financial systems in contributing to economic growth. Within the context of the functional approach proposed by Merton (1995), the insurance sector influences economic growth through capital accumulation, efficient risk management and as an institutional investor.

According to Arena (2008), the African insurance industry is amongst the least developed in the world. Nevertheless, the industry has recorded remarkable growth rates in the recent years. Arena (2008) postulates that the African insurance sector will continue registering high growth rates, due to financial liberalisations and structural reforms that have been implemented in the recent past. The insurance industry in emerging economies grew by 57% against a growth rate of 27% in industrialised countries, between the period 1997-2004 (Arena, 2008). Given the potential growth of the African insurance industry, it is crucial to understand how the industry contributes to economic growth. Unquestioningly, South Africa is an important player within the continent's insurance industry, because of its relative level of development.

The South African insurance sector makes more than two thirds of the African insurance market (Stalib & Puttaiah, 2018).[1] The high development of the South African insurance sector is attributed to its well-developed infrastructure, sophistication and the wide range of products offered by the sector. In view of the above, albeit this study focusing on the insurance sector as a whole, it is important to note that the South African life insurance sector dominates the nonlife insurance sector outrightly. According to Stalib & Puttaiah (2018), the South African life insurance sector makes 80.10% of the total South African insurance sector.[2] Evidently, the country's life insurance sector is significantly important; it certainly skews any inferences drawn about the total insurance sector due to its sheer market share. Thus, it would be thought provoking to determine the relationship and impact of the insurance sector's contribution to the South African economy. For that reason, this study intends to explore the relationship between the insurance sector and economic growth in South Africa. More importantly, the study seeks to explore the causal relationship between economic growth and the insurance sector.

[1] The South African total insurance market makes 71.67% of the total African insurance market

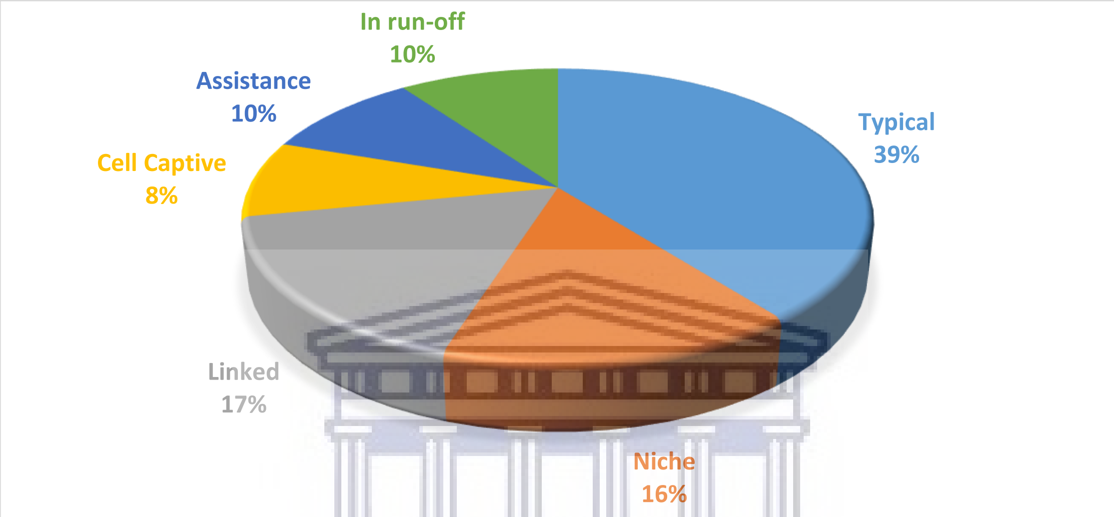
[2] The South African life insurance market makes 85% of the total African life-insurance market

1.2.1 Brief overview of the South African long-term insurance sector

The South African insurance sector is complex and offers a wide range of products to its clients. As at the end of March 2018 the sector had 71 companies dealing in long-term insurance FSCA (2018).[3]

Figure 1.1 shows the composition of the long-term insurance sector.

Figure 1. 1: Composition of the long-term insurance



Source: Author, data from FSCA (2018)

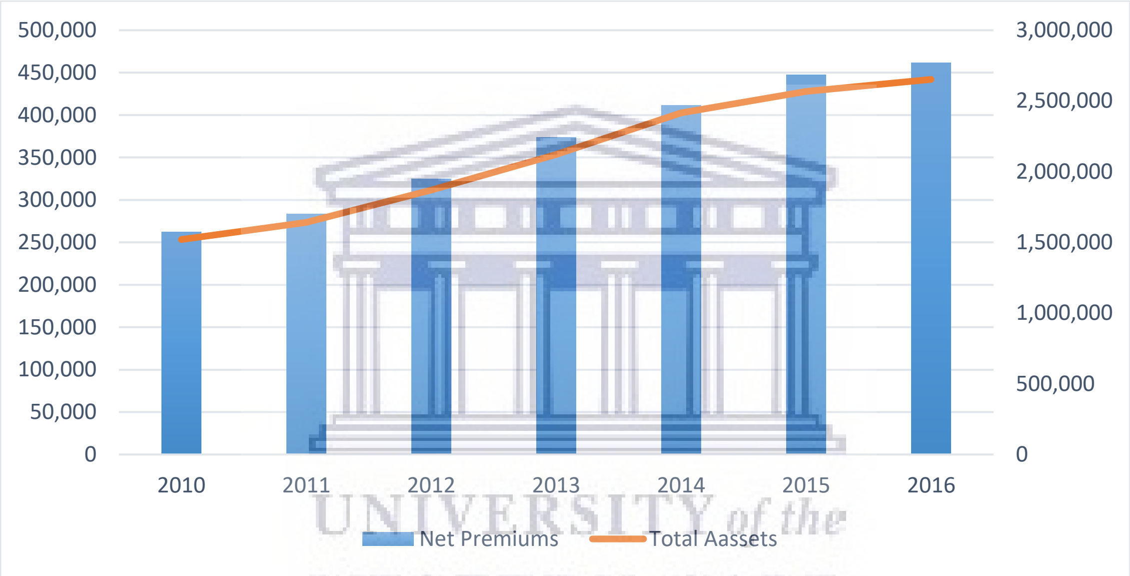
As observed in figure 1.1 above, the long-term insurance sector is comprised of six types of insurers: which include typical, linked and niche insurers. The number of typical long-term insurers is disproportionately high compared to other types. Almost 40% of the long-term insurance share is typical insurance, followed by linked insurers (17%) and niche insurers (16%). Typical insurers are companies that offer insurance products for the general public at large FSB (2013). Thus, the significantly high market share of typical insurers is quite telling about the penetration ratio of long-term insurance and the ability of the sector to pool resources.

Figure 1.2 shows the time series progression of net premiums and total assets for the long-term insurance sector from 2010 to 2016. The values on the primary vertical axis pertain to net premiums (R'million), whilst the values on the secondary vertical axis apply to total assets (R'million). As observed in figure 1.2 below, net premiums and total assets have been constantly rising during the

[3] There were 96 short-term insurers during the same period

2010 – 2016 period. The net premiums of the long-term insurance sector increased by a remarkable 76%, rising from roughly R262 billion accounted for in 2010 to about R461 billion accounted for in 2016. The significant increase in premiums rears important questions about the impact of the premiums on the savings rate and consequent economic growth. Similarly, total assets of the long-term insurance sector registered a remarkable growth of 74%, increasing from roughly 1,5 trillion recorded in 2010 to about 2,7 trillion recorded in 2016. Therefore, it is conceivable that the long-term insurance sector plays a crucial role in the pooling and accumulation of resources.

Figure 1. 2: Net premiums and total assets of the long-term insurance sector



Source: Author, data[4] from FSB & FSCA

Table 1.1 presents the investment spread with asset categories of the long-term insurance sector for the 2014 – 2016 period.[5] As observed in table 1.1 below, the total value of assets held by the long-term insurance sector increased by 10%, rising from roughly 2,4 trillion registered in 2014 to about 2,7 trillion registered in 2016. Roughly, 50% of the assets held by the long-term insurance sector fall under equities and collective investment schemes. Furthermore, debentures and loan stock, fixed-interest investments and, cash and deposits are where most of the income generated by the long-term insurance sector is invested, after equities and collective investment schemes. It is noteworthy that

[4] Data were collected from various FSB and FSCA annual reports

[5] The inclusion of long-term reinsurers is insignificant, because it makes less than 1% of the total asset value.

fixed assets are the least popular investment vehicle in the long-term insurance industry, this is expected because premiums should ideally be tied to relatively liquid assets, so that claims could be processed timeously. In conclusion, the investment activities of the long-term insurance sector lend credence to the view that the sector is crucial for efficient resource allocation and mobilisation.

Table 1. 1: Investment Spread and categories of the long-term insurance sector

The spread and categories of assets for primary insurers and reinsurers for the long-term insurance industry were as follows:

Kinds of assets	2014		2015		2016	
	R'million	%	R'million	%	R'million	%
In South Africa:						
Cash and deposits	176 328	7	173 311	7	208 094	8
Fixed-interest investments	204 652	8	211 013	8	222 683	8
Equities and collective investment schemes	1 230 283	51	1 260 214	49	1 315 024	49
Debentures and loan stock	270 613	11	292 623	11	305 965	11
Immovable properties	48 618	2	48 468	2	43 380	2
Fixed assets*	1 631	0	1 828	0	2 010	0
Current assets	160 238	7	175 474	7	180 932	7
Foreign (covering domestic liabilities)	227 498	9	278 789	10	229 541	9
Foreign (covering foreign liabilities)	111 195	5	142 161	6	164 184	6
Total	2 431 057	100	2 583 881	100	2 671 813	100

* Result is less than 0.5% but not necessarily 0%.

Source: FSCA (2016)

1.3 Problem Statement

An understanding of the connection between the insurance industry and prosperity in the economy is immensely important to effect judicious policy making, which will enhance economic growth. The UNCTAD argued for the importance of a vigorous insurance sector as far back as 1964, stating: "a sound national insurance and reinsurance market is an essential characteristic of economic growth." (UNCTAD, 1964). Expanding on the same logic, Skipper (1997) advances that insurance development is more than just an important feature for economic growth, but it is a necessary and indispensable characteristic of economic growth. According to Pagano (1993), financial intermediaries are instrumental to economic growth, due to their role of channelling savings into productive investment and providing mechanisms of risk transfer. More precisely, Arena (2008) argues that insurance companies are essential as institutional investors, because of their ability to merge large volumes of funds, which are then invested in other firms, thereby enabling efficient allocation of resources for productive investment.

Furthermore, extant research on the insurance-growth nexus in Africa produced mixed results. Aziakpono (2005) investigated whether financial intermediation had an impact on economic growth in the SACU region.[6] In the case of South Africa, the study found compelling evidence for the existence of a strong relationship between financial intermediation and economic growth. On the other hand, the results were mixed in the case of Botswana. Finally, the study found weak results for the rest of the countries investigated. Alhassan & Fiador (2014) studied the causal linkages between the insurance industry and prosperity in the economy of Ghana. Their results found that there is a positive long-run relationship and that causality runs from the insurance sector to economic growth. Furthermore; Chen, Lee & Lee (2011) studied the life insurance industry in Africa (including South Africa) to determine its effect on economic growth. Their study discovered that life insurance development affects economic growth positively. Finally, Sibindi (2015) analysed insurance industry trends in ten African countries (including South Africa).[7] Firstly, the study found that all the African countries under consideration (except South Africa), have underdeveloped insurance markets and that their nonlife insurance sector is dominant over life insurance. Secondly, the study establishes that insurance development and economic growth have a long run relationship. Lastly, the study concludes that there is a strong impetus for the relationship of the insurance-growth nexus to be demand following in Africa.

As discussed earlier, given the significance of the South African insurance market, understanding how the sector impacts on economic growth is an imperative. Surprisingly, insufficient research has been conducted to unravel the link between South Africa's insurance industry and economic growth. Most of the studies that have been conducted were cross-sectional studies. As explained by Sibindi & Godi (2014), the drawback of conducting investigations using cross-sectional data methods is their susceptibility to ignoring or at worst leaving out effects that are unique to a specific country. Thus, it would be thought provoking to determine the relationship and impact of the insurance sector's contribution to the South African economy. For that reason, this study intends to explore the link between South Africa's insurance industry and economic development.

[6] South Africa, Namibia, Botswana, Lesotho and Swaziland

[7] The rest of the countries are: Nigeria, Kenya, Angola, Namibia, Algeria, Mauritius, Morocco and Tunisia, Egypt.

To the best of the author's knowledge, there are only three local studies that have been carried-out, which employed time-series methods of analysis to study the country's insurance sector.[8] The studies provide key insights with regards to the interconnectedness of the insurance industry and economic progress in South Africa. However, the models used by those studies do not control for the effects of important variables which are directly related to economic growth. For instance, none of the three studies included labour productivity in their model for economic growth. Human capital and labour productivity are critical to propel sustained economic growth and cannot be treated passively in the process of economic growth Delsen & Schonewille (1999). Furthermore, all of the three studies investigated only one proxy variable of insurance development.[9]

In view of the aforementioned, the following research questions are pertinent: taking into account the important variables which affect economic growth and the other main proxy variables of insurance development, is there a link between South Africa's insurance industry and economic growth? If there is, which one precedes the other? This study will attempt to answer these questions by using a model that is controlled for the effects of important factors which affect economic growth, as endorsed in economic growth theory. Furthermore, this study intends to provide insight into the link between South Africa's insurance industry and economic growth.

1.4 Objectives of the study

The main objective of this study is to investigate whether there is a link between South Africa's insurance industry and economic growth, if there is; the study intends to detangle the nature of that relationship. The specific objectives of the study are as follows:

- To establish the nature of the trend between economic growth and insurance proxies.
- To determine the direction of causality between economic growth and insurance proxies.

1.5 Hypothesis

1.5.1 **Null:** Economic growth and insurance proxies exhibit similar trends over time.

Alternate: Economic growth and insurance proxies do not exhibit similar trends over

[8] Sibindi & Godi (2014), Sibindi (2014) and Olayungbo (2015)

[9] Insurance density

time.

1.5.2 **Null:** Economic growth and insurance proxies have a long-run cointegrating relationship.
Alternate: Economic growth and insurance proxies do not have a long-run cointegrating relationship.

1.5.3 **Null:** The direction of causality between economic growth and insurance proxies is supply-leading.
Alternate: The direction of causality between economic growth and insurance proxies is demand-following.

1.6 Significance of the study

Since the 2008 economic recession South Africa has struggled to get its economy back to a path of sustained economic growth. Ten years prior to the 2008 recession, GDP was growing at an annual average rate of 3,72 per-cent. Subsequent to the recession, between the 2009 –2018 period GDP has been growing at an annual average rate of 1,51 per-cent.[10] Given the sluggish economic growth rates, there is a need for the government to find ways to effect economic policy in order to achieve a prosperous economic growth path. Furthermore, when the South African economy entered into a recession in 2019; the financial sector, mining and the personal services sector are the only sectors that did not contract (STATS SA, 2020).[11] In light of the aforementioned, the financial sector is one of the sectors that could be pivotal to achieve the desired economic growth rates in South Africa. However, the economic dynamics of the channels by which the insurance industry contributes to economic growth remain unclear (Olayungbo, 2015). Hence, the current study aims to discover the relationship between growth in the economy and the insurance sector in South Africa, so as to provide the much-needed clarity.

As mentioned earlier, there are only three local studies that have been carried-out, which employed time-series methods of analysis to study the South African insurance sector. Thus, the current study intends to make a contribution to the economic literature on the finance-growth nexus, in particular the insurance-growth nexus in the South African context. The current study is significant in that it is filling a research gap on a scarcely researched field of study, thus, providing foundational basis for

[10] Growth rate data were acquired from the World Bank

[11] The sectors grew by 2,7%, 1,8% and 0,7% respectively

future research on country-specific time series studies in the insurance-growth field. Finally, the current study intends to provide insight that policy makers and potential investors should find valuable for decision making, albeit for different reasons. The study will assist policy makers to effect judicious policies that will encourage economic growth and hopefully elevate the country's sluggish economy back to the path of sustained growth. Potential investors who are intending to invest in the insurance sector, should find the study valuable in assisting to make informed investment decisions, with a clear perspective on long-term investments in the insurance sector.

1.7 Outline of the study

The study will consist of six different chapters ordered in the following manner: Chapter 1 will be the first section, an introductory chapter into the study. It will provide the context, rational and a brief overview on the topic of the study. In addition, this chapter will state the research objectives and scope of the study. Chapter 2 will be a literature review; it will present the theoretical and conceptual framework related to the study. In addition, key concepts will be defined and a review of past empirical studies will be undertaken. Thereafter, Chapter 3 will be a discussion of the research approach and methodology undertaken to meet the objectives of the study. This section will explain the rational for choosing the particular research designs and the data collection methods. Furthermore, Chapter 4 will be an analysis of data and the findings of the study. The section will legibly and coherently present and discuss the results of the study. Lastly, Chapter 5 will be a conclusion of the study. This last section will state the implications and limitations of the empirical findings.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

Given the unabated debate on the finance-growth nexus, an understanding of the connection between the insurance industry and prosperity in the economy is immensely important. It is crucial to understand the key concepts, core theories and empirical findings underlying the insurance-growth nexus. For that reason, this chapter of the study discusses the aforementioned in the following four main sections. Firstly, section 2.2 explains the definitions of key concepts pertaining to this study. Secondly, section 2.3 presents the theoretical framework that relates insurance sector development to economic development. Thirdly, section 2.4 presents the conceptual framework that that is used in this study. Furthermore, section 2.5 presents a brief literature review of relevant past empirical studies conducted on the insurance-growth nexus. Lastly, section 2.6 concludes the chapter.

2.2 Definition of key concepts

Financial development transpires when financial markets and financial institutions lessen imperfections in the market, thereby allowing for efficient allocation of capital to most productive economic uses (Čihák, Demirgüç-Kunt, Feyen, & Levine, 2012).

Economic growth in general means, an increase in productivity of goods and services in an economy over a specified period, it is measured by gross domestic product (GDP) (Acemoglu, 2007).

Life insurance is a contract entered into by an individual[12] and an insurance company[13], where the individual pays an agreed-upon regular premium to the insurance company. In a life insurance contract, the insurer is bound to make a stated lump sum payment to a specified beneficiary in an event of the policyholder's death[14] (Insurance ZA, n.d.). In the South African context, companies that deal in the life insurance business are identified as *long-term insurers.*

[12] Policyholder

[13] Insurer

[14] Some contracts also include disability and terminal illness

Nonlife insurance is a contract entered into by a policyholder and an insurer, where the policyholder pays an agreed-upon regular premium to the insurer. Essentially, nonlife insurance is liability insurance and covers: property, people, disaster or legal liabilities (Insurance ZA, n.d.).[15] In the South African context, companies that deal in the nonlife insurance business are identified as *short-term insurers*.

2.3 Theoretical Framework

The positive relationship between financial development and economic growth was first noted by Schumpeter (1911). The debate pertaining to the finance-growth nexus gained substantial attention in the 1960s. The causality question was of interest to early financial development pioneers such as Gerschenkron (1962), Patrick (1966) and Goldsmith (1969). The aforementioned economists employed rudimentary econometric techniques and different case studies to get insight about the relationship between economic activity and financial progress. Indeed, their findings roughly established correlations between the proxies representing financial development and growth in the economy. Particularly, Gerschenkron (1962) proposed that the position of a countries' economic progress during its initial stages of industrialisation determines the degree and sophistication of the development of its financial sector. More to the point, Patrick (1966) hypothesised that the relationship of the finance-growth nexus can have two possible causality patterns: 'demand-following' or 'supply-leading.' In this view, the demand-following pattern implies that the expansion of economic activities induces demand for financial services, subsequently resulting to financial development. Whereas, the supply-leading pattern suggests that expansion of economic activity is spurred by an efficient functioning financial system.

In addition, Patrick (1966) posits that the pattern of causality changes from supply-leading to demand-following during the course of economic development. This argument contends that during the early stages of economic development an efficient financial services sector can possibly bring about innovation driven investment, thereby spurring economic development. In this perspective, as economic growth gets sustained, the impetus of the supply-leading pattern diminishes, as such the demand-following pattern becomes a dominant pattern due to the expansion of economic activities. Furthermore, Goldsmith (1969) propounds that there is a positive correlation between financial sector development and economic growth. The aforementioned author, however, does not claim a causal

[15] Examples of none-life insurance: car-insurance, credit insurance, mortgage insurance, etc.

interpretation of the relationship between economic activity and financial progress. The study concludes that the financial sector advancement provides a prediction of future economic growth rates in the country concerned. Undeniably, the above studies establish the necessity of financial progress for efficacious growth in the economy. Nevertheless, the causality question remains ambiguous, without sufficiently plausible theoretical and empirical inferences to conclude the direction of causality.

The discourse on economic activity and financial progress in the 1970s, focused on the benefits that can be brought by financial liberation as opposed to financial repression. The independent development of a theoretical framework by Mckinnon (1973) and Shaw (1973) provided a fundament to scientifically reason about the financial factors that induce economic growth. The Mckinnon-shaw (1973) school of thought postulates that financial development could create efficiency through improving and increasing productive investment in the economy. In this view, through the mobilisation of savings the financial system can efficiently allocate savings in large quantities to high quality investments, in that way affecting economic growth positively. The abovementioned framework ignited a more theoretically based inquiry into the finance-growth nexus, in contrast to prior investigations. With that being said, the theoretical framework was lacking in explaining sustained economic growth rates. Furthermore, it is worth mentioning that there were extremely polarised views with regards to the cruciality of the financial sectors' contribution to economic growth. Notably, Lucas (1988) propounds about economists' preoccupation to "badly over-stress" the financial sectors' role in economic development.

In the 1990s the debate on the finance-growth nexus witnessed a paradigm shift. The endogenous growth theory developed by Romer (1990) became fundamental to explain the links between financial development and technological innovation, thus establishing the channels of which financial development could potentially impact productivity to create sustainable long-run economic growth. In line with Schumpeter's (1911) rational on innovation, King & Levine (1993a) describe how the financial sector enables innovation through an efficient system of allocating resources and risk management within the endogenous growth framework. In this regard, the financial system is able to efficiently pool and channel savings from risk averse depositors to risk seeking entrepreneurs who need capital to fund their innovative and productive projects, thereby increasing chances of successfully innovating and the rate at which technological progress takes place. An important diversion between the endogenous growth framework and the physical capital accumulation-based framework underlying the Mckinnon-Shaw (1973) school of thought is that: within the endogenous growth framework economic growth rate increases are sustainable, because the technological progress rate is determined endogenously (Eschenbach, 2004).

Extant studies on the finance-growth nexus have since had extensive contributions to the field. The studies unveil important previously unknown findings about the relationship between economic activity and financial progress. King & Levine (1993b) propounds that the degree of a country's financial progress is an imperative factor in predicting the long-run growth rate of an economy. According to this argument, financial development does not passively follow economic development, but it is inextricably linked to the process of economic growth. More to the point, Levine (1997) posits that a functional and effective financial system is vital for economic growth, as it has implications for the rate and pattern of an economy's development. In addition, Harrison, Sussman & Zeira (1999) argues that there is a feedback effect between the financial sector and economic growth. This argument contends; the financial sector specialises when there is productive advancement in the economy, leading to a decrease in the cost of financial intermediation. In turn, the low cost of financial intermediation enables a more rapid capital accumulation rate, thus feeding back to economic growth.

Furthermore, Benhabib (2000) postulates that the relationship between economic activity and financial progress is different across countries. In this view, different countries have 'country specific' characteristics that are unique to their economies, such characteristics impact on the interconnectedness of economic activity with financial progress in those countries. In more specific terms, Eschenbach (2004) notes that country specific time-series studies are not harmoniously conclusive with regards to the relationship between economic activity and financial progress. Thus, a general conclusion about the finance-growth nexus cannot be drawn, countries need to be individually investigated, taking into account their specific characteristics. Notwithstanding, Benhabib (2000) and Eschenbach (2004) are in consensus with Patricks' (1966) assertion that the pattern of causality changes from supply-leading to demand-following during the course of economic development. The former scholars maintain that the relationship between economic activity and financial progress is predominantly supply leading in less developed countries, whereas, it is observed to be largely demand following in highly developed and industrialised countries.

The debate on the finance-growth nexus still continues unbridled. Due to the unambiguity of the conclusions; it becomes necessary to explore 'country specific' time-series properties of the relationship. What can be inferred with certainty from the aforementioned studies is that economic activity is inextricably linked to financial development. Nonetheless, the causality question first raised by Robinson (1952) is still a critical question of debate within the finance-growth nexus discourse. Furthermore, it is important to highlight that none of the aforementioned studies investigated the insurance sector; the studies either looked at banking, the stock market sector or both.

2.4 Conceptual framework

The debate on whether financial development[16] has an effect on long-term economic growth is persistently on-going in economic literature. This is due to two major schools of thought, which are opposed in their positions. As mentioned by Bednarczyk (2013), the classical school of thought argues that the impact of money on long-term economic growth is neutral. She further explains that, conversely, the Keynesian school of thought maintains; money is an active factor in long-term economic growth. The endogenous-growth model (Pagano, 1993) provides conceptual fundament to understand the channels that underpin the relationship between the insurance sector and economic growth. To fully comprehend the potential impact of financial development on economic growth, consider the following simple endogenous-growth model:

$$Y_t = AK_t \quad [17] \qquad (2.1)$$

Above is a production function of a closed economy that produces a single good, where:

Y_t = Aggregate output at period t

K_t = Capital stock at period t

A = Marginal productivity of capital

$$K_t = I_{t-1} + (1 - \delta)K_{t-1} \quad [18] \qquad (2.2)$$

Above is a function relating investment and capital, where:

I_{t-1} = Investment at period t

K_{t-1} = Capital stock at period $t - 1$

δ = Depreciation

[16] Financial development and insurance development will be used interchangeably in this section.

[17] For simplicity of the analysis it is assumed: No government, population growth and international markets.

[18] I_{t-1} is equal to a good that was not consumed, which depreciates at a rate of δ per period.

In a closed economy, the capital-market equilibrium theory condition requires that total domestic savings equals total domestic investment, therefore:

$$\phi S_t = I_t \qquad (2.3)$$

I_t = Investment at period t

S_t = Savings at period t

ϕ = Propotion of savings directed to investment

The growth rate g can be derived as follows from equation (2.1):

$$g_{t+1} = \frac{Y_{t+1}}{Y_t} - 1 = \frac{K_{t+1}}{K_t} - 1 \qquad (2.4)$$

Hence, equation (2.1) and (2.2) can be equated and simplified to derive steady state growth[19] rate as:

$$g = A\frac{I}{Y} - \delta = A\phi s - \delta \qquad (2.5)$$

$$s = \frac{S}{Y}$$

From equation (2.5) above, it can be deduced that financial development effects economic growth through the following three channels:

1. Improving the marginal product of capital, A
2. It can increase the saving rate, s
3. I can increase the proportion of saving directed to investment, ϕ

Through the mechanism of risk transfer, the insurance sector is able to indemnify individuals and firms from suffering losses (Merton, 1995). Consequently, risk adverse units of the economy are induced to purchase goods and services they would have normally not considered, especially highly valued goods, as they are indemnified against losses. Accordingly, a rise in consumption will result in an increased demand for goods and services, which directly translates to more production and

[19] Steady state: a situation where capital per capita is and output per capita are no longer changing, but constant.

employment, leading to growth in the economy (Ćurak, Lončar, & Poposki, 2009). Thus, the insurance industry has an effect on economic growth.

2.5 Review of past empirical studies

Sibindi & Godi (2014) investigated the relationship between insurance sector development and economic growth in South Africa, using time-series data methods of analysis. The study found that there is a long-term association between South Africa's insurance industry and economic development. In particular, they established that the relationship is demand following, an increase in economic activity leads to the growth of the insurance sector. Later on, Sibindi (2014) conducted a research on the possible interactions between the life insurance sector, economic activity and financial progress in the South African context using the Autoregressive distributed lag model approach. This study established that life insurance and economic growth move in tandem in the long-run. Specifically, the study found that the relationship between the two variables is demand following. These findings re-enforce well with the earlier investigation undertaken by Sibindi & Godi (2014). Thereafter, Olayungbo (2015) mirrored the earlier study by Sibindi (2014) and augmented the method from the original study. This study used the Toda-Yamamoto method to arrive at its findings. The results of the study are harmonious with the previously conducted investigations, as such, the study finds that insurance development and economic growth have a long-run relationship. However, the latter study holds that causality runs from insurance sector to economic growth.

Akinlo & Apanisile (2014) undertook a similar study, however it examined the interconnectedness between the insurance industry and prosperity in the economy of the sub-Saharan African region, using dynamic panel-data analysis methods. Their study revealed a positive and significant effect of the insurance sector on economic growth. Then again, Sibindi (2015) analysed insurance-growth trends exhibited by 10 African countries, using three different insurance proxies, the study discovered that the trends presented a clear relationship between economic activities and the insurance sector. Furthermore, Alhassan & Biekpe (2016) studied the relationship between the insurance sector and economic development exploring a sample of eight African countries; they found a bi-directional relationship between the two variables. In addition, the study also found an existence of a long-term relationship between economic activities and the insurance sector, particularly the life insurance sector.

Outreville (1990) studied the relationship between financial and insurance development with economic growth in 55 developing countries[20], paying attention to their respective market structures. This study used cross-sectional analysis and found that the financial sector is significantly important for economic development in developing countries. Similarly, Webb, Grace & Skipper (2002), conducted the same study on 55 developed and developing countries, utilising iterated three stage least squares method to control for endogeneity. Their study supports the findings of the study by Outreville (1990). Additionally, the latter study finds that the banking and insurance sectors have a complementary effect in contributing to economic growth; this effect is greater than their individual effects in the economy. The above studies are further collaborated by Arena (2008), who conducted a study focused on 55 developed and developing countries as well, using dynamic panel data analysis methods. This study was an improved version of the study by Webb et al. (2002), in that it incorporated a more advanced method of analysis that partly caters for dynamic time-series effects. The study established that both life and nonlife insurance have a positive effect on economic growth, however, the extent of the impact of life insurance on economic growth is significantly high for developing countries. On the other hand, nonlife insurance has a significant impact on developed countries.

Furthermore, the study by Ward & Zurbruegg (2000) investigated short and long run dynamics of insurance sector development and economic growth in nine OECD countries, using granger causality tests. The study made remarkable findings, by discovering that the effect of the insurance sector to economic growth depends on country specific factors. Additionally, Sawadogo, Guerineau & Ouedraogo (2018) investigated the level of insurance development in developing countries compared to developed countries, the study found that over the recent years, developing countries have seen an increase in the growth of insurance sector development. The study further finds that insurance premiums have increased by 60.21% in developing countries, while they have increased by just 9.43% in developed countries. Evidently, insurance market activity is highest in developing countries and thus significant. On top of that, the study finds that life insurance demand and real GDP per person stabilise at a long-term equilibrium.

Lastly, the impact of the insurance sector on economic growth can be supply-leading or demand-following (Sibindi & Godi, 2014). When it is supply-leading it means that insurance development

[20] Most of them are African countries.

improves economic growth, on the other hand, when it is demand-following it stipulates that economic growth improves insurance development. More to the point, Sawadogo et al. (2018) found that the positive incremental impact of life insurance on economic growth is relatively less in Sub-Saharan Africa and in countries that use the British legal system. In addition, their study established that high quality institutions foster an environment that enables life insurance activity to have a greater effect on economic growth. On the contrary, the effect of life insurance in an environment of high-quality institutions is not as great in developed countries. Moreover, they found that life insurance has a greater impact on economies of developing countries as opposed to developed countries.

There are only three local studies that have been carried-out, which employed time-series methods of analysis to study the country's insurance sector.[21] The studies provide key insights with regards to the interconnectedness of the insurance industry and economic growth in South Africa. However, the models used by those studies do not control for the effects of important variables which are directly related to economic growth. This research paper will attempt to conduct the study using a model that is controlled for the effects of important factors which affect economic growth, as endorsed in economic growth theory. Additionally, this study will use different proxy variables to represent insurance development, thereby providing more insight to the insurance-growth nexus in South Africa. Furthermore, there is a time gap of about five years since the last study by Olayungbo in 2015. A lot of developments have taken place during that time, hence a need for a renewed study.

2.6 Conclusion

Chapter two provided a brief review of the literature on economic growth and insurance development. Undoubtedly, insurance sector development and economic growth are correlated; howbeit, there is an on-going debate with regards to the causal relationship between the two. The impact of the insurance sector to economic growth can be supply-leading, demand-following or bi-directional. Studies on African countries have found an existence of a long-term connection between economic activities and the insurance sector, particularly the life insurance sector. In South Africa the relationship was found to be demand-following. The contribution of Insurance sector development to economic growth is more significant for developing countries in comparison to developed countries. Furthermore, the effect of the insurance sector to economic growth is attributed to country specific factors, such as their financial and institutional systems.

[21] Sibindi & Godi (2014), Sibindi (2014) and Olayungbo (2015)

CHAPTER THREE: DATA AND METHODOLOGY

3.1 Introduction

This chapter presents an outline of the research methodology and data employed in this research paper. The structure of the chapter is as follows: Section 3.2 provides data sources from which secondary data used in this study was extracted. Section 3.3 explains the methodological framework and model specification that is employed to investigate the research question/s. Then, section 3.4 gives apparatus for the analysis of data. Finally, section 3.5 mentions the limitations of the study given its scope. Thereafter, section 3.6 draws a conclusion of the chapter.

3.2 Data

To examine the relationship between life insurance and economic growth in South Africa this study made use of quantitative data. In particular, the data under consideration were: secondary time-series quarterly data on gross domestic product per capita, life-insurance, non-life insurance, total-insurance, foreign direct investment, government debt and labour productivity. Furthermore, this study specifically studied three different proxy variables which represent insurance development. The proxy variables evaluated were: penetration ratio, density ratio and total assets ratio. The study used data for the period 1994 to 2019. The data for gross domestic per capita, foreign direct investment, government debt, labour productivity, and insurance premiums were acquired from the South African Reserve Bank (SARB). Finally, the data for population was sourced from Statistics South Africa (Stats SA). A GDP deflator has been applied to all the nominal values (2019 = 100).

3.3 Model Specification

This study employed quantitative methods of analysis in order to estimate the connection between the insurance industry and prosperity in the economy. The study adopted and modified the model by Alhassan & Fiador (2014) to fit the South African context. In addition, a causality test between the variables concerned was evaluated. Furthermore, the model was subjected to stability and diagnostic tests.

$$GDP = f(LTI, STI, TI, GDT, FDI, LP) \tag{3.1}$$

The transformation of equation (3.1) into a log-linear form is given below by equation (3.2).

$$lnGDP_t = \alpha_0 + \alpha_1 lnLTI_t + \alpha_2 lnSTI_t + \alpha_3 lnTI_t + \alpha_4 lnFDI_t + \alpha_5 lnGDT_t + \alpha_4 lnLP_t + \mu_t \quad (3.2)$$

Where:

Gross domestic product per-capita (GDP): Gross Domestic Product per capita is the total value of goods and services produced within an economy during a given period over total population. Real GDP growth rate is used as a dependent variable in this study.

Independent variables:

Life-insurance penetration ratio (LTI): This is a penetration rate given by total life insurance premiums over real GDP per-capita.

Nonlife insurance penetration ratio (STI): This is a penetration rate given by total nonlife insurance premiums over real GDP per-capita.

Total insurance penetration ratio (TI): This is a penetration rate given by the total sum of the life and nonlife insurance premiums over real GDP per-capita.

Foreign direct investment (FDI): This is a measure of gross net investment and asset ownership into the South African economy by foreign based entities.

Government debt (GDT): This is the gross outstanding amount of debt that a country's government or state owes to private institutions, individuals or other countries.

Labour productivity (LP): This is rate of output produced by each worker in an economy given by total output per period over total input[22].

3.4 Data Analysis

The Autoregressive Distributed Lag model (ARDL) is employed to explore the linkage between South Africa's insurance industry and economic development. This is because the ARDL modelling technique allows for non-stationary data, even if the data has a mixed order of integration, to be estimated. Furthermore, a compelling reason to use the ARDL model is that it enables a researcher to estimate both short-run dynamics and long-run relationships simultaneously. This model is suitable for the data type being analysed in this study. As argued by Shrestha and Bhatta (2018), time series data is more likely to be non-stationary and integrated of mixed orders.

[22] Employees at work or total hours worked

The transformation of equation (3.2) into an ARDL model is given below by equation (3.3).

$$\Delta lnGDP_t = \alpha_0 + \sum_{i-1}^{n} \alpha_1 \, \Delta lnGDP_{t-1} + \sum_{i-1}^{n} \alpha_2 \, \Delta lnLTI_{t-1} + \sum_{i-1}^{n} \alpha_3 \, \Delta lnSTI_{t-1} + \sum_{i-1}^{n} \alpha_4 \, \Delta lnTI_{t-1} + \sum_{i-1}^{n} \alpha_5 \, \Delta lnGDT_{t-1} + \sum_{i-1}^{n} \alpha_6 \, \Delta lnFDI_{t-1} + \sum_{i-1}^{n} \alpha_7 \, \Delta lnLP_{t-1} + \beta_1 lnGDP_{t-1} + \beta_2 lnLTI_{t-1} + \beta_3 lnSTI_{t-1} + \beta_4 lnTI_{t-1} + \beta_5 lnGDT_{t-1} + \beta_6 lnFDI_{t-1} + \beta_7 lnLP_{t-1} + \varepsilon_t \qquad (3.3)$$

Above is an ARDL model relating the dependent variable ($\Delta lnGDP_t$) to the specified independent variables, where:

Δ = Difference operator

$(\alpha_1 - \alpha_7)$ = Long-run relationship coefficients

$(\beta_1 - \beta_7)$ = Short-run dynamic model coefficients

α_0 = Drift component

ε_t = White noise error-term

3.4.1 Unit root test

Before the estimation of ARDL equation (3.3), unit root tests needed to be undertaken. The unit-root tests were undertaken to determine if the data is stationary or non-stationary. In a case where the data has no unit root, that would mean the variables do not have a long-run relationship, therefore a basic Ordinary Least Square regression would be run to estimate the relationship between the variables. If the data has a unit root, then a cointegration test would need to be conducted to determine if the data is cointegrated in the long-run. The configuration of the ARDL model allows it to take variables integrated to the order of zero I(0) and one I(1) only. Therefore, unit root tests were important to ascertain the order of integration of the variables before estimating the model. The Augmented Dickey Fuller (ADF), Phillips-Perron (PP) and Kwiatkowski-Philips-Schmidt-Shin (KPSS) can be used to test for unit roots.

The ADF and PP unit root tests test the null hypothesis of the presence of a unit root. The alternate hypothesis is that there is no unit root. The null hypothesis is rejected if the value of the calculated statistic is greater than the value of the critical statistic at a chosen level of significance, which can be 1%, 5% or 10%, respectively. On the other hand, the KPSS unit root test tests the null hypothesis of trend stationarity. The alternate hypothesis is that there is a unit root. Moreover, the rejection of the null hypothesis is consistent with the ADF and PP unit root tests.

3.4.2 Lag length selection

Selecting the correct lag length is critical for autoregressive models of estimation. Incorrect lag lengths can result into wrong estimations. Therefore, it is critical to select an optimal lag length according to a criterion. The data presented in this study indicated that there is a conflict amongst the different criterions with regards to the optimal lag length. According to the SC and HQ criterions, the optimal lag length should be one. On the other hand, the LR and FPE criterions select five as the optimal lag length. In this case, there is a risk of over or under-estimating the true maximum lag length if lags are selected arbitrarily between the different criterions. The rule of thumb is to choose a model that gives the lowest value between two chosen criterions, normally AIC and SIC. In this case the AIC criterion has the lowest value between the criterions. Nonetheless, Liew (2004) advocates that AIC and FPE are the most superior criterions to select an optimal lag length. More to the point, Gredenhoff, & Karlsson (1997) argue that the AIC and FPE criterions choose similar lag lengths in large sample sizes, however, the AIC criterion tends to overestimate the actual lag length for smaller sample sizes. Lütkepohl (1985) is in collaboration with the Gredenhoff, & Karlsson (1997), he established that the AIC and FPE criterions have asymptotic equivalence. The sample size in this study is relatively small, that may explain the large difference of the choice of lag lengths between the two different criterions.

Furthermore, Hsiao (1981) proposes that the FPE criterion should be employed to eradicate arbitrariness in determining the correct lag length for empirical studies. The author further asserts that the FPE criterion is a more practical criterion in application of autoregressive models that have multiple variables, it is efficient in dealing with spurious imposition of restrictions on a model. Expanding on the same logic, Thornton & Batten (1985) concur with Hsiao (1981) stating that the FPE criterion efficiently selects lag lengths for a model, although it is not in the preconceived beliefs about bias and efficiency trade-offs of most researchers. Consequently, for the purposes of this study the FPE criterion was used to select the appropriate lag length for the data. As previously articulated, the LR criterion selects the same model as the FPE criterion. Above and beyond, lag lengths as suggested by different criterions were subjected to diagnostic tests, indeed, the tests affirmed the FPE chosen model to be an appropriate model for the data concerned.

3.4.3 Bound test to cointegration

The bound test to cointegration is conducted if the variables are found to be integrated of mixed orders I(0) and I(1), as is likely with time series data. This test is conducted to establish if there is a long-run relationship among the variables. The advantage of this test is that it takes short run dynamics into account in its estimation of the long-run relationship. This test is rooted in the F-distribution test statistic (or Wald statistic). The null hypothesis is that there is no cointegration between the variables concerned. The F-test has two critical values: the lower and the upper bound. The value of the calculated statistic is compared to the lower and upper bound values of the critical statistic. If the calculated value of the F-test falls below the lower bound, that implies the order of integration between the variables is I(0), which means the variables are not cointegrated, therefore they do not have a long-run relationship. On the other hand, If the calculated value of the F-test falls above the upper bound, that implies the order of integration between the variables is I(1), which means the variables are cointegrated, therefore they have a long-run relationship. The null hypothesis is rejected if the value of the calculated statistic is above the critical value of the upper bound. Conversely, the null hypothesis cannot be rejected if the value of the calculated statistic is below the critical value of the lower bound. Moreover, if the value of the calculated statistic falls in-between the two critical bounds the test is inconclusive. This test is conducted to establish if there is a long-run relationship among the variables.

3.4.4 Error Correctional Model (ECM) on ARDL form

The cointegration of the variables warrants an estimation of an Error Correction Model (ECM) on the ARDL form in order to determine the speed of adjustment of the variables concerned to their equilibrium values. That is, the rate or speed at which deviations of the previous period from long-run equilibrium are corrected in the next period.

The error correction model can be specified on the ARDL form as follows:

$$\Delta lnGDP_t = \beta_0 + \sum_{i-1}^{n} \beta_1 \Delta lnGDP_{t-1} + \sum_{i-1}^{n} \beta_2 \Delta lnLTI_{t-1} + \sum_{i-1}^{n} \beta_3 \Delta lnSTI_{t-1} + \sum_{i-1}^{n} \beta_4 \Delta lnTI_{t-1} + \sum_{i-1}^{n} \beta_5 \Delta lnFDI_{t-1} + \sum_{i-1}^{n} \beta_6 \Delta lnGDT_{t-1} + \sum_{i-1}^{n} \beta_7 \Delta lnLP_{t-1} + \gamma ECM_{t-1} + \varepsilon_t \qquad (3.4)$$

Where:

ECM = residual acquired from the estimation of equation (3.3) for cointegration

γ = Speed of adjustment of the variables concerned to their long-run equilibrium values

ε_t = White noise error-term

3.4.5 Non-Granger Causality Test

The Granger test of causality is conducted if the variables are found to be cointegrated. Cointegration of variables warrants an existence of at least one Granger causality relationship. The causality test will be evaluated in the Toda & Yamamoto (1995) framework, which tests the null hypothesis that there is causality amongst the variables concerned. The Toda & Yamamoto (1995) Granger causality framework is preferred due to its competency of testing causality even if the variables are not cointegrated Umar, Dayyabu, Gambo, Danlami and Ahmad (2015). Therefore, the characteristics of the Toda & Yamamoto (1995) model are more conducive if the variables are found to be fractionally cointegrated. As proposed by Shrestha and Bhatta (2018), time series data is more likely to be non-stationary and integrated of mixed orders, meaning it is more likely to be fractionally integrated.

As previously mentioned, the Toda & Yamamoto (1995) framework is invariant to the cointegration of variables concerned. The model augments the Vector Autoregressive (VAR) model in its levels. The Toda & Yamamoto (1995) model does not use the F-statistic as Granger causality methods traditionally propose. Conversely, the Toda & Yamamoto (1995) model transforms the Wald test to obtain a modified test statistic (MWALD). The MWALD statistic is then used to test whether the restrictions of the un-augmented Vector Autoregressive (VAR) model's parameters are different from zero. The original un-augmented Vector Autoregressive (VAR) model uses the original lags as determined by any lag criterion VAR (k). Whereas, the augmented Vector Autoregressive (VAR) model augments the original VAR (k) model by adding the highest order of integration to the originally determined lag length VAR (k + dmax). Thus, the Toda & Yamamoto (1995) framework evaluates the VAR (k + dmax) model using a modified Wald test statistic (MWALD). The test is based on the chi-square distribution.

The Toda & Yamamoto (1995) model has the following fundamental steps in its evaluation. The best lag-length (k) and highest order of integration (dmax) amongst the variables needs to be determined. The efficient lag-length (k) is obtained in the VAR framework in levels, using the consensus of different lag-length criterions. Furthermore, the order of integration (dmax) amongst the variables is acquired through conducting unit-root tests as explained in section 3.3.1.

The Toda & Yamamoto (1995) model can be specified as follows:

$$lnGDP_t = \alpha_0 + \sum_{i=1}^{k} \alpha_1\, lnGDP_{t-i} + \sum_{i=k+1}^{k+dmax} \alpha_2\, lnGDP_{t-i} + \sum_{i=1}^{k} \alpha_3\, lnLTI_{t-i} +$$
$$\sum_{i=k+1}^{k+dmax} \alpha_4\, lnLTI_{t-i} + \sum_{i=1}^{k} \alpha_5\, lnSTI_{t-i} + \sum_{i=k+1}^{k+dmax} \alpha_6\, lnSTI_{t-i} + \sum_{i=1}^{k} \alpha_7\, lnTI_{t-i} +$$
$$\sum_{i=k+1}^{k+dmax} \alpha_8\, lnTI_{t-i} + \sum_{i=1}^{k} \alpha_9\, lnGDT_{t-i} + \sum_{i=k+1}^{k+dmax} \alpha_{10}\, lnGDT_{t-i} + \sum_{i=1}^{k} \alpha_{11}\, lnFDI_{t-i} +$$

$$\sum_{i=k+1}^{k+dmax} \alpha_{12}\, lnFDI_{t-i} + \sum_{i=1}^{k} \alpha_{13}\, lnLP_{t-i} + \sum_{i=k+1}^{k+dmax} \alpha_{14}\, lnLP_{t-i} + \varepsilon_{1t} \quad (3.5)$$

$$lnLTI_t = \alpha_0 + \sum_{i=1}^{k} \alpha_1\, lnLTI_{t-i} + \sum_{i=k+1}^{k+dmax} \alpha_2\, lnLTI_{t-i} + \sum_{i=1}^{k} \alpha_3\, lnGDP_{t-i} + \sum_{i=k+1}^{k+dmax} \alpha_4\, lnGDP_{t-i} + \sum_{i=1}^{k} \alpha_5\, lnSTI_{t-i} + \sum_{i=k+1}^{k+dmax} \alpha_6\, lnSTI_{t-i} + \sum_{i=1}^{k} \alpha_7\, lnTI_{t-i} + \sum_{i=k+1}^{k+dmax} \alpha_8\, lnTI_{t-i} + \sum_{i=1}^{k} \alpha_9\, lnGDT_{t-i} + \sum_{i=k+1}^{k+dmax} \alpha_{10}\, lnGDT_{t-i} + \sum_{i=1}^{k} \alpha_{11}\, lnFDI_{t-i} + \sum_{i=k+1}^{k+dmax} \alpha_{12}\, lnFDI_{t-i} + \sum_{i=1}^{k} \alpha_{13}\, lnLP_{t-i} + \sum_{i=k+1}^{k+dmax} \alpha_{14}\, lnLP_{t-i} + \varepsilon_{2t} \quad (3.6)$$

$$lnSTI_t = \alpha_0 + \sum_{i=1}^{k} \alpha_1\, lnSTI_{t-i} + \sum_{i=k+1}^{k+dmax} \alpha_2\, lnSTI_{t-i} + \sum_{i=1}^{k} \alpha_3\, lnGDP_{t-i} + \sum_{i=k+1}^{k+dmax} \alpha_4\, lnGDP_{t-i} + \sum_{i=1}^{k} \alpha_5\, lnLTI_{t-i} + \sum_{i=k+1}^{k+dmax} \alpha_6\, lnLTI_{t-i} + \sum_{i=1}^{k} \alpha_7\, lnTI_{t-i} + \sum_{i=k+1}^{k+dmax} \alpha_8\, lnTI_{t-i} + \sum_{i=1}^{k} \alpha_9\, lnGDT_{t-i} + \sum_{i=k+1}^{k+dmax} \alpha_{10}\, lnGDT_{t-i} + \sum_{i=1}^{k} \alpha_{11}\, lnFDI_{t-i} + \sum_{i=k+1}^{k+dmax} \alpha_{12}\, lnFDI_{t-i} + \sum_{i=1}^{k} \alpha_{13}\, lnLP_{t-i} + \sum_{i=k+1}^{k+dmax} \alpha_{14}\, lnLP_{t-i} + \varepsilon_{3t} \quad (3.7)$$

$$lnTI_t = \alpha_0 + \sum_{i=1}^{k} \alpha_1\, lnTI_{t-i} + \sum_{i=k+1}^{k+dmax} \alpha_2\, lnTI_{t-i} + \sum_{i=1}^{k} \alpha_3\, lnGDP_{t-i} + \sum_{i=k+1}^{k+dmax} \alpha_4\, lnGDP_{t-i} + \sum_{i=1}^{k} \alpha_5\, lnLTI_{t-i} + \sum_{i=k+1}^{k+dmax} \alpha_6\, lnLTI_{t-i} + \sum_{i=1}^{k} \alpha_7\, lnSTI_{t-i} + \sum_{i=k+1}^{k+dmax} \alpha_8\, lnSTI_{t-i} + \sum_{i=1}^{k} \alpha_9\, lnGDT_{t-i} + \sum_{i=k+1}^{k+dmax} \alpha_{10}\, lnGDT_{t-i} + \sum_{i=1}^{k} \alpha_{11}\, lnFDI_{t-i} + \sum_{i=k+1}^{k+dmax} \alpha_{12}\, lnFDI_{t-i} + \sum_{i=1}^{k} \alpha_{13}\, lnLP_{t-i} + \sum_{i=k+1}^{k+dmax} \alpha_{14}\, lnLP_{t-i} + \varepsilon_{4t} \quad (3.8)$$

Above is a Toda & Yamamoto (1995) model relating the dependent variables — $lnGDP_t$, $lnLTI_t$, $lnSTI_t$, $lnTI_t$ to the specified independent variables, where:

k = Lag length

$(\alpha_1 - \alpha_{14})$ = Model's parameters

$dmax$ = Highest order of integration

α_0 = Drift component

$(\varepsilon_{1t} - \varepsilon_{4t})$ = White noise error-term

3.5 Limitations

The study does not investigate the complimentary and/or substitution effect between the insurance sector and other financial sectors.

3.6 Conclusion

Chapter three presented an outline of the research methodology and data employed in this research paper. The chapter provided the data sources from which the secondary data used in this study was extracted and methodically explained the framework and model specification that is employed to investigate the research question/s. Thereafter, limitations of the study given its scope were identified.

CHAPTER FOUR: DATA ANALYSIS AND FINDINGS

4.1 Introduction

This chapter presents the empirical results of the study based on the model specified in chapter three. The chapter explores the way in which the methodological approach was undertaken. The structure of the chapter is as follows: section 4.2 provides an empirical analysis for the long-term, short-term and total insurance. This is done through the analysis of descriptive statistics for the data used in the empirical investigation. Thereafter, the study outlines the correlation matrix, which gives a preliminary picture of the relationships among the variables. Then, an evaluation of the unit root analysis is undertaken, thus showing the order of integration of the variables. Furthermore, the presentation of the ARDL bound test of cointegration among the variables concerned is investigated. Then, the results of the long and short run estimated models are presented, along with the diagnostic tests. Thereafter, the last section expounds on the direction of causality between the dependent and independent variables of interest.

4.2 Empirical Analysis for Long-term, Short-term and Total insurance

4.2.1 Empirical Results for Long-term Insurance

4.2.1.1 Long-term Insurance Descriptive Statistics Analysis

Table 4.1 presents the descriptive statistics of the variables investigated in this study, with a particular focus on the Long-term insurance variables. The descriptive statistics provide a statistical overview of the important characteristics pertaining to the variables concerned. It is important to analyse the descriptive statistics of the variables prior to analysing the empirical test, this process gives insight to the normality and symmetric distribution of the data. For a series to be normally distributed the Skewness coefficient estimates must be in the range of -2 and +2, while the Kurtosis coefficient estimates must be between -3 and +3.

Table 4. 1: Descriptive statistics

	LNGDP	LNFDI	LNGDT	LNLP	LNLTIA	LNLTID	LNLTIP
Mean	3.0655	0.1839	0.4491	13.5031	0.0842	0.0033	-3.8979
Median	3.0969	0.4559	0.4816	13.5031	0.0519	0.0260	-3.9186

Maximum	3.2110	0.7023	0.8740	13.5056	0.3252	0.7057	-3.2128
Minimum	2.8122	-1.0759	-0.0334	13.5010	-0.1053	-0.7085	-4.4292
Std. Dev.	0.1048	0.5439	0.2206	0.0015	0.1164	0.2844	0.2539
Skewness	-0.5433	-1.3558	-0.3726	0.0597	0.3183	-0.4527	0.1638
Kurtosis	2.2122	3.1923	2.2772	1.6676	1.7978	3.1354	2.6561
Observations	104	104	104	104	104	104	104

Source: Author's computations

As observed from table 4.1 above, there are no statistical discrepancies in the variables. The mean and median values of the variables fall within the minimum and maximum values. The standard deviations of the variables are close to zero, indicating minimal deviation of the values from their means. It is also worth noting that LNGDP and LNLP have the least variability, while LNFDI and LNLTID have the most variability. Moreover, the statistical properties show a high level of consistency. The Skewness and Kurtosis estimates for LNGDP, LNGDT, LNLP, LNLTIA and LNLTIP imply that these variables are normally distributed, the only exceptions are LNFDI and LNLTID. Skewness estimates for LNGDP, LNFDI, LNGDT and LNLTID were negative implying that the distributions of the variables are skewed to the left, while Skewness estimates for LNLP, LNLTIA and LNLTIP are positive, implying that they are skewed to the right.

4.2.1.2 Correlation Matrix Analysis

Table 4.2 presents the correlation matrix analysis of the variables investigated in this study, in particular the long-term insurance variables. The correlation test exhibits statistical associations of the variables represented in the regression analysis. The coefficient estimates range between -1 and +1, the closer the estimated coefficient is to -/+1, the stronger the correlation. The signs of the correlation coefficients imply the direction of the correlation, a positive sign (+) implies positive correlation and a negative sign (-) implies negative correlation, respectively.

Table 4. 2: Correlation matrix

	LNGDP	**LNFDI**	**LNGDT**	**LNLP**	**LNLTIA**	**LNLTID**	**LNLTIP**
LNGDP	1.0000						
LNFDI	0.7980	1.0000					
LNGDT	-0.3775	-0.2374	1.0000				
LNLP	0.0292	0.0923	-0.0243	1.0000			

LNLTIA	-0.3436	-0.3301	-0.0528	0.0754	1.0000		
LNLTID	0.6264	0.5755	-0.5723	0.0263	0.0952	1.0000	
LNLTIP	0.3146	0.3181	-0.5687	0.0372	0.3566	0.9279	1.0000

Source: Author's computations

As observed from table 4.2 above, all the variables exhibit the presence of a positive correlation with economic growth, except for government debt and long-term insurance total assets ratio. This preliminary picture may be an indicator of how government debt and assets accumulation by long-term insurance impacts on economic growth. Foreign direct investment and long-term insurance density ratio depict the highest level of correlation with economic growth. On the other hand, labour productivity depicts the lowest level of correlation with economic growth. The high correlations depicted by some variables in table 4.2 suggest multicollinearity between the variables. However, multicollinearity does not mean the model is mis-specified, because the estimators remain best linear and unbiased (BLUE), standard errors also remain valid (Gujarati, 2004).

4.2.1.3 Unit Root Analysis

Table 4.3 presents the unit root analysis of the variables investigated in this study. As discussed in the previous chapter, time series data is assumed to be stochastic and non-stationary. Hence, it is essential to determine the stationary properties of the data to avoid running spurious regressions. The presence of a unit root in the time series variables was determined using the ADF and PP tests.

Table 4. 3: Unit root tests: ADF & PP in levels and first differences

Variable	**Model Specification**	**ADF**	**PP**	**ADF**	**PP**	**Order of Integration**
		Levels	**Levels**	**First Difference**	**First Difference**	
LNGDP	Intercept	-1.76	-1.98	-3.53***	-10.75***	I(1)
	Intercept and trend	-0.99	-1.93	-3.83***	-11.00***	I(1)
	Intercept	-2.71**	-2.16	-2.77***	-10.74***	I(1)

LNFDI	Intercept and trend	-2.57	-2.05	-3.10	-10.82***	I(1)
LNGDT	Intercept	-1.36	-0.32	-2.07	-8.56***	I(1)
	Intercept and trend	-0.88	-0.26	-3.06	-8.95***	I(1)
LNLP	Intercept	-8.68***	-11.47***	-6.24***	-57.25***	I(0)
	Intercept and trend	-8.68***	-11.48***	-6.24***	-57.25***	I(0)
LNLTIA	Intercept	-1.85	-3.19**	-9.97***	-9.98***	I(1)
	Intercept and trend	-4.48***	1.86	-9.97***	-9.98***	I(1)
LNLTID	Intercept	-2.37	-3.42***	-9.39***	-12.30***	I(1)
	Intercept and trend	-1.92	-3.37**	-9.54***	-13.90***	I(1)
LNLTIP	Intercept	-1.99	-3.66***	-9.48***	-12.95***	I(0)
	Intercept and trend	-2.10	-3.63***	-9.58***	14.09***	I(0)

*Note: *** and * means the rejection of the null hypothesis at 5% and 10% respectively.*
Source: Author's computations

As observed in table 4.3 above, the order of integration of the variables is a mixture of I(0) and I(1). LNLP and LNLTIP are stationary at levels I(0). The rest of the variables become stationary at first difference I(1). Therefore, the order of integration exhibited by the data allows for the ARDL model to be estimated.

4.2.1.4 ARDL Bound Testing Cointegration

Table 4.4 below presents the ARDL bound test of cointegration among the variables investigated in this study. Given that the objective of the study is to determine the effects of the insurance sector on economic growth in South Africa, it is important to establish whether these effects are long-run effects or not. Hence, the bound test to cointegration was estimated to determine if there is a long-run relationship among the variables concerned.

Table 4. 4: Autoregressive distributed lag (ARDL) results of Cointegration

Test Statistic	Value	Level of Significance	Lower Critical Value I(0)	Upper Critical Value I(1)
F-statistic	6.587072	10%	2.12	3.23
		5%	2.45	3.61
		1%	3.15	4.43

Source: Author's computation

As observed in table 4.4 above, the F-statistic value of the ARDL bound testing cointegration is greater than both the lower and upper bound critical values at all levels of significance, implying that there is a long-run relationship among the variables. The same conclusion of a long-run relationship would have still been reached if the F-statistic was greater than both critical values at at-least one level of significance. Therefore, an error correction model on the ARDL form can be estimated in order to determine the speed of adjustment of the variables concerned to their equilibrium values. The error correction model takes short and long run dynamics into account in its estimation.

4.2.1.5 Estimated Long-Run and Short-Run

Table 4. 5: Long-run Estimated Coefficients (dependent variable: Real GDP Per-Capita)

Variable	Coefficient	t-Statistic	Prob.
LNFDI	-0.005	-0.425	0.672
LNFDI(-5)	0.031	2.374	0.020
LNGDT	-0.349	-3.791	0.000
LNGDT(-1)	0.515	4.123	0.000
LNGDT(-4)	-0.339	-3.635	0.000
LNLP	1.339	1.283	0.204
LNLTIA	0.111	2.869	0.005
LNLTID	1.180	6.161	0.000
LNLTID(-5)	-0.499	-2.632	0.010
LNLTIP	-1.170	-6.101	0.000
LNLTIP(-5)	0.487	2.529	0.013
C	-58.587	-1.515	0.134
Robustness Indicators			

R^2	0.988
Adjusted R^2	0.981
F-Statistic	158.173 [0.000]
D.W Statistic	2.094
Serial Correlation, F	1.162 [0.338]
Heteroscedasticity, F	1.115 [0.346]
Ramsey RESET, F	0.667 [0.417]
Normality, F	0.036 [0.982]

Source: Author's computations

Table 4.5 presents the ARDL long-run coefficients estimated for the variables studied in this analysis, particularly the long-term insurance variables. Pertaining to the variables of interest, the results reveal a positive long-run relationship between long-term insurance total assets and density ratios, whilst the penetration ratio depicts a negative relationship with real GDP per-capita. As observed in table 4.5, the long-term insurance ratios are all highly statistically significant. It is important to note that the lagged variables of long-term insurance density and penetration ratios have a negative and positive relationship with GDP per-capita, respectively. The lagged values of the latter mentioned variables are also statistically significant. At least, according to the long-term insurance total assets and penetration ratio, these findings imply that long-term insurance and economic growth move in the same direction in the long run, an increase in the long-term insurance proxy variables results in an increase in real GDP per-capita. The opposite is also true, a decrease in the long-term insurance proxy variables leads to a decrease in real GDP per-capita. Pertaining to the negative relationship between GDP per-capita with the lagged variable of long-term insurance density ratio, this finding may be illuminating a disparity in the growth rates of the long-term insurance sector and population growth.

These findings are consistent with a study by Sibindi & Godi (2014) and Sibindi (2014) on the South African insurance sector. Moreover, Olayungbo (2015) also arrived at the same conclusion of an existence of a positive long run connection between growth in the economy and the insurance sector. Furthermore, a positive association between economic prosperity and insurance industry innovation in the sub-Saharan African region was found by Akinlo & Apanisile (2014). Alhassan & Biekpe (2016) also found a similar relationship on a sample of eight African countries they investigated.

Table 4. 6: Short-run Estimated Coefficients (dependent variable: Real GDP Per-Capita)

Variable	Coefficient	t-Statistic	Prob.
D(LNFDI)	-0.004	-0.465	0.643
D(LNFDI(-2))	0.020	2.009	0.048
D(LNFDI(-4))	-0.031	-2.872	0.005
D(LNGDT)	-0.349	-4.763	0.000
D(LNGDT(-1))	0.202	2.555	0.013
D(LNGDT(-3))	0.339	3.979	0.000
D(LNLP)	1.339	1.683	0.097
D(LNLP(-2))	-2.617	-2.634	0.010
D(LNLP(-3))	-1.641	-2.057	0.043
D(LNLTIA)	0.111	3.287	0.001
D(LNLTID)	1.180	7.065	0.000
D(LNLTID(-4))	0.499	2.936	0.004
D(LNLTIP)	-1.170	-6.957	0.000
D(LNLTIP(-4))	-0.487	-2.825	0.006
C	-58.587	-7.101	0.000
ECT(-1)	-0.588	-7.101	0.000
Robustness Indicators			
R^2	0.878		
Adjusted R^2	0.829		
F-Statistic	18.060 [0.000]		
D.W Statistic	2.094		
Serial Correlation, F	1.162 [0.338]		
Heteroscedasticity, F	1.115 [0.346]		
Ramsey RESET, F	0.667 [0.417]		
Normality, F	0.036 [0.982]		

Source: Author's computations

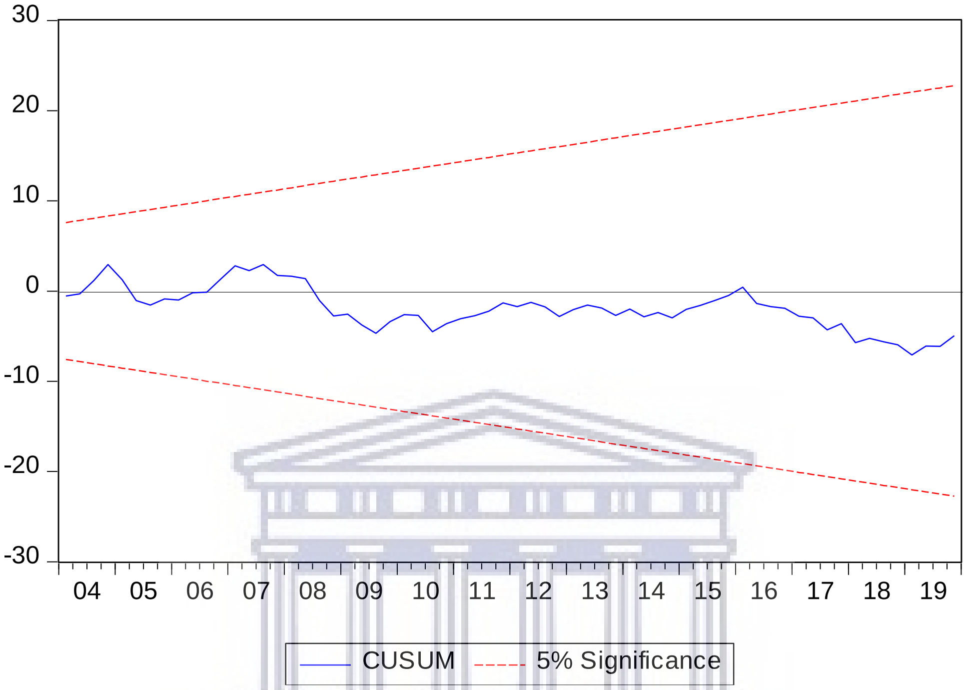
Table 4.6 presents the ARDL short-run coefficients estimated for the variables studied in this study, particularly the long-term insurance variables. As observed from the table, the long-term insurance total assets and density ratios affect positively on GDP per-capita. As reflected in the table, the results are highly statistically significant. The results of the relationship between GDP per-capita and total assets ratio are similar for both the long run and short run relationships. On the other hand, the results of the density and penetration ratios are antagonistic between the long and short run. Density ratio affects GDP per-capita positively and the penetration ratio is negatively related to GDP per-capita in the short run, whereas the opposite is true when considering the long-run relationship.

The speed of adjustment of the short-run variables to their long-run equilibrium values is captured by the error correction term coefficient. The error correction term (ECM) coefficient is between 0 and -1, however emerging research suggests that the ECM coefficient lies between 0 and -2, this is because the error correction term is just oscillation and indicates speed of convergence. The coefficient of the error correction term lagged once (-0.588) is highly statistically significant at 5% level of significance. The ECM coefficient implies that, on average, roughly over 58% of the deviations from the equilibrium level of economic growth in the current quarter would adjust towards their long-run equilibrium in the next quarter. The ECM coefficient of -0.588 indicates a moderately high rate of convergence or speed of adjustment to equilibrium. The results of the Durbin-Watson statistic for autocorrelation show that there is no correlation between the variables concerned. Additionally, the results of the F-statistic for the overall significance of the model show that the explanatory variables fit the specified linear model well. In other words, the explanatory variables jointly improve the explanatory power of the model, compared to a model a model that does not contain the specified explanatory variables. Finally, the adjusted-R^2 reveals that the explanatory variables explain just over eighty two percent of the variation in the dependent variable, thus, confirming the overall good fit of the model.

4.2.1.6 Stability Diagnostic Test

In line with general practice, the model was subjected to diagnostic and stability tests to ascertain its robustness for forecasting and policy. The Jarque-Bera normality test was undertaken to test for normality, the results confirmed normality. The Serial Correlation Test was carried-out to test for autocorrelation between the variables, the results confirmed there is no correlation. The Breusch-Pagan-Godfrey was utilised to test for heteroscedasticity, the results confirmed that the model has no heteroscedasticity. The Ramsey RESET test was undertaken to test for the model misspecification and/or omitted variables, the results confirm that the model does not suffer from misspecification and omitted variables.[23]

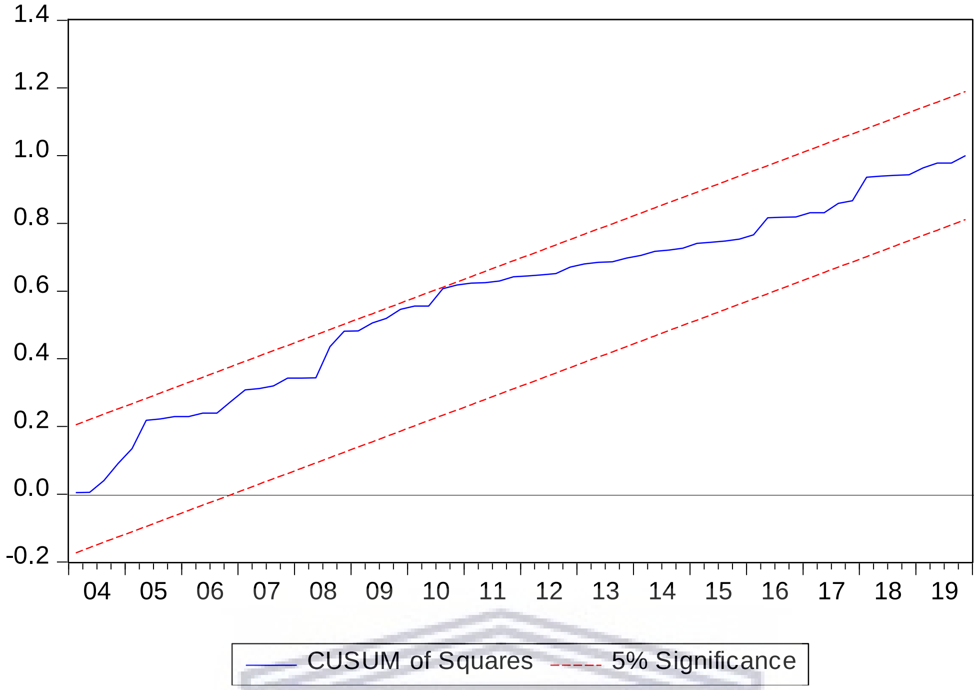
Figure 4. 1: Cumulative Sum (CUSUM)



Source: Author's computations

[23] See Appendix

Figure 4. 2: Cumulative Sum of Square (CUSUMSQ)



Source: Author's computations

The CUSUM and CUSUMSQ parameter constancy test was undertaken to test for parameter stability during the period of investigation, the results confirmed that the parameters are stable and do not change suddenly (Hansen, 1992). Figures 4.1 and 4.2 show that the CUSUM and CUSUMSQ lines lay within the 5% level of significance; they did not breach the 5% level of significance lines during the period of investigation.

4.2.1.7 Granger Causality

Table 4. 7: Long-run Estimated Coefficients (dependent variable: Real GDP Per-Capita)

Dependent variable: LNGDP	**Chi-sq.**	**Df.**	**Prob.**
LNFDI does not Granger cause LNGDP	22.375	5	0.000*
LNLTIA does not Granger cause LNGDP	18.777	5	0.002*
LNLTID does not Granger cause LNGDP	21.492	5	0.000*
LNLTIP does not Granger cause LNGDP	21.542	5	0.000*
Dependent variable: LNLTIA	**Chi-sq.**	**Df.**	**Prob.**

LNGDP does not Granger cause LNLTIA	7.583	5	0.180
LNFDI does not Granger cause LNLTIA	21.462	5	0.000*
Dependent variable: LNLTID	**Chi-sq.**	**Df.**	**Prob.**
LNGDP does not Granger cause LNLTID	2.279	5	0.809
Dependent variable: LNLTIP	**Chi-sq.**	**Df.**	**Prob.**
LNGDP does not Granger cause LNLTIP	2.168	5	0.825

*Note: * means the rejection of the null hypothesis at 5%*

Source: Author's computations

Table 4.7 presents the Granger causality long-run estimated coefficients of the variables investigated in this study, particularly the long-term insurance variables. Pertaining to the variables of interest, the results show that long-term insurance total assets, density and penetration ratios Granger cause GDP per-capita in the long-run. As observed in table 4.7, the long-term insurance ratios are all highly statistically significant. On the other hand, GDP per-capita does not Granger cause long-term insurance. These results imply that the South African long-term insurance sector is supply-leading. These findings are in contrast with a study by Sibindi & Godi (2014) and Sibindi (2014) who found that the South African insurance sector is demand-following. The results are harmonious with the study by Olayungbo (2015), which established that the insurance sector in South Africa is supply-leading. These results lend credence to a study conducted by Patrick (1966), which asserted that during the early stages of development of a country financial development leads to economic growth and not the other way around.

Table 4. 8: Short-run Estimated Coefficients (dependent variable: Real GDP Per-Capita)

Dependent variable: D(LNGDP)	Chi-sq.	Df.	Prob.
D(LNFDI) does not Granger cause D(LNGDP)	15.253	5	0.009*
D(LNLTIA) does not Granger cause D(LNGDP)	13.077	5	0.022*
D(LNLTID) does not Granger cause D(LNGDP)	17.123	5	0.004*
D(LNLTIP) does not Granger cause D(LNGDP)	16.686	5	0.005*

Dependent variable: D(LNLTIA)	Chi-sq.	Df.	Prob.
D(LNGDP) does not Granger cause D(LNLTIA)	12.841	5	0.024*
D(LNFDI) does not Granger cause D(LNLTIA)	24.737	5	0.000*
Dependent variable: D(LNLTID)	**Chi-sq.**	**Df.**	**Prob.**
D(LNGDP) does not Granger cause D(LNLTID)	2.952	5	0.707
Dependent variable: D(LNLTIP)	**Chi-sq.**	**Df.**	**Prob.**
D(LNGDP) does not Granger cause D(LNLTIP)	3.052	5	0.691

*Note: * means the rejection of the null hypothesis at 5%*
Source: *Author's computations*

Table 4.8 presents the Granger causality short-run estimated coefficients of the variables investigated in this study, particularly the long-term insurance variables. Pertaining to the variables of interest, similarly to the long-run Granger causality results; the short-run Granger causality results illustrate that long-term insurance total assets, density and penetration ratios Granger cause GDP per-capita. As observed in table 4.8, the long-term insurance ratios are all highly statistically significant. On the other hand, GDP per-capita Granger causes long-term insurance in the short run, according to the long-term insurance total assets ratio. These results imply that in the short run, the relationship between GDP per-capita and the long-term insurance sector is supply leading. Nonetheless, as it pertains to the long-term insurance total assets ratio the relationship is bidirectional, supposing interdependence between economic growth and the long-term insurance sector in South Africa.

4.2.2 Empirical Results for Short-term Insurance

4.2.2.1 Short-term Insurance Descriptive Statistics Analysis

Table 4.9 presents the descriptive statistics of the variables, including the short-term insurance variables. Important characteristics of the variables can be observed from analysing their descriptive statistics. For a series to be normally distributed the Skewness coefficient estimates must be in the range of -2 and +2, while the Kurtosis coefficient estimates must be between -3 and +3.

Table 4. 9: Descriptive statistics

	LNGDP	LNFDI	LNGDT	LNLP	LNSTIA	LNSTID	LNSTIP
Mean	3.0655	0.1839	0.4491	13.5031	-2.6931	-0.6146	-4.5158
Median	3.0969	0.4559	0.4816	13.5031	-2.7681	-0.6015	-4.5232
Maximum	3.2110	0.7023	0.8740	13.5056	-2.2412	-0.3180	-4.3156
Minimum	2.8122	-1.0759	-0.0334	13.5010	-2.9533	-0.9916	-4.6919
Std. Dev.	0.1048	0.5439	0.2206	0.0015	0.2143	0.1272	0.0836
Skewness	-0.5433	-1.3558	-0.3726	0.0597	0.6931	-0.5953	0.1391
Kurtosis	2.2122	3.1923	2.2772	1.6676	2.0580	3.8292	2.4002
Observations	104	104	104	104	104	104	104

Source: Author's computations

As observed from table 4.9 above, the variables are consistent with accepted statistical standards of normally distributed data. The mean and median values of the variables fall within the minimum and maximum values. Their standard deviations are close to zero, signifying minimal deviation of the variables from their means. LNLP and LNSTIP have the least variability, meanwhile LNFDI and LNGDT have the most variability of all the variables. Nevertheless, as is the case for long-term insurance variables, the statistical properties show a high level of consistency. The Skewness and Kurtosis estimates for LNGDP, LNGDT, LNLP, LNSTIA and LNSTIP imply that these variables are normally distributed, the only exceptions are LNFDI and LNSTID. Skewness estimates for LNGDP, LNFDI, LNGDT and LNSTID were negative implying that the distributions of the variables are skewed to the left, while Skewness estimates for LNLP, LNSTIA and LNSTIP are positive, implying that they are skewed to the right.

4.2.2.2 Correlation Matrix Analysis

Table 4.10 presents the correlation matrix analysis of the variables, including the short-term insurance variables. The correlation representation illustrates the relations of the variables statistically. The strength of the correlation is depicted by how close the coefficient estimates are from a range of -1 and +1, the closer the coefficient is to either -1 or +1 the stronger the correlation. The direction of correlation is identified by the respective signs of the coefficients. A positive coefficient implies positive correlation, on the other hand, a negative coefficient implies a negative correlation, respectively.

Table 4. 10: Correlation matrix

	LNGDP	LNFDI	LNGDT	LNLP	LNSTIA	LNSTID	LNSTIP
LNGDP	1.0000						
LNFDI	0.7980	1.0000					
LNGDT	-0.3775	-0.2374	1.0000				
LNLP	0.0292	0.0923	-0.0243	1.0000			
LNSTIA	-0.7855	-0.6970	0.3179	0.0837	1.0000		
LNSTID	0.8037	0.5911	-0.4250	0.0463	-0.6142	1.0000	
LNSTIP	0.0276	-0.1045	-0.4283	0.0933	0.1898	0.5344	1.0000

Source: Author's computations

As observed from table 4.10 above, all the variables confirm a positive correlation with economic growth, except for government debt and short-term insurance total assets ratio. This is a snapshot that signals the impact of government debt and asset accumulation of the short-term insurance sector on economic growth. Foreign direct investment and short-term insurance density ratio depict the highest level of correlation with economic growth. On the other hand, short-term insurance penetration ratio depicts the lowest level of correlation with economic growth. Some variables depict high correlations, suggesting multicollinearity. Nevertheless, the presence of multicollinearity does not mean the model is not specified correctly, because the estimators remain BLUE, the standard errors also remain valid (Gujarati, 2004).

4.2.2.3 Unit Root Analysis

Table 4.11 presents the unit root analysis of the variables, including short-term insurance variables. Due to the stochastic and non-stationary nature of time series data, it is an imperative to run stationarity tests of the data. The presence of a unit root in the time series variables was determined using the ADF and PP tests.

Table 4. 11: Unit root tests: ADF & PP in levels and first differences

Variable	Model Specification	ADF	PP	ADF	PP	Order of Integration
		Levels		First	First	

			Levels	**Difference**	**Difference**	
LNGDP	Intercept	-1.76	-1.98	-3.53***	-10.75***	I(1)
	Intercept and trend	-0.99	-1.93	-3.83***	-11.00***	I(1)
LNFDI	Intercept	-2.71**	-2.16	-2.77***	-10.74***	I(1)
	Intercept and trend	-2.57	-2.05	-3.10	-10.82***	I(1)
LNGDT	Intercept	-1.36	-0.32	-2.07	-8.56***	I(1)
	Intercept and trend	-0.88	-0.26	-3.06	-8.95***	I(1)
LNLP	Intercept	-8.68***	-11.47***	-6.24***	-57.25***	I(0)
	Intercept and trend	-8.68***	-11.48***	-6.24***	-57.25***	I(0)
LNSTIA	Intercept	-1.29	-1.32	-3.21***	-8.98***	I(1)
	Intercept and trend	-1.31	-1.43	-5.13***	-8.98***	I(1)
LNSTID	Intercept	-3.41***	-3.85***	-9.57***	-14.84***	I(1)
	Intercept and trend	-2.96	-4.44***	-9.82***	-15.24***	I(1)
LNSTIP	Intercept	-3.42***	-5.66***	-6.35***	-5.93***	I(0)
	Intercept and trend	-4.56***	-5.93***	-6.42***	-18.60***	I(0)

*Note: *** and * means the rejection of the null hypothesis at 5% and 10% respectively.*
Source: Author's computations

As observed in table 4.11 above, the order of integration of the variables, with the short-term insurance variables included is a mixture of I(0) and I(1). LNLP and LNSTIP are the only variables that remain stationary at levels I(0), all other variables become stationary after first differencing. The unit root properties of the variables warrant the use of the ARDL model.

4.2.2.4 ARDL Bound Testing Cointegration

Table 4.12 presents the ARDL bound test of cointegration among the variables, including short-term insurance variables. The bound test to cointegration was estimated to determine if there is a long-run relationship among the variables in question.

Table 4. 12: Autoregressive distributed lag (ARDL) Results of Cointegration

Test Statistic	Value	Level of Significance	Lower Critical Value I(0)	Upper Critical Value I(1)
F-statistic	5.93	10%	2.12	3.23
		5%	2.45	3.61
		1%	3.15	4.43

Source: Author's computations

As observed in table 4.12 above, the value of the F-statistic is greater than both the lower and upper bound critical values at all levels of significance, thus inferring a long-run relationship among the variables. Even if the F-statistic was greater than both critical values at at-least one level significance, the same conclusion would of a long run relationship would have attained.

4.2.2.5 Estimated Long-Run and Short-Run

Table 4. 13: Long-run Estimated Coefficients (dependent variable: Real GDP Per-Capita)

Variable	Coefficient	t-Statistic	Prob.
LNFDI	-0.017	-1.555	0.124
LNFDI(-1)	0.028	2.074	0.041
LNFDI(-5)	0.032	2.711	0.008
LNGDT	-0.337	-3.899	0.000
LNGDT(-1)	0.524	4.419	0.000
LNGDT(-4)	-0.246	-2.663	0.009
LNLP	1.057	1.012	0.315
LNSTIA	0.136	2.974	0.004
LNSTIA(-1)	-0.086	-2.010	0.048
LNSTID	1.231	6.147	0.000

LNSTID(-2)	-0.516	-2.192	0.031
LNSTID(-5)	-0.478	-2.304	0.024
LNSTIP	-1.236	-6.248	0.000
LNSTIP(-2)	0.530	2.302	0.024
LNSTIP(-5)	0.493	2.384	0.019
C	-37.998	-0.935	0.352
Robustness Indicators			
R^2	0.987		
Adjusted R^2	0.981		
F-Statistic	165.319 [0.000]		
D.W Statistic	1.929		
Serial Correlation, F	0.318 [0.899]		
Heteroscedasticity, F	0.955 [0.543]		
Ramsey RESET, F	2.218 [0.141]		
Normality, F	1.447 [0.485]		

Source: Author's computations

Table 4.13 presents the ARDL long-run estimated coefficients of the variables, particularly the short-term insurance variables. The results show that there is a positive long-run relationship between short-term insurance total assets and density ratios, whereas, the penetration ratio depicts a negative relationship with real GDP per-capita. The short-term insurance ratios are all highly statistically significant. It is important to note that the lagged variables of short-term insurance total assets and density ratios are negatively related to GDP per-capita. Whereas, the lagged variables of short-term insurance penetration ratio have a positive relationship with GDP per-capita. The lagged values of the latter mentioned variables are also statistically significant. In view of that, according to the short-term insurance total assets and density ratios, these findings imply that short-term insurance and economic growth do not move in the same direction in the long run, an increase in the short-term insurance proxy variables results in a decrease in real GDP per-capita. The opposite is also true, a decrease in the short-term insurance proxy variables leads to a decrease in real GDP per-capita. Furthermore, according to the short-term insurance penetration ratio lagged variables, the relationship between GDP per-capita and short-term insurance is positive.

As far as the short-term total assets and density ratios are concerned, these findings are inconsistent with the studies by Sibindi & Godi (2014), Sibindi (2014) and Olayungbo (2015) on the South African insurance sector. The aforementioned studies arrived at the same conclusion of an existence of a positive long-term relationship between economic growth and the insurance sector.

Table 4. 14: Short-run Estimated Coefficients (dependent variable: Real GDP Per-Capita)

Variable	Coefficient	t-Statistic	Prob.
D(LNFDI)	-0.017	-1.733	0.087
D(LNFDI(-4))	-0.032	-3.302	0.001
D(LNGDT)	-0.337	-4.512	0.000
D(LNGDT(-1))	0.227	3.078	0.003
D(LNGDT(-2))	0.205	2.857	0.005
D(LNGDT(-3))	0.246	2.923	0.004
D(LNLP)	1.057	1.331	0.187
D(LNLP(-3))	-1.737	-2.288	0.025
D(LNSTIA)	0.136	3.512	0.000
D(LNSTID)	1.231	6.741	0.000
D(LNSTID(-1))	0.529	3.167	0.002
D(LNSTID(-4))	0.478	2.712	0.008
D(LNSTIP)	-1.236	-6.811	0.000
D(LNSTIP(-1))	-0.505	-3.034	0.003
D(LNSTIP(-4))	-0.493	-2.835	0.006
C	-37.998	-6.728	0.000
ECT(-1)	-0.372	-6.728	0.000
Robustness Indicators			
R^2	0.866		
Adjusted R^2	0.820		
F-Statistic	18.965 [0.000]		
D.W Statistic	1.929		
Serial Correlation, F	0.318 [0.899]		
Heteroscedasticity, F	0.955 [0.543]		
Ramsey RESET, F	2.218 [0.141]		
Normality, F	1.447 [0.485]		

Source: Author's computations

Table 4.14 presents the ARDL short-run estimated coefficients of the variables, particularly the short-term insurance variables. As observed from the table, the short-term insurance total assets and density ratios positively affects GDP per-capita. The results are highly statistically significant as well. The results of the relationship between GDP per-capita, short-term insurance total assets and density ratios are analogous for both the long run and short run relationships. Contrarily, the results of the short-term insurance penetration ratio are antagonistic between the long and short run. Penetration ratio is negatively related to GDP per-capita in the short run, whereas the opposite is true when considering the long-run relationship.

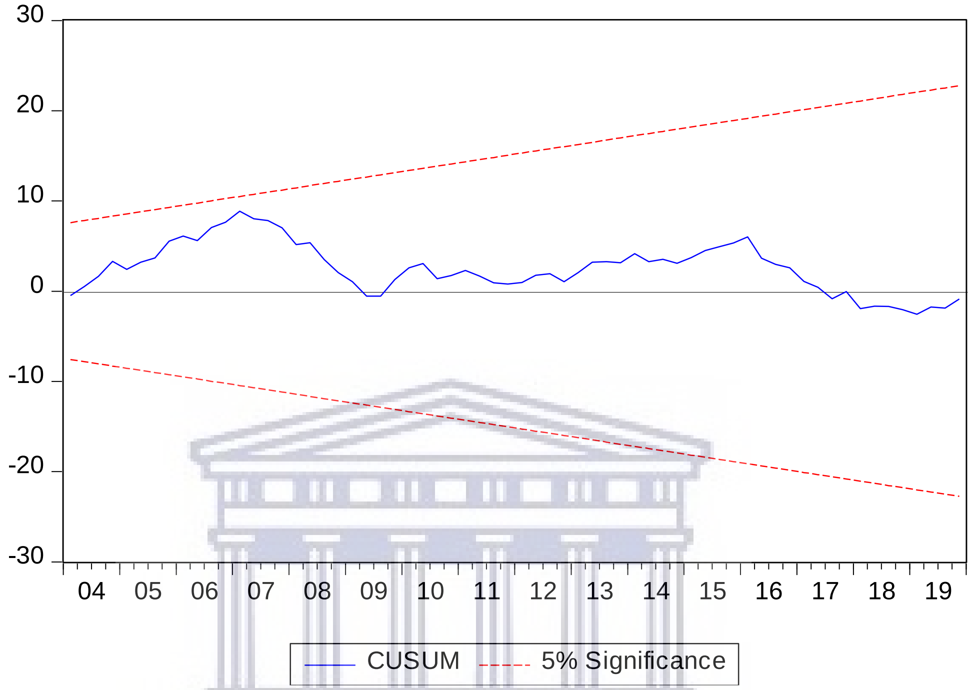
The speed of adjustment of the short-run variables to their long-run equilibrium values is captured by the error correction term coefficient. The coefficient of the error correction term lagged once (-0.372) is highly statistically significant at 5% level of significance. The ECM coefficient implies that, on average, roughly over 37% of the deviations from the equilibrium level of economic growth in the current quarter would adjust towards their long-run equilibrium in the next quarter. The ECM coefficient of -0.372 indicates a moderately low rate of convergence or speed of adjustment to equilibrium. The results of the Durbin-Watson statistic for autocorrelation show that there is no correlation between the variables concerned. Additionally, the results of the F-statistic for the overall significance of the model show that the explanatory variables fit the specified linear model well. Phrased differently, the explanatory variables jointly improve the explanatory power of the model, compared to a model a model that does not contain the specified explanatory variables. Finally, the adjusted-R^2 reveals that the explanatory variables explain about eighty percent of the variation in the dependent variable, thus, confirming the overall good fit of the model.

4.2.2.6 Stability Diagnostic Test

In line with general practice, the model was tested for consistency through subjecting it to diagnostic and stability tests, thereby, ascertaining its robustness for forecasting and policy. The Jarque-Bera normality test was undertaken to test for normality, the results confirmed normality. The Serial Correlation Test was carried-out to test for autocorrelation between the variables, the results confirmed there is no correlation. The Breusch-Pagan-Godfrey was utilised to test for heteroscedasticity, the results confirmed that the model has no heteroscedasticity. The Ramsey

RESET test was undertaken to test for the model misspecification and/or omitted variables, the results confirm that the model does not suffer from misspecification and omitted variables.[24]

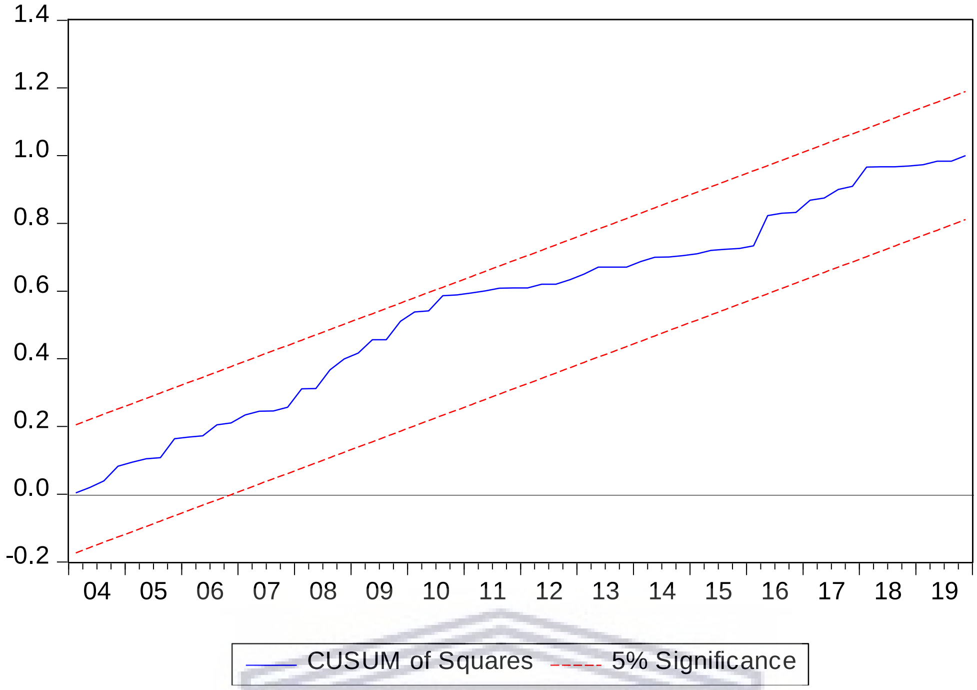
Figure 4. 3: Cumulative Sum (CUSUM)



Source: Author's computations

[24] See Appendix

Figure 4. 4: Cumulative Sum of Square (CUSUMSQ)



Source: Author's computations

The CUSUM and CUSUMSQ parameter constancy test was undertaken to test for parameter stability during the period of investigation, the results confirmed that the parameters are stable and do not change suddenly (Hansen, 1992). Figures 4.3 and 4.4 show that the CUSUM and CUSUMSQ lines lay within the 5% level of significance; they did not breach the 5% level of significance lines during the period of investigation.

4.2.2.7 Granger Causality

Table 4. 15: Long-run Estimated Coefficients (dependent variable: Real GDP Per-Capita)

Dependent variable: LNGDP	**Chi-sq.**	**Df.**	**Prob.**
LNFDI does not Granger cause LNGDP	19.953	5	0.001*
LNSTIA does not Granger cause LNGDP	7.766	5	0.169
LNSTID does not Granger cause LNGDP	21.591	5	0.000*
LNSTIP does not Granger cause LNGDP	20.887	5	0.000*

Dependent variable: LNSTIA	Chi-sq.	Df.	Prob.
LNGDP does not Granger cause LNSTIA	25.020	5	0.000*
LNFDI does not Granger cause LNSTIA	26.898	5	0.000*
Dependent variable: LNSTID	**Chi-sq.**	**Df.**	**Prob.**
LNGDP does not Granger cause LNSTID	11.715	5	0.038*
Dependent variable: LNSTIP	**Chi-sq.**	**Df.**	**Prob.**
LNGDP does not Granger cause LNSTIP	12.082	5	0.033*

*Note: * means the rejection of the null hypothesis at 5%*
Source: *Author's computations*

Table 4.15 presents the Granger causality long-run estimated coefficients of the variables, specifically the short-term insurance variables. The results depict that short-term insurance density and penetration ratios Granger cause GDP per-capita in the long-run. The previously mentioned short-term insurance ratios are all highly statistically significant. Conversely, the short-term insurance total assets ratio does not Granger cause GDP per-capita. On the other hand, GDP per-capita Granger causes short-term insurance. These results imply that the South African short-term insurance sector is bi-directional, economic growth and the short-term insurance sector are interdependent. These findings are in contrast with a study by Sibindi & Godi (2014) and Sibindi (2014) who found that the South African insurance sector is demand-following. Furthermore, these results are in disaccord with the findings of the study by Olayungbo (2015), which established that the insurance sector in South Africa is supply-leading.

Table 4. 16: Short-run Estimated Coefficients (dependent variable: Real GDP Per-Capita)

Dependent variable: D(LNGDP)	Chi-sq.	Df.	Prob.
D(LNFDI) does not Granger cause D(LNGDP)	11.971	5	0.035
D(LNSTIA) does not Granger cause D(LNGDP)	2.6242	5	0.757
D(LNSTID) does not Granger cause D(LNGDP)	16.628	5	0.005
D(LNSTIP) does not Granger cause D(LNGDP)	16.272	5	0.006

Dependent variable: D(LNSTIA)	Chi-sq.	Df.	Prob.
D(LNGDP) does not Granger cause D(LNSTIA)	22.715	5	0.000
D(LNFDI) does not Granger cause D(LNSTIA)	19.470	5	0.001
Dependent variable: D(LNSTID)	**Chi-sq.**	**Df.**	**Prob.**
D(LNGDP) does not Granger cause D(LNSTID)	10.402	5	0.064
Dependent variable: D(LNSTIP)	**Chi-sq.**	**Df.**	**Prob.**
D(LNGDP) does not Granger cause D(LNSTIP)	10.516	5	0.061

*Note: * means the rejection of the null hypothesis at 5%*
Source: *Author's computations*

Table 4.16 presents the short-run Granger causality estimated coefficients of the variables, paying attention to the short-term insurance variables. Referring to the variables of interest, similarly to the long-run Granger causality results; the short-run Granger causality results illustrate that short-term insurance density and penetration ratios Granger cause GDP per-capita. The estimated coefficients of the short-term insurance ratios are highly statistically significant. On the contrary, GDP per-capita Granger causes short-term insurance in the short run, according to the short-term insurance total assets ratio. These results imply that in the short run, the relationship between GDP per-capita and the short-term insurance sector is supply-leading.

4.2.3 Empirical Results for Total Insurance

4.2.3.1 Total Insurance Descriptive Statistics Analysis

Table 4.17 presents the descriptive statistics of the variables, with the total insurance proxy variables included. Analysing the descriptive statistics unveils important statistical characteristics about the variables. For a series to be normally distributed the Skewness coefficient estimates must be in the range of -2 and +2, while the Kurtosis coefficient estimates must be between -3 and +3.

Table 4. 17: Descriptive statistics

	LNGDP	LNFDI	LNGDT	LNLP	LNTIA	LNTID	LNTIP
Mean	3.0655	0.1839	0.4491	13.5031	0.1452	0.4412	-3.4600

Median	3.0969	0.4559	0.4816	13.5031	0.1118	0.4598	-3.4656
Maximum	3.2110	0.7023	0.8740	13.5056	0.3786	0.9579	-2.9606
Minimum	2.8122	-1.0759	-0.0334	13.5010	-0.0431	-0.1418	-3.8448
Std. Dev.	0.1048	0.5439	0.2206	0.0015	0.1193	0.2098	0.1760
Skewness	-0.5433	-1.3558	-0.3726	0.0597	0.3106	-0.4879	0.2855
Kurtosis	2.2122	3.1923	2.2772	1.6676	1.7312	3.3639	2.7643
Observations	104	104	104	104	104	104	104

Source: Author's computations

As tabulated in table 4.17 above, the statistical properties of the variables do not show any statistical discrepancies. The mean and median values of the variables fall within the minimum and maximum values. The standard deviations of the variables are close to zero, indicating minimal deviation of the values from their means. LNGDP and LNLP have the least variability, while LNFDI and LNGDT have the most variability. Nevertheless, the statistical properties show a high level of consistency. The Skewness and Kurtosis estimates for LNGDP, LNGDT, LNLP, LNTIA and LNTIP imply that these variables are normally distributed, the only exceptions are LNFDI and LNTID. Skewness estimates for LNGDP, LNFDI, LNGDT and LNTID were negative implying that the distributions of the variables are skewed to the left, while Skewness estimates for LNLP, LNTIA and LNTIP are positive, implying that they are skewed to the right.

4.2.3.2 Correlation Matrix Analysis

Table 4.18 presents the analysis of correlation between the variables, including the total insurance variables. The closer the coefficient is to either -1 or +1 the stronger the correlation. The direction of correlation is identified by the respective signs of the coefficients. A positive coefficient implies positive correlation, on the other hand, a negative coefficient implies a negative correlation, respectively.

Table 4. 18: Correlation matrix

	LNGDP	LNFDI	LNGDT	LNLP	LNTIA	LNTID	LNTIP
LNGDP	1						
LNFDI	0,7980	1					
LNGDT	-0,3774	-0,2373	1				
LNLP	0,0291	0,0922	-0,0243	1			
LNTIA	-0,4008	-0,3797	-0,0141	0,0784	1		
LNTID	0,7075	0,6233	-0,5962	0,0285	-0,0109	1	
LNTIP	0,2802	0,2681	-0,6043	0,0450	0,3775	0,8593	1

Source: Author's computations

As table 4.18 above depicts, all the variables exhibit the presence of a positive correlation with economic growth, except for government debt and total insurance total assets ratio. This preliminary picture may be an indicator of how government debt and assets accumulation by the total insurance industry impacts on economic growth. Foreign direct investment and total insurance density ratio depict the highest level of correlation with economic growth. On the other hand, labour productivity depicts the lowest level of correlation with economic growth. The high correlations depicted by some variables in table 4.18 may suggest multicollinearity between the variables. However, multicollinearity does not invalidate the model, because the estimators remain best linear and unbiased (BLUE) with robust standard errors (Gujarati, 2004).

4.2.3.3 Unit Root Analysis

Table 4.19 presents the unit root analysis of the variables, including total insurance variables. Time series data tends to contain unit roots and to be non-stationary. Thus, it is crucial to ascertain the stationary properties of the data to avoid running spurious regressions. The presence of a unit root in the time series variables was determined using the ADF and PP tests.

Table 4. 19: Unit root tests: ADF & PP in levels and first differences

Variable	Model Specification	ADF	PP	ADF	PP	Order of Integration
		Levels	Levels	First Difference	First Difference	

LNGDP	Intercept	-1.76	-1.98	-3.53***	-10.75***	I(1)
	Intercept and trend	-0.99	-1.93	-3.83***	-11.00***	I(1)
LNFDI	Intercept	-2.71**	-2.16	-2.77***	-10.74***	I(1)
	Intercept and trend	-2.57	-2.05	-3.10	-10.82***	I(1)
LNGDT	Intercept	-1.36	-0.32	-2.07	-8.56***	I(1)
	Intercept and trend	-0.88	-0.26	-3.06	-8.95***	I(1)
LNLP	Intercept	-8.68***	-11.47***	-6.24***	-57.25***	I(0)
	Intercept and trend	-8.68***	-11.48***	-6.24***	-57.25***	I(0)
LNTIA	Intercept	-1.75	-1.94	-9.89***	-9.91***	I(1)
	Intercept and trend	-4.41***	-3.16**	-9.85***	-9.87***	I(1)
LNTID	Intercept	-2.55	-3.13***	-8.83***	-11.56***	I(1)
	Intercept and trend	-2.03	-2.95	-9.09***	-12.90***	I(1)
LNTIP	Intercept	-2.04	-3.29***	-9.01***	-12.83***	I(0)
	Intercept and trend	-2.33	-3.30**	-9.17***	-13.18***	I(0)

*Note: *** and * means the rejection of the null hypothesis at 5% and 10% respectively.*
Source: Author's computations

The order of integration of the variables, with the total insurance variables included is a mixture of I(0) and I(1). LNGDP and LNLP are the only variables that remain stationary at levels I(0), all other variables become stationary after first differencing. Therefore, the order of integration exhibited by the data allows for the ARDL model to be estimated.

4.2.3.4 ARDL Bound Testing Cointegration

Table 4.20 presents the ARDL bound test of cointegration among the variables investigated in this study. Given that the objective of the study is to determine the effects of the insurance sector on economic growth in South Africa, it is important to establish whether these effects are long-run effects or not. Hence, the bound test to cointegration was estimated to determine if there is a long-run relationship among the variables concerned.

Table 4. 20: Autoregressive distributed lag (ARDL) Results of Cointegration

Test Statistic	Value	Level of Significance	Lower Critical Value I(0)	Upper Critical Value I(1)
F-statistic	6.91	10%	2.12	3.23
		5%	2.45	3.61
		1%	3.15	4.43

Source: Author's computations

As observed in table 4.20 above, the F-statistic value of the ARDL bound testing cointegration is greater than both the lower and upper bound critical values at all levels of significance, implying that there is a long-run relationship among the variables. The same conclusion of a long-run relationship would have still been reached if the F-statistic was greater than both critical values at at-least one level of significance. Therefore, an error correction model on the ARDL form can be estimated in order to determine the speed of adjustment of the variables concerned to their equilibrium values. The error correction model takes short and long run dynamics into account in its estimation.

4.2.3.5 Estimated Long-Run and Short-Run

Table 4. 21: Long-run Estimated Coefficients (dependent variable: Real GDP Per-Capita)

Variable	Coefficient	t-Statistic	Prob.
LNFDI	-0.004	-0.428	0.669
LNFDI(-5)	0.029	2.316	0.023
LNGDT	-0.325	-3.624	0.000
LNGDT(-1)	0.484	4.122	0.000
LNGDT(-4)	-0.297	-3.357	0.001
LNLP	0.974	0.936	0.352
LNTIA	0.125	3.186	0.002
LNTID	1.196	6.320	0.000
LNTID(-2)	-0.499	-2.297	0.024
LNTID(-5)	-0.473	-2.670	0.009

LNTIP	-1.178	-6.237	0.000
LNTIP(-2)	0.535	2.437	0.017
LNTIP(-5)	0.453	2.508	0.014
C	-58.904	-1.526	0.131
Robustness Indicators			
R^2	0.987		
Adjusted R^2	0.982		
F-Statistic	174.553 [0.000]		
D.W Statistic	1.966		
Serial Correlation, F	1.127 [0.355]		
Heteroscedasticity, F	1.243 [0.225]		
Ramsey RESET, F	0.108 [0.742]		
Normality, F	0.289 [0.865]		

Source: Author's computations

Table 4.21 presents the ARDL long-run coefficients estimated for the variables studied in this analysis, particularly the total insurance variables. Pertaining to the variables of interest, the results reveal a positive long-run relationship between total insurance total assets and density ratios, whilst the total insurance penetration ratio depicts a negative relationship with real GDP per-capita. As observed in table 4.21, the total insurance ratios are all highly statistically significant. It should be noted that the lagged variables of total insurance density and penetration ratios have a negative and positive relationship with GDP per-capita, respectively. The lagged values of the latter mentioned variables are also statistically significant. At least, according to the total insurance total assets and penetration ratios, these findings imply that total insurance and economic growth move in the same direction in the long run, an increase in the total insurance results in an increase in real GDP per-capita. The opposite is also true, a decrease in total insurance leads to a decrease in real GDP per-capita. Pertaining to the negative relationship between GDP per-capita with the lagged variable of total insurance density ratio, this finding may be illuminating a disparity in the growth rates of the total insurance sector and population growth. It should be pointed out that these total insurance results mirror the results of the long-term insurance sector. This is not surprising given the relative sheer size of the South African long-term insurance sector compared to the short-term insurance sector.

These findings are consistent with a study by Sibindi & Godi (2014) and Sibindi (2014) on the South African insurance sector. Moreover, Olayungbo (2015) also arrived at the same conclusion of an existence of a positive long-run association between growth in the economy and the insurance sector. Furthermore, a positive connection between economic progress and insurance innovation on the sub-Saharan African region was found by Akinlo & Apanisile (2014). Alhassan & Biekpe (2016) also found a similar relationship on a sample of eight African countries they investigated.

Table 4. 22: Short-run Estimated Coefficients (dependent variable: Real GDP Per-Capita)

Variable	Coefficient	t-Statistic	Prob.
D(LNFDI)	-0.004	-0.472	0.637
D(LNFDI(-2))	0.020	2.085	0.040
D(LNFDI(-4))	-0.029	-2.996	0.003
D(LNGDT)	-0.325	-4.481	0.000
D(LNGDT(-1))	0.190	2.642	0.010
D(LNGDT(-2))	0.206	2.959	0.004
D(LNGDT(-3))	0.297	3.665	0.000
D(LNLP)	0.974	1.256	0.213
D(LNLP(-2))	-2.607	-2.707	0.008
D(LNLP(-3))	-1.619	-2.076	0.041
D(LNTIA)	0.125	3.676	0.000
D(LNTID)	1.196	7.380	0.000
D(LNTID(-1))	0.514	3.151	0.002
D(LNTID(-4))	0.473	2.994	0.003
D(LNTIP)	-1.178	-7.206	0.000
D(LNTIP(-1))	-0.527	-3.192	0.002
D(LNTIP(-4))	-0.453	-2.824	0.006
C	-58.904	-7.262	0.000
ECT(-1)	-0.502	-7.262	0.000
Robustness Indicators			
R^2	0.873		
Adjusted R^2	0.830		
F-Statistic	20.172 [0.000]		
D.W Statistic	1.966		

Serial Correlation, F	1.127 [0.355]
Heteroscedasticity, F	1.243 [0.225]
Ramsey RESET, F	0.108 [0.742]
Normality, F	0.289 [0.865]

Source: Author's computations

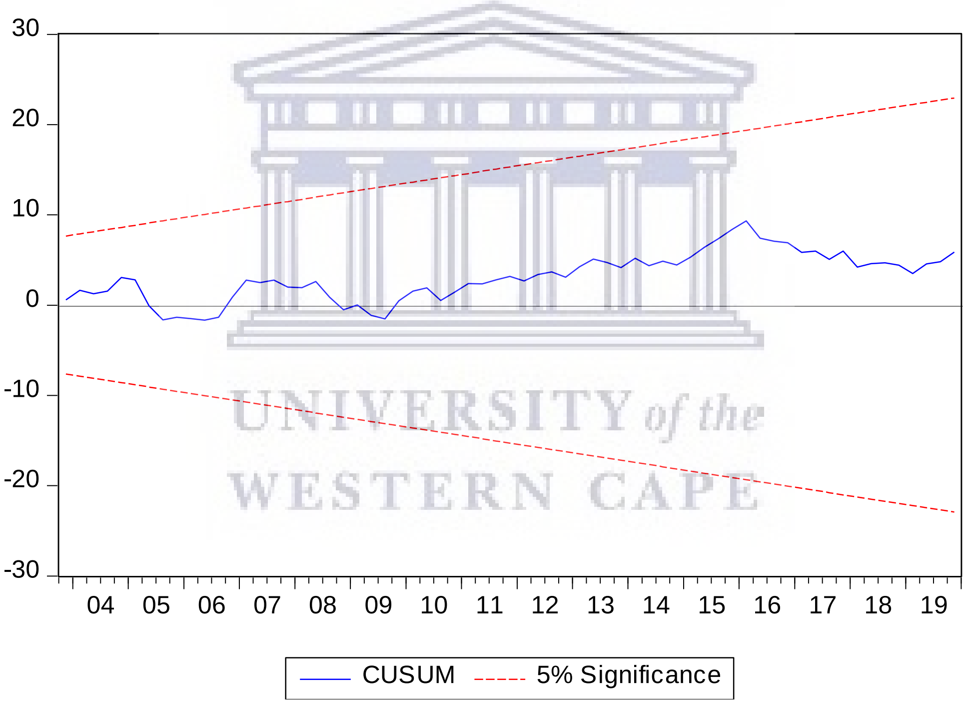
Table 4.22 presents the ARDL short-run coefficients estimated for the variables studied in this analysis, particularly the total insurance variables. As observed from the table, the total insurance total assets and density ratios affect positively on GDP per-capita. As reflected in the table, the results are highly statistically significant. The results of the relationship between GDP per-capita and total assets ratio are similar for both the long run and short run relationships. On the other hand, the results of the density and penetration ratios are antagonistic between the long and short run. Density ratio affects GDP per-capita positively and the penetration ratio is negatively related to GDP per-capita in the short run, whereas the opposite is true when considering the long-run relationship. Just as it was the case with the long run relationship, total insurance results of the short run relationship mirror the short run long-term assets results.

The speed of adjustment of the short-run variables to their long-run equilibrium values is captured by the error correction term coefficient. The coefficient of the error correction term lagged once (-0.503) is highly statistically significant at 5% level of significance. The ECM coefficient implies that, on average, about 50% of the deviations from the equilibrium level of economic growth in the current quarter would adjust towards their long-run equilibrium in the next quarter. The ECM coefficient of -0.50 indicates a moderate rate of convergence or speed of adjustment to equilibrium. The results of the Durbin-Watson statistic for autocorrelation show that there is no correlation between the variables concerned. Additionally, the results of the F-statistic for the overall significance of the model show that the explanatory variables fit the specified linear model well. In other words, the explanatory variables jointly improve the explanatory power of the model, compared to a model a model that does not contain the specified explanatory variables. Finally, the adjusted-R^2 reveals that the explanatory variables explain just over eighty three percent of the variation in the dependent variable, thus, confirming the overall good fit of the model.

4.2.3.6 Stability Diagnostic Test

In line with general practice, the model was subjected to diagnostic and stability tests to ascertain its robustness for forecasting and policy. The Jarque-Bera normality test was undertaken to test for normality, the results confirmed normality. The Serial Correlation Test was carried-out to test for autocorrelation between the variables, the results confirmed there is no correlation. The Breusch-Pagan-Godfrey was utilised to test for heteroscedasticity, the results confirmed that the model has no heteroscedasticity. The Ramsey RESET test was undertaken to test for the model misspecification and/or omitted variables, the results confirm that the model does not suffer from misspecification and omitted variables.[25]

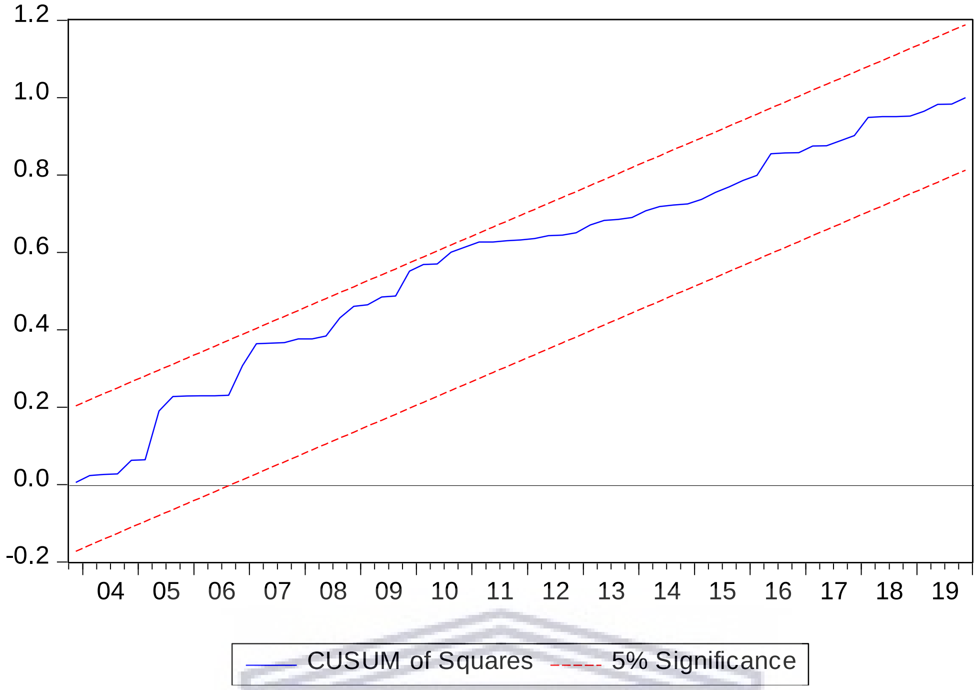
Figure 4. 5: Cumulative Sum (CUSUM)



Source: Author's computations

[25] See Appendix

Figure 4. 6: Cumulative Sum of Square (CUSUMSQ)



Source: Author's computations

The CUSUM and CUSUMSQ parameter constancy test was undertaken to test for parameter stability during the period of investigation, the results confirmed that the parameters are stable and do not change suddenly (Hansen, 1992). Figures 4.5 and 4.6 show that the CUSUM and CUSUMSQ lines lay within the 5% level of significance; they did not breach the 5% level of significance lines during the period of investigation.

4.2.3.7 Granger Causality

Table 4. 23: Long-run Estimated Coefficients (dependent variable: Real GDP Per-Capita)

Dependent variable: LNGDP	Chi-sq.	Df.	Prob.
LNFDI does not Granger cause LNGDP	22.734	5	0.000
LNTIA does not Granger cause LNGDP	16.713	5	0.005
LNTID does not Granger cause LNGDP	22.777	5	0.000
LNTIP does not Granger cause LNGDP	22.539	5	0.000

Dependent variable: LNTIA	Chi-sq.	Df.	Prob.
LNGDP does not Granger cause LNTIA	7.849	5	0.164
LNFDI does not Granger cause LNTIA	21.306	5	0.000
Dependent variable: LNTID	**Chi-sq.**	**Df.**	**Prob.**
LNGDP does not Granger cause LNTID	1.533	5	0.909
Dependent variable: LNTIP	**Chi-sq.**	**Df.**	**Prob.**
LNGDP does not Granger cause LNTIP	1.565	5	0.905

*Note: * means the rejection of the null hypothesis at 5%*
Source: *Author's computations*

Table 4.23 presents the Granger causality long-run coefficients estimated for the variables studied in this analysis, particularly the total insurance variables. Pertaining to the variables of interest, the results show that total insurance total assets, density and penetration ratios Granger cause GDP per-capita in the long-run. As observed in table 4.23, the total insurance ratios are all highly statistically significant. On the other hand, GDP per-capita does not Granger cause total insurance. Expectedly, these total insurance results mirror the results of the long-term insurance sector. The results imply that the South African total insurance sector is supply-leading. These findings are in contrast with a study by Sibindi & Godi (2014) and Sibindi (2014) who found that the South African insurance sector is demand-following. The results are harmonious with the study by Olayungbo (2015), which established that the insurance sector in South Africa is supply-leading. These results lend credence to a study conducted by Patrick (1966), which asserted that during the early stages of development of a country financial development leads to economic growth and not the other way around.

Table 4. 24: Long-run Estimated Coefficients (dependent variable: Real GDP Per-Capita)

Dependent variable: D(LNGDPCC)	Chi-sq.	Df.	Prob.
D(LNFDI) does not Granger cause D(LNGDPCC)	15.403	5	0.008
D(LNTIA) does not Granger cause D(LNGDPCC)	11.155	5	0.048
D(LNTID) does not Granger cause D(LNGDPCC)	18.139	5	0.002

D(LNTIP) does not Granger cause D(LNGDPCC)	17.281	5	0.004
Dependent variable: D(LNTIA)	**Chi-sq.**	**Df.**	**Prob.**
D(LNGDPCC) does not Granger cause D(LNTIA)	13.673	5	0.017
D(LNFDI) does not Granger cause D(LNTIA)	22.804	5	0.000
Dependent variable: D(LNTID)	**Chi-sq.**	**Df.**	**Prob.**
D(LNGDPCC) does not Granger cause D(LNTID)	2.383	5	0.793
Dependent variable: D(LNTIP)	**Chi-sq.**	**Df.**	**Prob.**
D(LNGDPCC) does not Granger cause D(LNTIP)	2.625	5	0.757

*Note: * means the rejection of the null hypothesis at 5%*
Source: *Author's computations*

Table 4.24 presents the Granger causality short-run coefficients estimated for the variables studied in this study, particularly the total insurance variables. Pertaining to the variables of interest, similarly to the long-run Granger causality results; the short-run Granger causality results illustrate that long-term insurance total assets, density and penetration ratios Granger cause GDP per-capita. As observed in table 4.24, the long-term insurance ratios are all statistically significant. On the other hand, GDP per-capita Granger causes total insurance in the short run, according to the total insurance total assets ratio. These results imply that in the short run, the relationship between GDP per-capita and the total insurance sector is supply leading. Nonetheless, as it pertains to the total insurance total assets ratio the relationship is bidirectional, supposing interdependence between economic growth and the total insurance sector in South Africa. Just as it was the case with the long run relationship, total insurance results of the short run causal relationship mirror the short run causal long-term assets results.

CHAPTER FIVE: CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter concludes the study of the results inferred in chapter four and outlines the limitations of the study. The following is the chapter's structure: the summary and conclusions are found in Section 5.2. Following that, section 5.3 gives policy recommendations as well as the study's limitations.

5.2 Summary and Conclusions

The South African insurance sector makes more than two thirds of the African insurance market. The high development of the South African insurance sector is attributed to its well-developed infrastructure, sophistication and the wide range of products offered by the sector. In view of the above, it becomes more important to note that the South African long-term insurance sector dominates the short-term insurance sector. According to Stalib & Puttaiah (2018), the South African life insurance sector makes 80.10% of the total South African insurance sector. Evidently, the country's long-term insurance sector is significantly important; it certainly skews any inferences drawn about the total insurance market due to its sheer size. In light of the above, the research study set out to evaluate the association between the South African insurance industry and the country's economic growth.

The research attempted to investigate whether there is a connection between the insurance industry in South Africa and economic growth. Subsequently, the study aimed to shed light on the causal linkages between the insurance industry and the country's economic growth. Owing to the fact that there have only been three time-series studies carried-out on the impact of the insurance industry to economic growth in South Africa, this study holds an important value in the South African insurance-growth nexus knowledge area. The study made use of secondary time-series quarterly data and employed times-series techniques of analysis such as unit root tests, ARDL bound test to cointegration, error correction model estimation and causality analysis. The results of the unit root test showed that the order of integration of the variables is a mixture of I(0) and I(1). The bound test to cointegration reveals that there is a long-run relationship among the variables.

Long-term insurance has a favourable impact on economic development, according to the findings of the estimated long-run relation. The implication of the aforementioned finding is that long-term insurance and economic growth move in the same direction, an increase in the long-term insurance total assets and/or penetration ratio results in an increase in real GDP per-capita. Conversely, short-term insurance results showed a dissimilar relationship, short-term insurance and economic growth have a negative relationship. An increase in the short-term insurance total assets and/or density ratio results in a decrease in real GDP per-capita. With that being said, the long-run results of total insurance expectedly mirror the results of long-term insurance. Thus, it can be argued that the insurance industry has a positive long-term effect on the South African economy. Moreover, the results found that long-term insurance results into economic growth and not the other way around. The results of the short-term insurance, on the other hand, showed a bi-directional causal link between economic activities and the insurance industry; they are interdependent. Furthermore, the results of total insurance show that the relationship is supply leading, meaning that total insurance leads to economic growth and not contrariwise.

As discussed by Arena (2008) insurance proxy variables that incorporate premiums in their derivation capture the role played by the insurance sector in transferring risk and indemnification, their institutional role is captured by incorporating their assets (investments) as the proxy variable. In as far as this study is concerned, all total assets proxy variables have demonstrated a highly significant and positive relationship with economic growth. This demonstrates that the insurance sector's institutional position in the South African economy is undeniably significant.

5.3 Recommendations and Limitations

The study successfully addressed the research questions as intended. The results of the study have policy implications that can be supportive in improving the economic growth rate of South Africa. Policies which encourage the advancement of the insurance industry would meaningfully contribute to economic growth. However, the scope of this study was limited, as such there are more questions pertaining to how the study arrives at its conclusions which were not addressed in the study. The contrasts between the long-term, short-term and total insurance proxies require further research. Particularly, the relationship between the insurance sector proxy variables with other financial institutions that pool funds such as banks. It would be elucidating to know whether there is complementarity or a substitution effect between those institutions and the insurance sector.

5.3.1 Limitations

As previously alluded to, the scope of the study was limited. The study does not investigate the complimentary and/or substitution effect between the insurance sector and other financial sectors.

REFERENCES

Abu-Bader, S. and Abu-Qarn, A. S. (2008). Financial development and economic growth: The Egyptian experience. *Journal of Policy Modeling, 30(5): 887-898.*

Acemoglu, D. (2007). Introduction to Modern Economic Growth. Massachusetts: *Massachusetts Institute of Technology.*

Barajas, A., Chami, R. & Yousefi, S.R. (2013). The Finance and Growth Nexus Re-Examined: Do All Countries Benefit Equally? Middle East and Central Asia Department and Institute for Capacity Development: *International Monetary Fund WP/13/130*

Adusei, M. (2012). Financial development and economic growth: Is schumpeter right? British *Journal of Economics, Management & Trade, 2(3): 265-278.*

Agbetsiafa, D. (2004). The finance-growth nexus: Evidence from sub-saharan Africa. *Savings and Development Journal, 28(3): 271-288.*

Akinlo, A., & Egbetunde, I. (2010). Financial Development and Economic Growth; the Experience of 10 Sub Saharan African Countries Revisited. *The Review of Finance and Banking, 2(1): 17-28.*

Akinlo, T. (2015). Causal relation between insurance and economic growth in selected sub-saharan Africa: a heterogeneous panel causality approach. *Canadian Open Economics Journal, 2(1): 1-22.*

Akinlo, T., & Apanisile, O. T. (2014). Relationship between Insurance and Economic Growth in Sub-Saharan African: A Panel Data Analysis. *Modern Economy, 5(2):122-129.*

Alhassan, A. L., & Biekpe, N. (2016). Insurance market development and economic growth. *International Journal of Social Economics, 43(3): 321 - 339.*

Alhassan, A. L., & Fiador, V. (2014). Insurance-growth nexus in Ghana: An autoregressive distributed lag bounds cointegration approach. *Review of Development Finance, 4(1): 83 - 96.*

Arena, M. (2008). Does insurance market activity promote economic growth? A cross-country study for industrialized and developing countries. *The Journal of Risk and Insurance, 75(4): 921-946.*

Aziakpono, M. (2005). Financial Development and Economic Growth in Southern Africa. In N. Pinaud, & M. Grandes, *Development Centre Studies Reducing Capital Cost in Southern Africa* (pp. 137-164). OECD Development Centre .

Bednarczyk, T. H. (2013). Insurance development as a factor in long-term economic growth. *Insurance Review, 35(2): 29-47*.

Benhabib, J. (2000). The Role of Financial Development in Growth and Investment. *Journal of Economic Growth, 5(4): 341–360*.

Chen, P.-F., Lee, C.-C., & Lee, C.-F. (2011). How Does the Development of the Life Insurance Market affect Economic Growth? Some International Evidence. *Journal of International Development*.

Čihák, M., Demirgüç-Kunt, A., Feyen, E., & Levine, R. (2012). Benchmarking Financial Systems around the World. *Policy Research Working Paper No. 6175.* Washington DC: World Bank.

Ćurak, M., Lončar, S., & Poposki, K. (2009). Insurance sector development and economic growth in transition countries. *International Research Journal of Finance and Economics, 34(1): 29-41*.

Delsen, L., & Schonewille, M. (1999). *Human Capital and Labour Productivity, Integration of Institutions and Endogenous Growth.* Retrieved from EconPapers: https://econpapers.repec.org/paper/wpawuwphe/9908001.htm

Eschenbach, F. (2004). Finance and Growth: A Survey of the Theoretical and Empirical Literature. *TI 2004-039/2 Tinbergen Institute Discussion Paper, 49(2)*.

FSB. (2013). *Annual reports.* Retrieved from FSCA: https://www.fsca.co.za/annual%20reports/forms/allitems.aspx?Paged=TRUE&PagedPrev=TRUE&p%255FSortBehavior=0&p%255FCategory=Insurance%20Annual%20Reports&p%255FRank=16%2E0000000000000&p%255FID=181&SortField=Category%2CCategory&SortDir=Desc%2CDesc&PageFirstRo

FSCA. (2016). *Annual reports.* Retrieved from FSCA: https://www.fsca.co.za/annual%20reports/forms/allitems.aspx?Paged=TRUE&PagedPrev=TRUE&p%255FSortBehavior=0&p%255FCategory=Insurance%20Annual%20Reports&p%255FRank=16%2E0000000000000&p%255FID=181&SortField=Category%2CCategory&SortDir=Desc%2CDesc&PageFirstRo

FSCA. (2018). *Annual reports.* Retrieved from FSCA: https://www.fsca.co.za/annual%20reports/forms/allitems.aspx?Paged=TRUE&PagedPrev=TRUE&p%255FSortBehavior=0&p%255FCategory=Insurance%20Annual%20Reports&p%255FRank=16%2E0000000000000&p%255FID=181&SortField=Category%2CCategory&SortDir=Desc%2CDesc&PageFirstRo

Gerschenkron, A. (1962). *Economic Backwardness in Historical Perspective: A Book of Essays.* Cambridge, MA: Harvard University Press.

Goldsmith, R. W. (1969). *Financial Structure and Development* . New Haven, CT: Yale University Press.

Gredenhoff, M., & Karlsson, S. (1997). Lag-length Selection in VAR-models Using Equal and Unequal Lag-Length Procedures. *SSE/EFI Working Paper Series in Economics and Finance 177, Stockholm School of Economics*.

Gries, T., Kraft, M. & Meierrieks, D. (2009). Linkages Between Financial Deepening, Trade Openness, and Economic Development: Causality Evidence from Sub-Saharan Africa. *World Development, 37(12): 1849-1860.*

Gujarati, D. N. (2004). *Basic Econometrics, 4th Edition.* New York: McGraw-Hill Companies.

Hansen, B. E. (1992). Tests for Parameter Instability in Regressions with 1(I) Processes. *Journal of Business and Economic Statistics, 10(1): 321-336*.

Harrison, P., Sussman, O., & Zeira, J. (1999). Finance and growth: theory and new evidence. *Finance and Economics Discussion Series, 35(1)*.

Hsiao, C. (1981). Autoregressive Modeling and Money-Income Causality Detection. *Journal of Monetary Economics, 7(1): 85-106*.

InsuranceZA. (n.d.). *Life Insurance Qoutes*. Retrieved April 15, 2019, from www.insuranceza.co.za: http://www.insuranceza.co.za/life-insurance/

InsuranceZA. (n.d.). *Short Term Insurance*. Retrieved April 15, 2019, from www.insuranceza.co.za: http://www.insuranceza.co.za/short-term-insurance/

King, R. G., & Levine, R. (1993a). Finance and growth: Schumpeter might be right. *The Quarterly Journal of Economics, 108(3): 717 - 737*.

King, R. G., & Levine, R. (1993b). Finance, entrepreneurship and growth: theory and evidence. *Journal of monetary economics, 32(3): 513 - 542*.

Levine, R., Loayza, N., & Beck, T. (2000). Financial intermediation and growth: Causality and causes. *Journal of Monetary Economics, 46(1): 31-77.*

Levine, R. (2003). More on finance and growth: more finance, more growth? *Review-Federal Reserve Bank Of Saint Louis, 85(4): 31-46.*

Levine, R. (1997). Financial Development and Economic Growth: Views and Agenda. *Journal of Economic Literature, 35(2): 688-726*.

Liew, V. K.-S. (2004). Which Lag Length Selection Criteria Should We Employ? *Economics Bulletin, 3(33): 1−9*.

Lucas, R. E. (1988). On the mechanics of economic development. *J.Monet.Econ, 22(1): 3 - 42*.

Lütkepohl, H. (1985). Comparison of criteria for estimating the order of vector autoregressive process. *J. Time Series Anal, 6(1): 35-52*.

Motelle, S. & Sebutsoe, N. (2010). Is the free market unaided an antidote to financial exclusion? *Africa Growth Agenda Journal: 1(1): 30-32.*

Mckinnon, R. I. (1973). Money and Capital in Economic Development. *Washington, DC: Brookings Institution.*

Merton, R. C. (1995). A functional perspective of financial intermediation. *Financial Management, 24(2): 23-41*.

Nyasha, S. & Odhiambo, N.M. (2018). Finance-Growth Nexus Revisited: Empirical Evidence from Six Countries. *Scientific Annals of Economics and Business 65 (3): 247 – 268.*

Odhiambho, N.M. (2004). Financial development and economic growth in South Africa. South Africa: *Department of Economics, University of Fort Hare.*

Odhiambo, N.M. (2010). Finance-investment-growth nexus in South Africa. an ARDL bounds testing procedure. *Econ Change Restruct, 43: 205–219*

Olayungbo, D. O. (2015). Insurance and Economic Growth Nexus in Nigeria: Asymmetric Non-Linear Relationship under Heterogeneous Agents. *African Development Review, 27(3): 248-261*.

Opoku, E.E., Ibrahim, M. & Sare, Y.A. (2019). The causal relationship between financial development and economic growth in Africa. *International Review of Applied Economics, Taylor & Francis Journals, 33(6): 789-812*

Outreville, J. F. (1990). The Economic Significance of Insurance Markets in Developing Countries. *The Journal of Risk and Insurance, 57(3): 487-498*.

Pagano, M. (1993). Financial markets and growth: An overview. *European Economic Review 37(2-3): 613-622*.

Patrick, H. T. (1966). Financial development and economic growth in underdeveloped countries. *Economic Development and Cultural Change, 14(1): 174 - 189*.

PricewaterhouseCoopers. (2018). *Africa insurance trends.* Retrieved from www.pwc.ac.za: https://www.pwc.co.za/en/publications/insurance-survey-South-Africa.htlm

Robinson, J. (1952). The Generalization of the General Theory. In J. Robinson, *Rate of Interest and Other Essays* (p. 86). London: Macmillan.

Romer, P. (1990). Endogenous technological change. *Journal of Political Economy, 98(1): 71 - 102*.

Sawadogo, R., Guerineau, S., & Ouedraogo, I. M. (2018). Life insurance development and economic growth: evidence from developing countries. *Journal of Economic Development, 43(2): 1-28*.

Sibanda, M. & Holden, M. (2014) The Influence of Short-Term Insurance Industry on the Finance-Growth Nexus in South Africa. *Mediterranean Journal of Social Science, 5(1): 489 – 496*.

Schumpeter, J. A. (1911). *The Theory of Economic Development.* Cambridge, MA: Harvard University Press.

Shaw, E. S. (1973). *Financial Deepening in Economic Development.* New York: Oxford University Press.

Shrestha, M. B., & Bhatta, G. R. (2018). Selecting appropriate methodological framework for time series data analysis. *The Journal of Finance and Data Science, 4: 71-89*.

Sibindi, A. B. (2014). Life insurance, financial development and economic growth in South Africa. *Risk governance & control: financial markets & institutions, 4(3): 7-15*.

Sibindi, A. B. (2015). Insurance market development: an empirical study of African countries. *Risk Governance & Control: Financial Markets & Institutions, 5(4): 319-330*.

Sibindi, A. B., & Godi, N. J. (2014). Insurance sector development and economic growth: evidence from South Africa. *Corporate Ownership & Control, 11(4): 530-538*.

Skipper, H. D. (1997). Foreign Insurers in Emerging Markets: Issues and Concerns. *International Insurance Foundation*.

Stalib, D., & Puttaiah, M. h. (2018). *Sigma 3/2018: World insurance in 2017: solid, but mature life markets weigh on growth.* Retrieved March 05, 2019, from www.swissre.com: https://www.swissre.com/institute/research/sigma-research/sigma-2018-03.html

STATSSA. (2020). *Category Archives: Industry*. Retrieved from STATSSA: http://www.statssa.gov.za/?cat=32

Thornton, D. L., & Batten, D. S. (1985). Lag-Length Selection and Tests of Granger Causality between Money and In-come. *Journal of Money, Credit, and Banking, 17(1): 164-178*.

Toda, H. Y., & Yamamoto, T. (1995). Statistical inference in vector autoregressions with possibly integrated processes. *Journal of Econometrics, 66(1–2): 225-250*.

Umar, M. B., Dayyabu, S., Gambo, A. U., Danlami, M. R., & Ahmad, A. U. (2015). An Empirical Study on the Relationship between Financial Intermediaries and Economic Growth in Nigeria: A Cointegration and Causality Analysis. *IOSR Journal of Economics and Finance, 6(4): 15-31*.

UNCTAD. (1964). *First session of the United Nations Conference on Trade and Development (UNCTAD I).* Retrieved from UNCTAD: https://unctad.org/meeting/first-session-united-nations-conference-trade-and-development-unctad-i

Ward, D., & Zurbruegg, R. (2000). Does Insurance Promote Economic Growth? Evidence from OECD Countries. *The Journal of Risk and Insurance, 67(4): 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. *Journal of Financial Issues, 2(2):1-32*.

APPENDIX

SHORT TERM INSURANCE

Figure A. 1: Jarque-Bera normality test

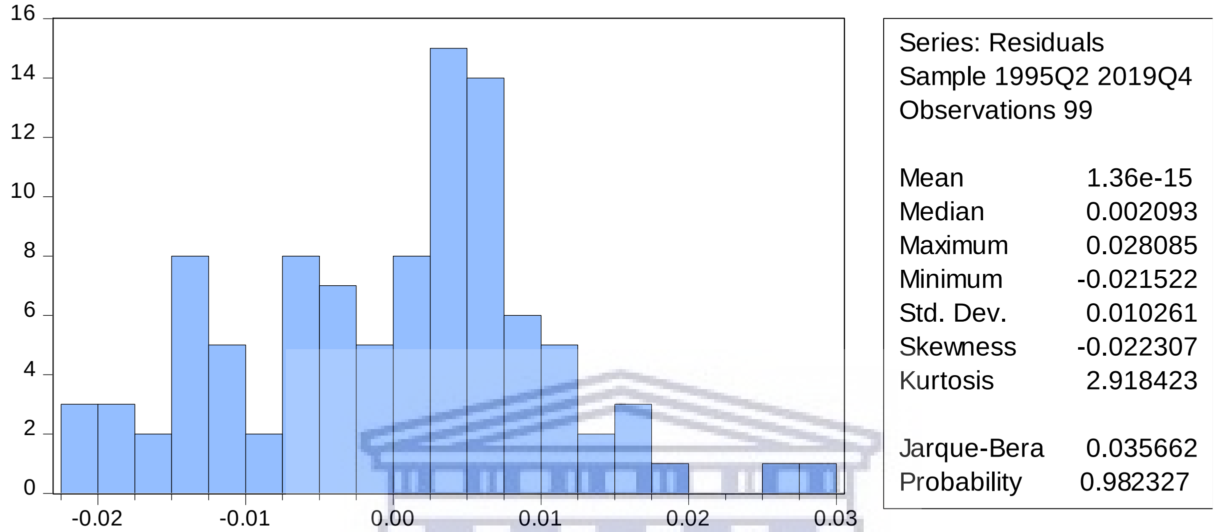


Table A. 1: Breusch-Godfrey Serial Correlation LM Test

F-statistic	1.1625	**Prob. F(1,82)**	0.3384
Obs*R-squared	8.8786	**Prob. Chi-Square(1)**	0.1140

Table A. 2: Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.1153	**Prob. F(18,83)**	0.3466
Obs*R-squared	36.8343	**Prob. Chi-Square(18)**	0.3391
Scaled explained SS	14.7658	**Prob. Chi-Square(18)**	0.9983

Table A. 3: Ramsey RESET Test

	Value	**df**	**Probability**
t-statistic	1.4895	66	0.1411
F-statistic	2.2189	(1, 66)	0.1411

Table A. 4: Lag Length Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	925.38	NA	1.16e-17	-19.13	-18.94	-19.05
1	1616.65	1267.31	1.79e-23	-32.51	-31.01*	-31.90*
2	1656.60	67.42	2.20e-23	-32.32	-29.52	-31.19
3	1699.80	66.58	2.58e-23	-32.20	-28.09	-30.54
4	1772.95	102.10	1.69e-23	-32.70	-27.28	-30.51
5	1837.66	80.89*	1.39e-23*	-33.03	-26.30	-30.31
6	1886.95	54.41	1.70e-23	-33.04	-25.00	-29.79
7	1947.27	57.80	1.84e-23	-33.27	-23.92	-29.49
8	2002.37	44.76	2.58e-23	-33.40*	-22.74	-29.09

* indicates lag order selected by the criterion

Author's computations

LONG TERM INSURANCE

Figure A. 2: Jarque-Bera normality test

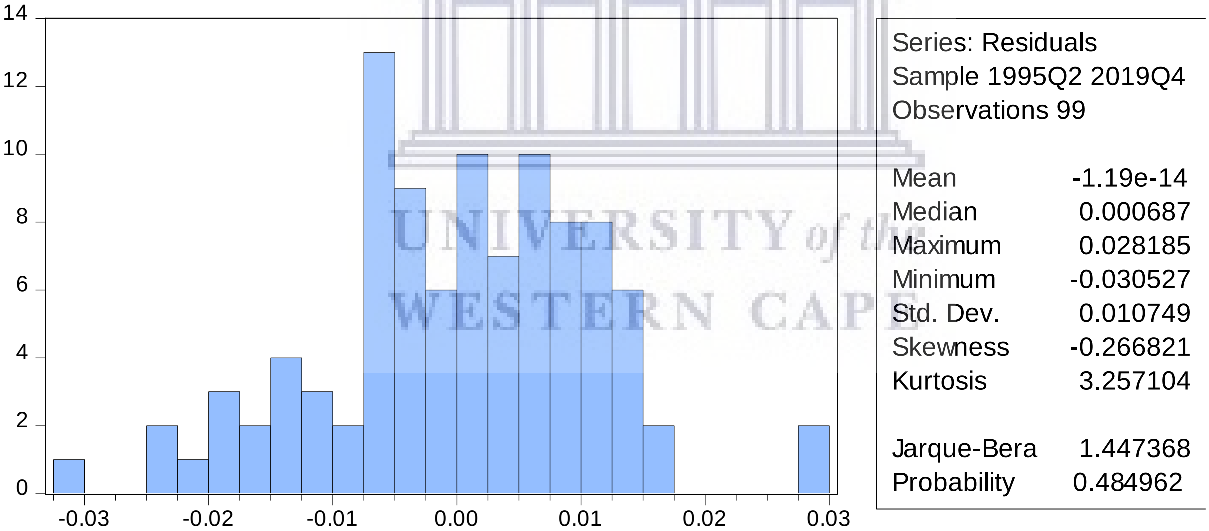


Table A. 5: Breusch-Godfrey Serial Correlation LM Test

F-statistic	0.3188	**Prob. F(1,82)**	0.8998
Obs*R-squared	2.4817	**Prob. Chi-Square(1)**	0.7792

Table A. 6: Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	0.9555	**Prob. F(18,83)**	0.5435

Obs*R-squared	30.3501	**Prob. Chi-Square(18)**	0.4993
Scaled explained SS	15.6877	**Prob. Chi-Square(18)**	0.9898

Table A. 7: Ramsey RESET Test

	Value	df	Probability
t-statistic	0.8168	63	0.4171
F-statistic	0.6671	(1, 63)	0.4171

Table A. 8: Lag Length Criteria

Lag	LogL	LR	FPE	AIC	SC	HQ
0	986.70	NA	3.22e-18	-20.41	-20.22	-20.33
1	1681.55	1273.88	4.64e-24	-33.86	-32.36*	-33.26*
2	1733.80	88.18	4.40e-24	-33.93	-31.12	-32.79
3	1789.69	86.16	3.97e-24	-34.07	-29.96	-32.41
4	1854.07	89.86	3.11e-24	-34.39	-28.97	-32.20
5	1927.50	91.78*	2.14e-24*	-34.90	-28.17	-32.18
6	1977.29	54.97	2.59e-24	-34.92	-26.88	-31.67
7	2027.36	47.98	3.47e-24	-34.94	-25.59	-31.16
8	2092.07	52.57	3.98e-24	-35.27*	-24.61	-30.96

* indicates lag order selected by the criterion
Source: Author's computations

TOTAL INSURANCE

Figure A. 3: Jarque-Bera normality test

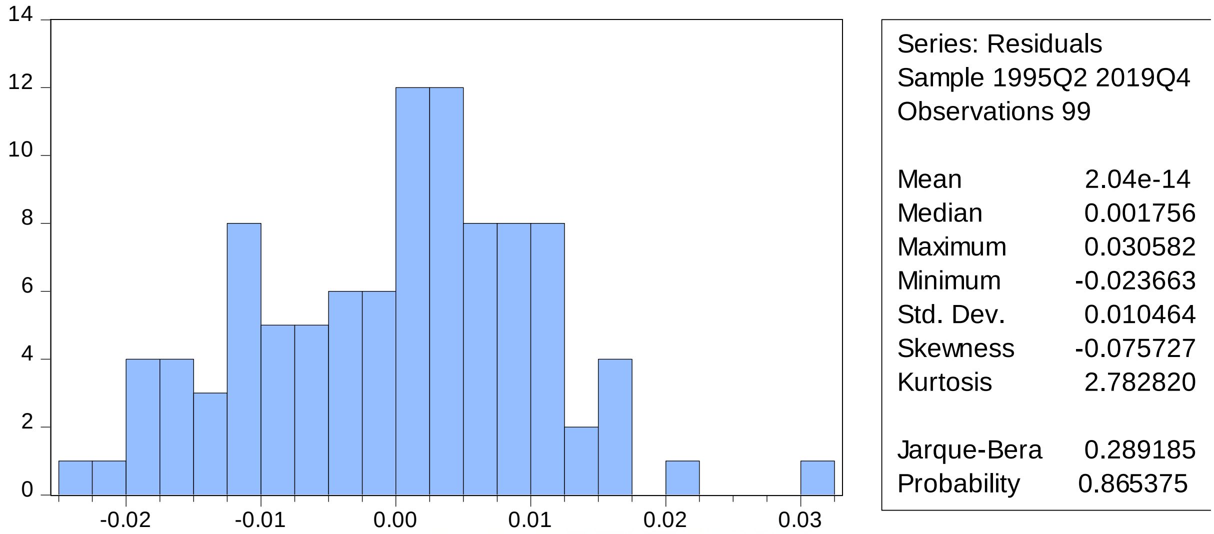


Table A. 9: Breusch-Godfrey Serial Correlation LM Test

F-statistic	1.1270	**Prob. F(1,82)**	0.3555
Obs*R-squared	8.2485	**Prob. Chi-Square(1)**	0.1431

Table A. 10: Heteroskedasticity Test: Breusch-Pagan-Godfrey

F-statistic	1.243944	**Prob. F(18,83)**	0.2256
Obs*R-squared	36.16504	**Prob. Chi-Square(18)**	0.2400
Scaled explained SS	14.76541	**Prob. Chi-Square(18)**	0.9940

Table A. 11: Ramsey RESET Test

	Value	**df**	**Probability**
t-statistic	0.329918	66	0.7425
F-statistic	0.108846	(1, 66)	0.7425

Table A. 12: Lag Length Criteria

Lag	**LogL**	**LR**	**FPE**	**AIC**	**SC**	**HQ**

0	967.86	NA	4.77e-18	-20.01	-19.83	-19.94
1	1658.66	1266.46	7.47e-24	-33.38	-31.89*	-32.78*
2	1700.43	70.48	8.82e-24	-33.23	-30.43	-32.10
3	1744.36	67.71	1.02e-23	-33.13	-29.01	-31.46
4	1815.95	99.93	6.89e-24	-33.60	-28.18	-31.41
5	1880.23	80.35*	5.72e-24*	-33.92	-27.19	-31.20
6	1924.92	49.34	7.72e-24	-33.83	-25.79	-30.58
7	1980.73	53.48	9.17e-24	-33.97	-24.62	-30.19
8	2036.69	45.46	1.26e-23	-34.11*	-23.46	-29.81

* indicates lag order selected by the criterion

Source: Author's computations