

UNIVERSITY OF GHANA

**DETERMINANTS OF FINANCIAL HEALTH OF LIFE INSURANCE
COMPANIES IN GHANA**

BY

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**THIS THESIS IS SUBMITTED TO THE SCHOOL OF GRADUATE
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DEGREE IN RISK MANAGEMENT AND INSURANCE**

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DECLARATION

CANDIDATE'S DECLARATION

This is to certify that this thesis is the result of my own research work and that no part of it has been presented for another degree in this university or elsewhere.

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SUPERVISORS' DECLARATION

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ABSTRACT

This study investigates determinants of financial health of Ghanaian life insurance companies, a market that has experienced significant change in recent years. It examines the solvency of life insurance companies and the current system used by the National Insurance Commission (NIC) to monitor solvency of life insurance companies in Ghana. Secondary data obtained from financial reports of 16 sampled life insurance companies from 2007 to 2013 were analysed using the unbalanced panel regression analysis technique. The study used solvency ratio as a proxy for financial health and assessed the impact of nine predictor variables, both macro and firm specific variables on it.

Analysis of the data showed that all the predictor variables, with the exception of premium growth and reforms are significant determinants of financial health. The results also indicated that aside claims incurred, combined ratio and inflation, all the other predictor variables are positively related to solvency. Further, analysis indicated a weak to moderate total financial health of the sampled life insurers during the study. It was revealed at the end of the project that less than 40% of the registered life companies were strongly solvent every year based on the categorization of solvency by the study. Therefore, aside the routine checks and ensuring compliance of insurance regulation by insurers which is currently done, the NIC can monitor these ratios published annually by insurers in addition to moving towards the proposed Risk Based supervision in order to detect early signs of insurer distress.

DEDICATION

This work is dedicated to my parents, Mr. Sampson Asare and my mum Mrs. Hilda Asare, and Evangelist Isaac George Boakye.



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First, I would like to thank the Almighty God for the divine wisdom and strength to complete this study. I thank my parents, Mr. Sampson Asare and Mrs. Hilda Asare for their support and encouragement throughout this degree. My journey through university would not be as enriched and fulfilling as it has been without you. I thank my sister, Caroline and cousins who were there to support me, I'm grateful.

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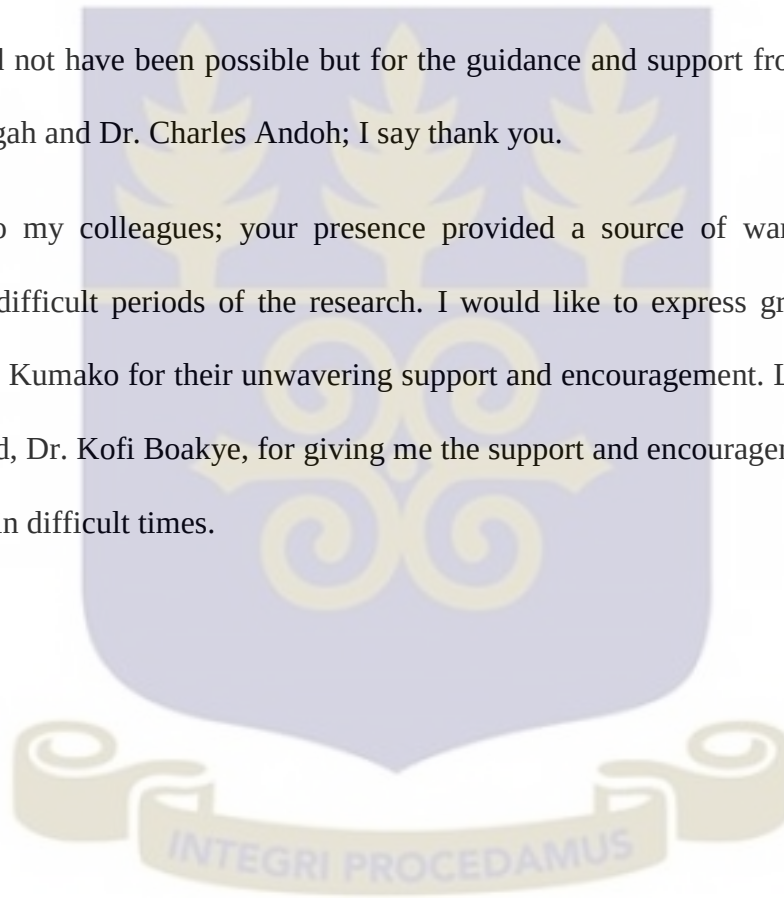


TABLE OF CONTENT

DECLARATION.....	i
ABSTRACT.....	ii
DEDICATION	iii
ACKNOWLEDGEMENTS.....	iv
TABLE OF CONTENT.....	v
LIST OF FIGURES	xi
CHAPTER ONE	1
INTRODUCTION.....	1
1.1 Background of the Study.....	1
1.2 Research Problem	7
1.3 Objectives of the Study.....	10
1.4 Research Questions.....	11
1.5 Significance of the Study	11
1.6 Scope of the Study.....	12
1.7 Organisation of the Study	12
CHAPTER TWO	13
LITERATURE REVIEW	13
2.1 Introduction.....	13
2.2 Concept of Insurance.....	13
2.3 Context of the Study	16
2.3.1 General Overview of Insurance in Ghana	16
2.3.2 Role of the NIC	18
2.3.3 Risk Based Supervision Approach	20
2.4 Review of Determinants of Financial Soundness of Insurance companies.....	22
2.4.1 Studies in the Ghanaian Context.....	22
2.4.2 Studies in Africa and Other Parts of the World	25
2.5 Importance and Contribution of Insurance	27
2.6 Financial Health/ Solvency of Insurers	29
2.7 Empirical Findings.....	29
2.8.1 Firm Specific Factors and Financial Health	31

2.8.2 Distribution System and Financial Health	35
2.8.3 External/Macroeconomic Determinants of Insurer's Financial Health	37
2.9 Theoretical Backing.....	38
2.10 Definition and Concept of Regression.....	39
2.11 Panel Regression	39
2.11.1 Fixed Effects Models (FE)	40
2.11.2 Random Effects Models (RE).....	41
2.11.3 Assumptions for Regression Analysis.....	42
2.12 Conclusion	43
CHAPTER THREE.....	44
METHODOLOGY	44
3.1 Introduction.....	44
3.2 Target Population and Sample	44
3.3 Sample and Sampling Procedure.....	45
3.4 Data Collection	45
3.5 Model Specification and Description.....	46
3.5.1 Specified Model	46
3.6 Checking for Model Assumptions	47
3.6.1 Checking for linearity	47
3.6.2 Checking for homoscedasticity	48
3.7 Measurement of Dependent and Independent Variables	48
3.7.2 Testing for the Significance of the Model and Its Parameters.....	53
3.8 Appropriateness of the Methodology	53
3.9 Conclusion	54
CHAPTER FOUR.....	55
DATA ANALYSIS, INTERPRETATION AND DISCUSSIONS	55
4.1 Introduction.....	55
4.2 Descriptive statistics.....	55
Table 4.2: Testing for panel effect.....	58
4.3 Fixed Effect Panel Regression.....	59
Table 4.3: Unbalanced Fixed effect panel Regression estimates.....	59
4.3.1 Diagnostics for the Fixed Effects Panel Regression Model	60
Table 4.4: Regression statistics (Fixed effect).....	60

Table 4.5: ANOVA results (Fixed effect)	60
4.4 Relationship between firm size and financial health	61
Table 4.6: Unbalanced Fixed effect panel Regression estimates (including size square)	62
Table 4.7: ANOVA results	63
Table 4.8: Regression statistics	63
4.5 Hausman test	64
Table 4.9: Hausman test for best model	64
4.6 Diagnostic Tests for the fixed effects	65
4.6.1 Testing time-fixed effects.	65
The null is that no time-fixed effects needed.	65
Table 4.10: Testing for time effect	65
4.6.2 Testing for serial correlation	66
Table 4.11: Testing for serial correlation	66
4.6.3 Testing for cross-sectional dependence/contemporaneous correlation: using Breusch-Pagan LM test of independence	66
Table 4.12: Testing for cross-sectional dependence	66
4.6.4 Breusch-Pagan test for Heteroscedasticity	67
Table 4.13: Testing for heteroscedasticity	67
4.7 Categorizations of the solvency ratios	67
Table 4.14: Categorization of solvency ratios	68
4.8 Discussion of Findings	68
4.9 Conclusion	73
CHAPTER FIVE	75
SUMMARY, CONCLUSION AND RECOMMENDATION	75
5.1 Introduction	75
5.2 Summary	75
5.3 Conclusions	76
5.4 Potential Areas of Application	77
5.5 Recommendations	78
5.5.1 Recommendations for Management, Policyholders and Investors	78
5.5.2 Recommendations for Future Research	79
5.6 Limitations of the Study	79
REFERENCES	81

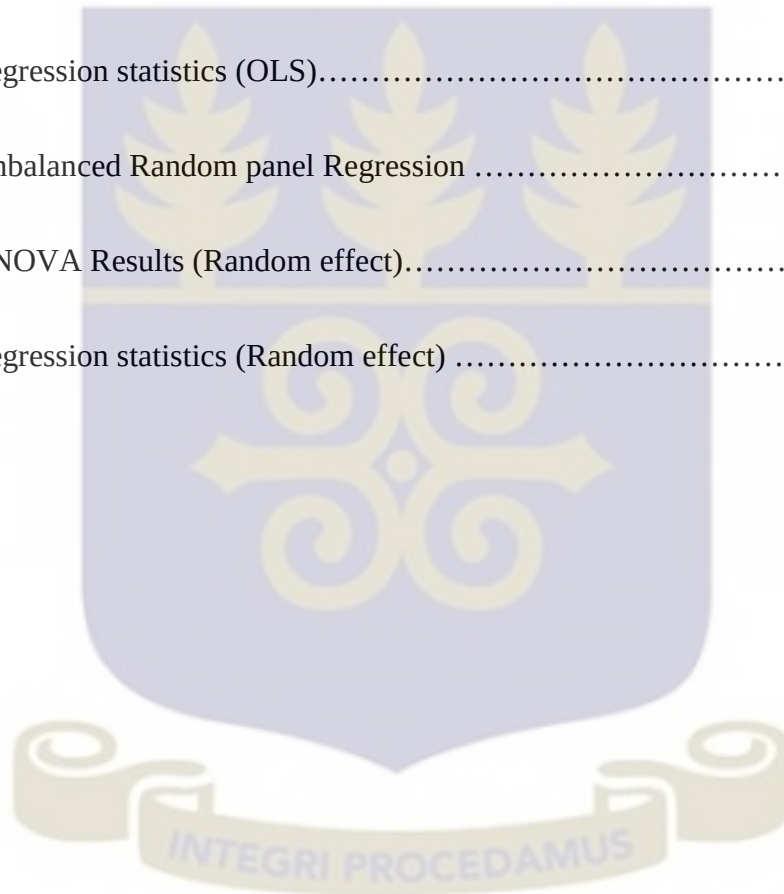
APPENDICES	91
APPENDIX B	92
ORDINARY LEAST SQUARES MODEL.....	92
Table 1: Unbalanced OLS Regression estimates.....	92
Table 2: ANOVA results (OLS).....	92
Table 3: Regression statistics (OLS).....	92
4.6 Random Effect Panel Regression.....	93
Table 4: Unbalanced Random Panel Regression	93
Table 6: Regression statistics (Random effect).....	93



LIST OF TABLES

Table 1.1:	Classification of Control mechanism for Solvency under Insurance Act 724.....	6
Table 1.2:	Growth indicators of the life insurance industry 2011 to 2012.....	8
Table 2.1:	Categorization of levels of solvency.....	30
Table 2.2:	Classification of methods of insurance distribution.....	35
Table 3.1:	Summary of Dependent and Independent Variables.....	49
Table 3.2:	Signs of Variables Used in Computation.....	51
Table 4.1:	Descriptive statistics.....	56
Table 4.2:	Testing for panel effect.....	57
Table 4.3:	Unbalanced Fixed effect panel Regression estimates.....	58
Table 4.4:	Regression Statistics (Fixed effect)	59
Table 4.5:	ANOVA Results (Fixed effect)	59
Table 4.6:	Unbalanced fixed effect Panel Regression estimates with SZ^2	61
Table 4.7:	ANOVA Results	62
Table 4.8:	Regression statistics	62
Table 4.9:	Hausman test for best model.....	63
Table 4.10:	Testing for time effect.....	64
Table 4.11:	Testing for serial correlation.....	65

Table 4.12:	Testing for cross-sectional dependence.....	65
Table 4.13:	Testing for heteroscedasticity.....	66
Table 4.14:	Categorization of solvency ratios.....	67
Table 1:	Unbalanced OLS regression estimates.....	89
Table 2:	ANOVA Results (OLS).....	89
Table 3:	Regression statistics (OLS).....	89
Table 4:	Unbalanced Random panel Regression	90
Table 5:	ANOVA Results (Random effect).....	90
Table 6:	Regression statistics (Random effect)	90



LIST OF FIGURES

Figure 1.1: Plot of the Market share of top five insurers by GWP from 2010 to 2012 3



LIST OF ABBREVIATIONS

BOG	Bank of Ghana
CI	Claims Incurred
CML	Conditional Maximum Likelihood
COV	Covariance
CR	Combined Ratio
DF	Degrees of Freedom
Fe	Fixed Effects
GDP	Gross Domestic Product
GLSS	Ghana Living Standards Survey
GSS	Ghana Statistical Service
GWP	Gross Written Premiums
IAIS	International Association of Insurance Supervisors
ILO	International Labour Organization
IMF	International Monetary Fund
IP	Investment Performance
KPMG	Klynveld Peat Marwick Goerdeler
LAE	Loss Adjustment Expense

LR	Liquidity Ratio
MFI	Microfinance Institutions
NAIC	National Association of Insurance Commissioners
NIC	National Insurance Commission
NLS	National Longitudinal Surveys
OLS	Ordinary Least Squares
OM	Operating Margin
PG	Premium Growth
PNDC	Provisional National Defence Council
Re	Random Effects
SIC	State Insurance Company
SR	Solvency Ratio
STDV	Standard Deviation
SWOT	Strengths Weaknesses Opportunities and Threats
SZ	Firm Size
UML	Unconditional Maximum Likelihood
VAR-VECM	Vector Auto Regressive-Vector Error Correlation Model
CI	Claims Incurred

CML	Conditional Maximum Likelihood
COV	Covariance
CR	Combined Ratio
DF	Degrees of Freedom
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GDP	Gross Domestic Product
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IAIS	International Association of Insurance Supervisors
ILO	International Labour Organization
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LAE	Loss Adjustment Expense
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Re	Random Effects
SIC	State Insurance Company
SR	Solvency Ratio
STDV	Standard Deviation
SWOT	Strengths Weaknesses Opportunities and Threats
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UML	Unconditional Maximum Likelihood
VAR-VECM	Vector Auto Regressive-Vector Error Correlation Model

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

The financial sector of an economy mainly consists of a category of stocks containing firms that provide financial services to commercial and retail customers. This sector includes banks, investment funds, insurance companies and real estate. The development of the financial sector in a less developed economy has been the concern of some economists for the past few decades (Georgantopoulos & Tsamis, 2011). There is a pattern of growing interest in the financial system of Ghana due to the many structural changes and adjustment it has undergone within the last decade. Ghana's financial sector, especially the insurance industry has undergone rapid growth and major structural transformation over the last decade, which has brought new opportunities and risks (NIC, 2012). Barros & Obijaku (2007) argued that growth in the industry is muffled when companies are unable to adapt rapidly to the changing business climate and take optimal advantage of the opportunities created by recent changes in legislation.

Authorities have been implementing reforms to strengthen the regulatory and supervisory framework and financial infrastructures (NIC, 2010). According to Herring & Santamero (1996), although the direct impact of financial institutions on the real economy is relatively minor, their indirect impact on economic performance is extraordinarily important. An efficient financial sector reduces the cost and risk of producing and trading goods and services and thus makes an important contribution to raising the standard of living.

Insurance is one of the key sectors in the economic development of Ghana. The insurance market is made up of two main stakeholders, the insurance companies who work as sellers of the insurance products, providing cover for various risks and the intermediaries mainly insurance agents and brokers. A thriving insurance industry mobilizes savings and allocates credit across space and time. It provides not only payment services, but also enables firms and households to cope with economic uncertainties by hedging, pooling, sharing and pricing risks (Huan & Eling, 2013). Due to the many benefits of insurance to individuals and to every economy, measures must be put in place to ensure their survival in the financial market and to monitor their financial health in order to prevent insolvencies and protect policyholders in today's increasingly competitive markets.

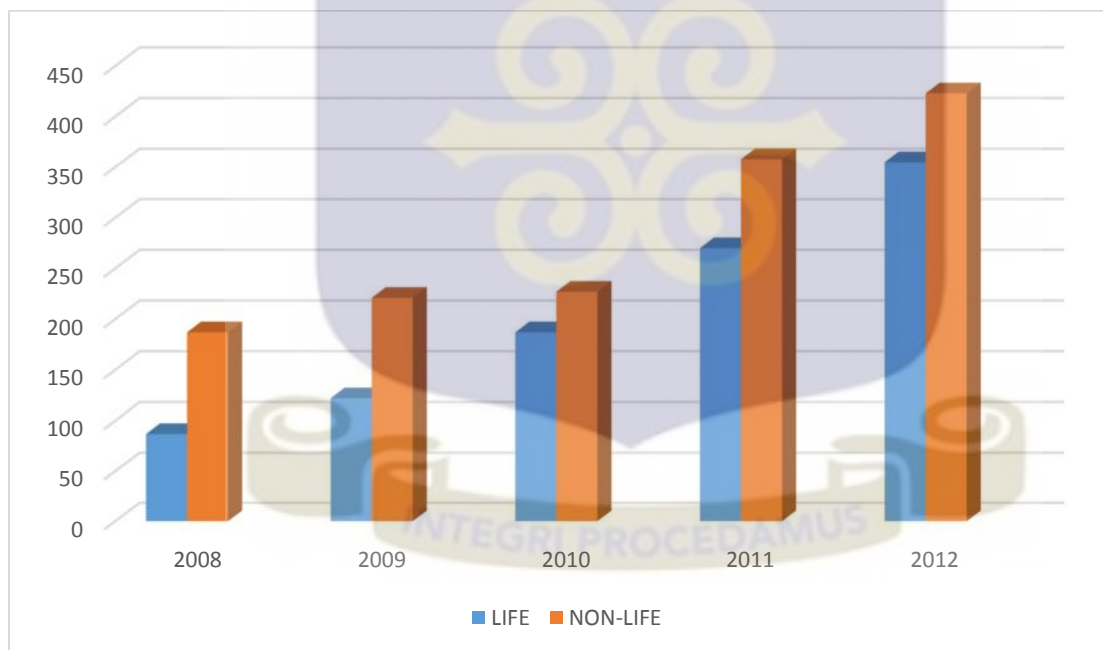
One major challenge of insurers, especially across Africa is the problem of insolvency. A combination of factors, including firm specific factors and macroeconomic factors like high rate of inflation, massive devaluation and general poor economic performance of most African countries can be linked to this problem of insolvency (Chen & Wong, 2004). This reduces the trust of people in insurance; hence their unwillingness to insure which subsequently leads to poor economic growth.

Life insurance is an insurance product that is also gradually gaining popularity in Ghana due to its savings benefits and also because death is inevitable and its time of occurrence is unpredictable. Many people avoid investing in life insurance simply because they imagine the costs as being too high for their budgets. Fortunately, there are a wide variety of life insurance policies available for each individual set of needs and budgets. These policies have low premiums and payout death benefits for the duration of a specific period. Life assurance

contracts are usually for much longer periods compared to general insurance. Life funds are therefore accumulated to cater for long-term liabilities.

Currently, there are twenty one registered life insurance companies in Ghana according to the NIC. While the Life sector experienced a growth in gross premium income of 44% from 2010 to 2011, the non-life sector grew by just 32% (NIC, 2011). In general, by all indicators, the life sector appears to be growing at a faster rate than the non-life sector. Although a significant improvement in life insurance growth has been recorded over the past decade, its popularity in Ghana cannot be compared to that of USA and other developed countries where most people have life insurance cover.

Figure 1.1 Growth rate of life and non-life insurers from 2008 to 2012 (In Cedis).



Source: NIC (2013)

Figure 1.1 provides a summary of the growth rate of life compared to non-life insurers in Ghana over the period of 2008 to 2012. The graphs show a significant increase in life insurance premiums over the 5 year period. The sharp increase in non-life premiums from 2010 to 2012

however could be attributed to compulsory insurance of commercial building and Ghana's oil find (NIC, 2011).

Powell (2007) established that insurance is not bought but rather sold. It appears that effective techniques or strategies are not being utilized fully by the Ghanaian insurance companies to publicize the benefits of the products. Again, claim handling has been reported to be poorly managed by most Ghanaian insurers over the years.

For every organization to remain financially sound, it has to consider the major factors that determine its financial performance. Among the major factors that could affect insurers' financial health in growing economies are firm size, investment performance, underwriting result, liquidity ratio, combined ratio, and operating margin, premium growth, and growth rate of surplus (Chen & Wong, 2004). The National Insurance Commission (NIC) is the sole regulator of insurers in Ghana. Among other responsibilities, it is responsible for maintaining contact and developing relations with foreign insurance regulators and maintaining international insurance regulation standards. The NIC also supervises, regulates and controls compliance with the provisions of the insurance act and regulations made under it and any other enactment relating to insurance (NIC, 2010). It has the responsibility of ensuring that insurers remain in operation and monitors them from going insolvent and also to protect the interest of insurance policyholders.

Insolvency occurs when an insurer is not able to meet its financial obligations, or when the liabilities of an insurer exceed its assets. The current solvency regime by the NIC requires the assets of non-life insurance companies at any point in time, to exceed their liabilities by at least 10% of net premium income in order to be technically solvent. In case of life companies, assets must at least equal liabilities (Insurance Act, 2006, Act 724). The International Association of

Insurance Supervisors' (IAIS) standard on solvency requires a solvency margin to be set to provide a safety against certain events. In the effort to ensure that Ghanaian insurers are governed by laws that meet international standards set by the IAIS, the NIC developed a new solvency framework to replace the current one issued in 2008 which had the same solvency requirements for life and non-life companies. According to the NIC, the previous framework was inappropriate because of the differences in operation of life and non-life insurers (NIC, 2010). The NIC requires both life and non-life insurance companies to have a financial solvency margin of 50% or the minimum capital requirement whichever is higher and that the solvency margin shall in no case be less than the minimum capital requirement.

Insurance regulatory standards and methodologies are fast changing all over the world. Methods of supervision of insurers are moving from the compliance and historical toward the risk-based and the progressive methodologies. Previously, insurance companies were mandated to comply with various requirements of laws or subordinate legislations. Experience has, however, shown that mere compliance with rules and legislations does not mean that a company is and will continue to be financially sound to honour its maturing obligations to policyholders.

This new solvency framework which was to be implemented in January 2012 is in line with international standards, that of the EU-based regulatory body (Hrechaniuk, Lutz & Talavera, 2007). Unlike the previous solvency framework, the new solvency II framework required an increase in the minimum level of reserve for insurers to ensure that insurers are financially healthy. The main aims of the new risk-based supervision approach are to specifically reduce major risks faced by insurers which include inability to meet financial obligations, unnecessary delay of claims payment, reduce the risk of incurring loss by policyholders when claim payment

is not paid and to provide a good monitoring system for regulators in order to detect early signs of insolvency (NIC, 2010). The new regulation seeks to compel insurers to do business according to their liquidity ratios - the amount of their assets that could easily be used to defray debts where necessary.

Due to the immense contribution of insurance to both individuals and firms, as well as its contribution to economic development as whole, regulators are required to design a system that can identify insurers which are in or heading towards insolvency. Aside the ratios, solvency control measures have been put in place to enable the NIC monitor insurers in order to detect emerging insolvencies before they degenerate into crises. These control mechanisms have been classified in the form of a traffic light system as seen in table 1.1.

Table 1.1: Solvency Regime under the Insurance Act, 2006, Act 724

Level	Margin	Corrective Action
Green	If asset are 150% or more of liabilities.	Routine Monitoring
Amber	If assets are more than 125% of liabilities but less than 150% thereof.	Restructure investments
Red	If assets are at least equal to liabilities but less than 125% of liabilities.	Enforcement Action/capital injection
Black	If liabilities are more than assets.	Suspend license with the possibility of final license withdrawal and liquidation

Source: Insurance Act (2006)

For every organization to remain financially solid, it has to consider certain major factors that determine its financial performance. The major factors that significantly affect general insurers' financial health in growing economies are firm size, investment performance, underwriting result, liquidity ratio, combined ratio, and operating margin, premium growth, and growth rate of surplus. Again, some macro determinants of life insurers' financial health exist (Chen & Wong, 2004). These include interest rate, GDP and competition. The Ghanaian life insurance industry has experienced keen competition over the past decade as a result of the influx of foreign companies into the market and the emergence of new firms. Reforms and regulations set in place by the NIC could also be argued as a contributor of this competition. An example is the recent increase in minimum reserve level by the NIC from one million US dollars to five million dollars and the separation of companies to life and non-life.

1.2 Research Problem

According to the world business dictionary, financial health is defined as a way in which to measure the overall financial aspect of an individual or an organization that includes the amount of assets they own and how much income they must pay out to cover regular and other expenses.

It is critical to investigate financial status of life insurance companies in Ghana mainly because operation and management of life and general insurers vary vastly and they are faced with different risks. In Ghana, the financial stability of the industry is mostly assessed by the NIC through financial ratios such as the claims ratio, the retention ratio, underwriting profit and investment income ratios. Aside these ratios used by the NIC to measure performance of insurers, other factors that affect life insurers' financial health is firm size (total assets own by a firm) and age (how long the company has been operating) which are also a major determinants (Chen & Wong, 2004). Research into how these factors affect insurer performance in Ghana has

not been properly investigated especially in the life insurance sector. Variables used to measure firm size include total premium, total admitted assets, capital and surplus. Firm size proxies like market cap and age can be mechanically correlated. Large insurance companies have a lower probability of becoming insolvent (Cummins, Harrington & Klein, 1995). Regulators are therefore less likely to liquidate such insurance companies.

Research on the Ghanaian insurance industry exhibit a trend which is quite different, in that, whereas insurance premiums worldwide declined from 2.5% in 2012 to 1.4% in 2013 (Swiss Re Sigma, 2013), the Ghanaian insurance market continuously experienced a rise in premiums (NIC, 2010). This is evident as the industry begun to witness some improvement especially in 2010. It witnessed a 21% reduction in its claims and managerial expenses in 2010. Although there has been restructuring in the Ghanaian insurance industry and increase in premiums over a seven year period (2007-2013), it can be observed that some life insurance companies seem to be more financially “sound” than others. The factors and determinants underlying this trend are yet to be ascertained.

The significant growth of the life sector over the past few years is therefore evident and cannot be overlooked.

Table 1.2: Key Growth indicators of the Life insurance Industry (2011- 2012).

Indicator	2011 (GHC' M)	2012 (GHC' M)	Growth Rate (%)
Premium Income	270.2	355.8	32%
Total Assets	492	669.8	36%
Total Investments	371.1	537.7	45%
Actuarial Liabilities	345.8	464.9	34%

Source: KPMG (2014)

As with most developing countries that have pursued economic and structural reforms, Ghana has been undergoing a process of financial sector restructuring and transformation as an integral part of a comprehensive program for some time (BOG, 2007). The financial sector reform is a critical part of the country's strategy to achieving emerging market status. In this regard, several reforms are taking place to enable the financial sector to reach world first class services within a globalized financial system. Also, the recent increase in the minimum level of reserve for insurers by the NIC has had significant impact on the financial health of insurers. These and many other restructuring and reform policies in the Ghanaian insurance industry including intense competition as more insurers enter the market have brought about the need for more research into the field. There is therefore the need for research into how these structural reforms are affecting the financial health of insurers.

Insurer insolvency is common in Africa and other developing countries and causes huge financial loss to economies and policyholders (Barros & Obijiaku, 2007). Quite a large number of stakeholders including the state go into distress when an insurer is declared insolvent. Thousands of policyholders suddenly find themselves with some very serious problems (Cummins, Harrington & Klein, 1995). This calls for the need for periodic monitoring and evaluation of the financial condition of insurance companies by regulators, investors, and insurer management. In addition to setting regulatory standards and assessment of annual financial reports to ensure that insurers are financially sound, the NIC embarks on a number of supervisory processes ranging from quantitative to qualitative assessments of the insurance companies (e.g. market analysis report, financial analysis and others, NIC Supervision Dept., 2007). An insurer seemingly performing financially well could go insolvent at any time if its financial status is not carefully monitored.

Currently, there are twenty one registered life insurance companies in Ghana (NIC, 2014). Life insurers in Ghana face challenges that are not very different from those experienced across the globe. Although a greater percentage of Ghana's total industry premiums are generated from the non-life sector, the percentage growth in premiums from life assurers far outweighs that of the non-life sector. For instance, according to a report by NIC, whereas the non-life sector grew by 23 percent in 2010, the life business recorded a remarkable growth of 52 percent. In other words, the growth rate of the life sector is more than twice that of the non-life business (NIC, 2010). The present study focuses only on factors determining the financial well-being of life insurers. This is because life insurers differ greatly from general insurers in terms of operations, investment activities, vulnerabilities, and duration of liabilities from general insurers (Brockett, Cooper, Golden, Rousseau & Wang, 2004). Life insurers play the role of "financial intermediaries" while general insurers functions as "risk takers."

The growing competition in the insurance industry has exposed it to harmful practices such as undercutting, unethical underwriting and marketing practices and the excessive dependence on credit to manage the competition. These problems lead to the inability of insurers to pay claims and meet other liabilities, which makes clients frustrated when claims are due. These and other factors bring up the need for the monitoring of financial health of Ghanaian insurers in order to detect insolvencies.

1.3 Objectives of the Study

The main aim of the study is to assess and highlight the determinants of the financial soundness of life insurance companies in Ghana. Related to the main aim of the study are the following specific objectives:

- To determine the variables (both external and internal) that affect the survival and failure of life insurance firms.
- To investigate the key predictors of financial health of life insurance firms in Ghana.
- To provide an early warning system on the probability of survival and failure which classify life insurance firms into survived (strong) and failed (moderate, weak and insolvent).

1.4 Research Questions

The following research questions will be deliberated upon in order to adequately cover the subject matter of the study. Answers to these questions will fulfill the objectives of the study.

- What are the major determinants of life insurer financial health and is there a systematic relationship between the firm specific factors (financial ratios) of a Ghanaian life insurer and its financial health?
- What are the effects of firm specific factors on the financial health of a Ghanaian life insurer?
- Can the micro and macro determinants of the life insurance industry in Ghana predict their financial health and serve as an early warning system for the NIC?

1.5 Significance of the Study

This study will be of value to future research, practice and policy making. It will serve as an added contribution to existing work of several other researchers who have discussed issues on the subject area. The findings from this study could also inform the work of the National Insurance Commission about how reforms are impacting the finances of life insurers.

Finally, the study will contribute to existing knowledge, serving as a build-up on that of Akotey et al. (2013) and Simpson & Damoah (2009) by looking at how solvency regulation by the NIC which includes increase the minimum capital requirement of insurers and many others may have impacted on the financial health of life insurers in Ghana. It can also be a basis for stakeholders to control the activities of the insurance industry to help grow its financial standing.

1.6 Scope of the Study

This research focused on the life assurance industry in Ghana. The whole study lasted for a one year period and covers a duration of seven years; from 2007 to 2013. The research examined financial statements of 16 life insurance companies. This sample was selected based on the fact that these companies have existed in the industry for at least five years between the period of 2007 to 2013 as used in the study, have reliable data and as such are in the best position to provide relevant information.

1.7 Organisation of the Study

The present study is organised into five chapters. Chapter one is the introduction of the study, it described the research background, research problem, objectives, significance and scope of study. Chapter two reviews the literature on life insurance. The chapter provides an overview of the research on life insurance industry in a global context and its performance in Ghana. Chapter three outlines the research methodology. It includes the population, sample, data collection, methods and models. Chapter four entails the analyses and interpretation of results. Chapter five gives the conclusion, summary of research, discussion and its implications for future research.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents a review of relevant literature on insurer financial health and insolvency and the factors related to these outcomes. The chapter provides a review of theoretical and empirical literature on insurance, history of insurance in Ghana, the importance of insurance, financial health and solvency of insurers in the Ghanaian life insurance industry. A theoretical review will be done alongside an empirical review concerning these themes.

The review is grouped into twelve main sections. The first section gives a general overview of insurance and how life insurance operation varies from general insurance. In the second and third sections, the importance and contribution of insurance to individuals and to economies and the need for the financial standing of insurers to be monitored are discussed respectively. The next section give an overview of existing literature. The eighth and ninth sections review key variables and predictors of financial health of insurance companies and early warning systems currently used to monitor and prevent future insolvencies. Sections ten and eleven describe the panel data analysis technique used for the study. The final section gives a conclusion of the chapter.

2.2 Concept of Insurance

The concept of insurance is an ancient practice, which came into being over 5000 years ago, in China where piracy was so common that seamen had to develop strategies to reduce losses (Smith, 2004). As a way of disseminating the risks faced, a number of ships would carry a portion of another ship's cargo so that if one ship was captured, the entire shipment would not be lost (Smith, 2004). Insurance was therefore used as a preventive measure against piracy on the

sea. Well-established systems of insurance, which takes into account the level of risk faced by an individual, the probability of occurrence of the risk and other factors were later developed (Berg, 2010). Several types of insurance were then later designed to cater for different kinds of risks that individuals and organizations are liable to.

Several definitions of insurance exist. For example, Htay and Salman (2013) defined insurance as the equitable transfer of the risk of a loss, from one entity to another, in exchange for a premium, and can be thought of as a guaranteed small loss to prevent a large, possibly devastating loss. Essvale Corporation Limited (2010), also define insurance as a promise of compensation for specific potential future losses in exchange for a periodic payment.

Insurance is designed to protect the financial well-being of an individual, company or other entity in the time of unexpected loss. Schrayner & Rowh (1999) also defined insurance as a financial arrangement that redistributes the costs of unexpected losses, as well as a contractual agreement in which one party agrees to compensate another party for losses.

Apparently, the concept of an insurance business is pretty forthright. An insurance firm pools together premiums that customers pay to offset the risk of loss. This risk of loss can apply to many different areas, which explains why health, life, property and casualty insurers exist. The challenging part of being an insurer is properly estimating what future insurance claims will be and setting premiums at a level that will cover these claims, as well as leave an ample profit for shareholders.

Outside the above core insurance operations, insurers run and manage investment portfolios. The funds for these portfolios come from reinvesting profits including earned premiums, where the premium is kept because no claim occurred during the policy's duration and from premiums before they get paid out as claims. These operations of insurers imply that they must be

financially sound in order to meet their future obligations to both insureds and shareholders. They are expected to take wise investment decisions in order to yield profit from the funds they handle.

Life insurance can simply be explained as a system or an agreement between two parties in which the insured makes regular payments to an insurance company (insurer) in exchange for a fixed amount of money that will be paid to the insured when he reaches a certain age or paid to someone named by the insured, usually a family member, when the insured dies. Life insurance has become an increasingly important type of insurance and an integral part of the financial sector over the past 40 years, providing a range of financial services for consumers and becoming a major source of investment in the capital market. Beck & Webb (2003) sampled 13 countries and studied the total assets of life insurance companies in the sample. It was observed that the total assets of these life companies accounted for 11 percent of GDP between 1980 and 1985 but increased tremendously to 28 percent between 1995 and 1997 for the same countries. Again, the insurance penetration of life insurance of 19 sampled countries showed a significant increase from 1.2 percent between 1960 and 1965 to 4.2 percent between 1996 and 2000. These confirm the increasing contribution of life insurance toward GDP and economic development over the years. The life insurance industry plays an important role in the economic development of Ghana in terms of long-term investment, savings mobilization, and contribution to the gross domestic product (GDP). In general insurance, compensation is usually proportionate to the loss incurred, whereas in life insurance a fixed sum is usually paid at the end of the contract.

2.3 Context of the Study

2.3.1 General Overview of Insurance in Ghana

Insurance in Ghana has its history dating back to 1924, when the first insurance company was started by Europeans, to cover only Europeans (Ansah-Adu et al., 2011). The industry in Ghana has since experienced substantial growth in terms of numbers, life insurance premium, number of policies and distribution network. The insurance industry has also undergone several reforms since its inception during pre-independence era. Reforms may be defined as changes in regulation. It is regulated under the Insurance Law, 1989 (PNDC L227) as amended by the Insurance (Amendment Laws 1991 and 1993 PNDC L's 260 and 316) (NIC 2005). The industry is currently governed by the Insurance Act 2006; Act 724. This Act complies significantly with the International Association of Insurance Supervisors' (IAIS) core principles and gives better regulatory powers to the National Insurance Commission.

In lieu with its objective of complying with international standards (International Association of Insurance Supervisors (IAIS)), core principles and to provide a level ground operation for all companies, the Insurance Law, 2006 among other things prohibits the operation of composite insurance. The Ghanaian insurance system therefore does not support provision of universal type financial system where insurers can provide composite insurance. All composite insurers were consequently mandated by the NIC to separate their life and non-life operations into distinct companies by December, 2007. Theoretical underpinnings of the insurance separation, consolidation, mergers and acquisition debate in the insurance industry have been grounded on theories such as the resource based theory which was propounded by Penrose (1959). This theory hinges on the financial benefits of diversification to a firm.

Over the past few years, the growth in the Ghanaian insurance industry has not been so spectacular. Gross premium income for non-life business increased from GH¢91.6million in the year 2005 to GH¢220.7 million in 2009. The growth rate for 2006 was 25% which fell to 23.9% in 2007. This picked up sharply to 31.6% in 2008 but dropped to 18% in 2009 (NIC, 2009). As of 2008, insurance penetration in Ghana was 1.6% which is still very low compared to that of other African countries like South Africa which is 12.6%. However, Ghana's oil find and the effective implementation of the compulsory insurance of commercial buildings may have contributed to a positive growth in 2011 as non-life insurance premiums rose from GH¢142million in 2007 to GH¢358million in 2011 (NIC, 2011).

Despite all these, growth in the life sector has been consistently high. Ghana's life insurance market has witnessed tremendous growth in terms of number of companies, sophistication and reach. Most Ghanaian companies are now selling universal life products which have a combination of life cover and investment. A recent financial sector assessment conducted by the IMF on the insurance industry reported that even though the number of insurance companies in Ghana grew by more than 200 percent between 2005 and 2009, insurance penetration only improved slightly from 1.16 percent to about 1.6 percent over the same period (Ghana Life Insurance Holds Brokers Forum, 2010).

The relatively higher growth rate in the life sector can be attributed to the emergence of innovative products on the market, the increasing popularity of micro insurance especially credit life and the utilization of innovative distribution channels. A tremendous growth in the life assurance market has been recorded over a period of time. The life sector experienced a steady rise in premium income, increasing from ₵52.1 billion in 2001 to ₵312.5 billion in 2005. This continuous increase in growth could be an indication of the increase in public awareness and

confidence in the insurance products of the life sector. It could also be attributed to the decrease in level of interest rates and inflation in the Ghanaian economy over this period. Companies have developed new universal life products which provide a hedge against inflation and suit the needs of the insureds (NIC, 2005).

Premium income for life business increased from GH¢31.2million in 2005 to GH¢122.2million in 2009. The growth rate however dropped from 36.1% to 34% in 2009. But as compared to the non-life sector, life experienced a much higher growth rate. The growth in the life sector increased the market share of life business to 35.7% (NIC, 2009). It must be noted that for the first time life business has more market share than motor insurance which has always been in lead because it is mandatory by law. The Ghanaian life insurance market is consolidated with the top five companies accounting for about 80% share in 2012 up from 78% in 2011 (NIC, 2011).

In 2012, the life insurance gross written premium (GWP) stood at GH¢355.8 million, witnessing a growth of 31.7%. Ghana's top three life insurers' performance in 2012 is summarized as follows; SIC Life Insurance collected GH¢100.3 million representing a premium growth of 39%. SIC is listed on the Ghana Stock Exchange and owned by government (40%) and others including institutions and individuals (60%). Enterprise Life Assurance reported total premium collection of GHS89.1 million, representing a growth of 45%. GLICO Life Insurance reported a gross premium of GHS36 million witnessing 4.65% growth.

2.3.2 Role of the NIC

In Ghana, the National Insurance Commission (NIC), which is sole regulator of insurance and insurance companies was established by the Insurance Act, 2006 (Act 724), which replaced Insurance Law, 1989 (P.N.D.C.L. 227). It is responsible for licensing, setting standards, and approving insurance premium and commission rates. The objective of the Commission is to

ensure effective administration, supervision, regulation and control of the business of insurance in Ghana and to ensure that insurers are financially sound in order to honour their obligations towards policyholders.

In addition to setting regulatory standards and assessment of annual financial reports to ensure that insurers are financially sound, the NIC embarks on a number of supervisory processes ranging from quantitative to qualitative assessments of the insurance companies (e.g. market analysis report, financial analysis and others, NIC Supervision Dept., 2007). An insurer seemingly performing financially well could go insolvent at any time if its financial status is not carefully monitored. For the above reason, the evaluation of insurers generally involves only statistical information or a mixture of quantitative and qualitative information (e.g. Swiss Re Sigma, 2003; Chen & Wong, 2004; Das & Gosh, 2006). When an insurer becomes insolvent or financially impaired, state regulators must take appropriate actions such as license revocation, cease-and-desist orders, and other actions that restrict an insurer's freedom to do business (Rejda, 1992).

Another of its major responsibilities is to set in place regulations in order to protect the interest of the public and that of the industry, this can be associated with the public and private interest theory of regulation. It protects the interest of the public by setting regulations in place to monitor the financial health of insurers in order to prevent huge losses and disappointments faced by insureds (the public) in case of insolvency. An example is evident in the recent regulation by the NIC which increased the minimum capital of insurers from 1 million to 5 million dollars (NIC, 2011). As part of its duties to protect the interest of the industry, the NIC put in place the "no insurance, no cover policy". Gaffikin (2005) stated that, the rationale for regulation is to

coordinate economic activities by organizing industries and directing the behaviour of people in an efficient manner, hence insurance businesses are regulated to prevent moral hazard.

Restructuring of insurance industry regulatory systems is a common practice in both developed and developing countries (Caprio & Klingebiel, 1996). This is due to financial and economic crisis often encountered (Williamson, 1994; Kroszner, 1999). These restructuring may help organizations to overcome the problems or challenges of the old law. Regulation is a very important way of monitoring insurers in order to assess their financial health and prevent future insolvencies. This is in connection with the main aim of insurance which is to provide reliable information and good services to stakeholders. The need for regulatory change in the insurance industry has been addressed by several authors including Batten (1981), who asserts that the main problem of insurance companies, specifically the life industries is their solvency control since they operate with a high degree of trust (also Obersteadt, Bruning, Cude, Schwarcz & Wilkonson, 2013).

In the Ghanaian insurance industry this has been met by requiring new entrants to submit a business plan and meet the initial capital requirement the Act has stated. Furthermore through regulation, the NIC mandated all composite insurance to be separated into Life and Non-life. Demsetz & Lehn (1985) suggested that regulations assist firms to report better financial performance. The distinct separation of insurance operation in Ghana can be seen to follow the Conglomeration Hypothesis which hinges on diversification and forbids composite insurance operation in Ghana (Cummins, Weiss, Xie & Zi, 2010).

2.3.3 Risk Based Supervision Approach

The development of risk-based frameworks follows the pattern of many innovations (Black, 2005b). Risk-based supervision is a new supervisory approach currently being adopted by most

regulatory authorities. Currently, it is in the process of being implemented, by many supervisory authorities. It is mainly concerned with the capital requirement to ensure the financial stability of financial organizations like banks and insurers in order to prevent insolvencies. In addition, risk-based supervision concepts are embedded in the Basel Core principles for effective banking supervision and are part of the IMF and World Bank's Financial Sector Assessment Programs (FSAPs) of countries.

Regulators in a number of countries are increasingly developing “risk-based” strategies to manage their resources, and their reputations as “risk-based regulators” have become much lauded by regulatory reformers (Black & Baldwin, 2010). The UK for instance has fully embraced risk-based regulation, at least at the level of exhortation. The extensive certification of the risk-based regulation or supervision approach in the financial sector of many economies, together with the experience of regulatory failure, brings to bare the need to consider how risk-based regulators can accustom the logics of risk analyses to the complex problems and the dynamics of regulation in practice. Before regulators can decide on adopting this approach, they must first regulate in a way that is responsive to these five major elements: regulated firms' behaviour, attitude, and culture; regulation's institutional environments, change, regulatory performance and interactions of regulatory controls (Black & Baldwin, 2010).

In today's fast moving and interconnected world, along with carrying out on-site and off-site activities, supervisors need to be forward-looking, and develop plans for intervening early, if a material problem surfaces in any of the insurance companies. In a quest to protect policyholders and provide secure treatment on transactions, to upgrade the legal and regulatory framework for the regulation and supervision of the insurance sector in Ghana, and to work in line with internationally accepted standards of regulation, the NIC is putting measures in place to adopt

the Risk Based Supervision approach. The Commission has proposed to Government that a new Insurance Act which follows the Risk Based Supervision Approach.

Considering the inappropriateness of the solvency framework issued in 2008 by NIC, a new solvency framework with separate solvency requirements for life and non-life companies that takes into accounts major risks the market faces was implemented in January 2012 (NIC, 2011). The National Insurance Commission (NIC) Ghana, in the year 2011 in line with its core aim, decided on a new solvency framework. This framework prohibits insurance companies with weak financial standing, the ability to undertake bigger business transactions.

2.4 Review of Determinants of Financial Soundness of Insurance companies

This section reviews previous academic research on the financial health of insurance in Ghana and worldwide. Due to the numerous benefits of insurance to individuals and its contribution to economies, there has been extensive research on insurer financial health and insolvency worldwide. Some of these studies focused on the efficiency or solvency of composite insurance companies, life or non-life. Others focus on methods of evaluating financial health of insures as well as factors that determine the financial health. The majority of the research has tended to focus on general insurance because of its short-term nature of operation compared to life insurance.

2.4.1 Studies in the Ghanaian Context

There is a pattern of growing interest in the financial system of Ghana due to the many structural changes and adjustment it has undergone within the last decade. According to an IMF report in May 2011, Ghana's financial system especially the insurance industry has undergone rapid growth and major structural transformation over the last decade, which has brought new opportunities and risks (IMF, 2011). Authorities have been implementing reforms to strengthen

the regulatory and supervisory framework and financial infrastructure (NIC, 2010). Quite a large number of stakeholders including the state go into distress when an insurer is declared insolvent. Thousands of policyholders suddenly find themselves with some very serious problems. This calls for the need for periodic monitoring and evaluation of the financial condition of insurance companies by regulators, investors, and insurer management.

Unlike the developed countries, the determinants of the financial health of insurance companies in Ghana has received little attention despite the growth in premiums, the continuous increase in the number of insurers and the many structural reforms put in place by the NIC. Inadequate research has been done on the efficiency and determinants of profitability and financial status of Ghanaian insurers. This study seeks to highlight the determinants of the financial health of life insurers in Ghana in this era of reforms and growth in premiums and profits in order to enable the NIC take measures to prevent insurer insolvency and to ascertain the possible reasons for the low insurance penetration despite the seeming growth in the industry.

Generally, it can be argued that there are not much empirical efficiency studies on the financial performance of life insurance in Ghana. This lack of research is probably the result of the unavailability of data and the unpopularity of life insurance in Ghana until recently. There was also the issue of unethical behavior of insurers concerning sale of insurance products and claims payment. Kasturi (2006) argued that the performance of insurance companies in financial terms is normally expressed in net premium earned, profitability from underwriting activities, annual turnover, return on investment and return on equity. These measures can be classified as profit performance measures and investment performance measures.

Akotey, Sackey, Amoah & Frimpong-Manso (2013), studied the relationship among three measures of insurers' profitability, namely; investment income, underwriting profit and overall

net profit. The study analysed the financial statements of ten sampled life insurers. They concluded that gross written premiums have a positive relationship with insurers' sales profitability, but a negative relationship with investment income. Their study, however, focused mainly on measuring performance and major determinants of profitability not determinants of financial health of life insurers as a whole. Another study by Owusu Ansah, Dontwi, Seidu, Abdulai & Sebil (2010) discussed the efficiencies of insurers using the DEA approach to evaluate the relative performance of Ghanaian general insurance companies. They employed debt capital, equity capital and management as inputs used by insurers to produce premium, claims and investment income. The result from their study showed that Ghanaian general insurers with higher dimension and market shares tend to have higher efficiencies. Boadi, Antwi & Lartey (2013) used panel method and ordinary least squared regression to examine secondary data from financial reports of sixteen insurance firms in Ghana. They concluded that apart from tangibility which is negatively related, there is a positive relationship between leverage, liquidity and profitability of insurance firms in Ghana.

Some previous studies have also focused on methods of evaluating insurer solvency. Several models are adopted worldwide to assess the financial health of insurers, but the most suitable method for a particular economy depends on the nature of the market in which it operates and some financial characteristics of the industry. According to Locke, S. (2006), Altman developed a method of measuring a firm's financial health called the Altman's Z-Score Method. It is a multivariate formula to measure the financial health of a company on whether it will enter into bankruptcy in the coming two years. The Altman's Z-Score Method, like other methods of evaluating financial health also makes use of financial ratios of firms. This method uses five common business ratios: earnings before interest and tax (ebit)/total assets ratio; sales/total assets

ratio; market value of equity/market value of total liabilities; working capital/total asset ratio and retained earnings/total assets.

Although recommendations as well as conclusions from past studies concerning the financial health on insurance companies are mixed, results from some studies like Simpson & Damoah (2009) argue that the model used currently by NIC to assess the financial health of non-life insurance companies in Ghana is not comprehensive enough to give early warnings to the industry's stakeholders and that the CAMELS model, as proposed by other authors do not fit the Ghanaian context. The aim of the present study, however, is to investigate the determinants of financial health and not to evaluate financial health per se.

2.4.2 Studies in Africa and Other Parts of the World

In a global context, insolvencies of insurance companies and other financial institutions have shown up, this has led to many financial regulators setting up measures to control it. In England & Wales, for example, measures including the compulsory liquidations and creditors' voluntary liquidations and other methods are being applied to curb numerous corporate financial insolvencies (Pessou & Reenen, 2014). Again, Palande, Shah & Lunawat (2003) studied insolvencies in the US insurance market and recorded about 300 insolvencies of insurance companies over a period of 25 years. Also, researchers in the USA identified three major techniques that were used by the National Association of Insurance Commissioners (NAIC) to predict insurer insolvencies (Best, 2007).

Insurer insolvency and assessment research has gotten lots of attention from researchers globally since it is not as straightforward as that of other financial institutions. This is mainly due to the fact that the unique format of insurance companies' financials does not lend itself to traditional

financial accounting analysis. Again, assessing financial soundness in the insurance industry is a complex task since the overall financial position of an insurance company depends on many factors, some of which are difficult to quantify (Simpson & Damoah, 2009). In line with most previous research that focused on solvencies using companies' balance sheets and other financial characteristics (Pistelis, 2008; Pistelis, 2009; Gatzert & Martin, 2012), this study adopts the use of financial characteristics to determine the effects of the solvency position of the life insurance companies. In so doing, the adequacy of the funds a company requires is determined in order to remain healthy and avoid insolvency.

Most insurance industries in Africa were established during colonial times, the insurance laws and regulations which provided the framework for regulation and supervision were usually based on the laws and regulations of the colonial power (Ombudsman for short-term insurance). Insurance regulation in most African countries has to a large extent been compliance-based, deriving its powers and protection from the various legislative frameworks of the respective countries. Various regulatory bodies worldwide have been working hard to achieve effective regulation but are faced with certain challenges. Ayee, J. (2013) identified the major challenges faced by regulators on the African continent as; financial dependence of regulatory bodies, weak financial strength of insurance companies, inadequate expertise and capacity of regulators, lack of cooperation among regulatory bodies, inadequate disclosure of information by insurers to stakeholders, lack of strict application of the provisions of the law, emphasis on minimum capital requirements irrespective of risk levels, cross border transactions by insurance companies and emerging trend of group structures. However, the challenge that has the most adverse effect on policyholders and economies has been identified as the problem of weak financial health (Brockett, Cooper, Golden & Pitaktong, 1994; Browne, Carson & Hoyt, 1999; Grosen &

Jorgensen, 2002). There is therefore the need for more research to be geared towards this direction. Several other studies including the International Study on Insolvency Systems in the Middle East and North Africa also confirms that insolvency among insurers is prevalent in North Africa and the middle East than in developed countries, emphasizing on the need for better monitoring of insurers in order to predict their financial soundness and suggested compliance with international standards of regulation as a possible solution (Insol International, 2009).

2.5 Importance and Contribution of Insurance

The role of financial institutions and financial intermediaries in fostering the economic growth by improving the efficiency of capital accumulation, encouraging savings and eventually improving the productivity of the economy has been thoroughly established. Recent studies show that the insurance industry can improve the economic growth through financial intermediation, risk aversion and generating employment (Ghosh, 2013).

The importance of insurance industries in the financial markets of emerging economies cannot be overlooked (Haiss & Sümegi, 2008). One major reason why many countries remain poor is the poor performance of their financial institutions and markets. The main purpose of insurance industries earlier was to provide the mechanism for risk transfer. Today, the sector also helps in channeling funds in an appropriate way to support the business activities in an economy. Levine (1997) and Haiss & Sümegi (2008) have shown that, insurance contributes to the economic growth of the country. Insurance provides stability in all emerging economies by enhancing the finances of countries where it is properly managed.

A well-developed insurance industry enhances economic development by providing long-term resources for substructure expansion of every economy (Charumathi, 2012; Akotey et al., 2013).

It offers various financial security products to protect individuals and firms, providing a sense of security for organizations which operate in risky businesses by helping to reduce risks encountered during business operations (Brown & Churchill, 1999; Bikker & Leuvensteijn, 2008; Rao & Srinivasulu, 2013). Also, net premium earned which is considered as an output in most insurance efficiency literature are the revenues earned by a company (Mandal & Dastidar, 2014; Huang & Eling, 2013). These revenues earned are the means through which the insurance sector contributes towards economic development.

Life policies serve as financial support and provide a savings fund for retirement income and offers a means of accumulating savings while providing for one's family. A comprehensive life insurance policy provides financial support to the dependents of an insured during trying moments and in periods of death. Life insurance also serves as a source of retirement income or savings package for an insured. Several life policies like the funeral policy and life education policy have been designed by life insurers to suit the unique needs of its insureds. According to Vane (1973), life insurance also serves as a medium through which insured can accumulate savings while providing for their families. These savings are pooled by insurance companies and injected back into the financial bloodstream of the economy in the form of investment.

Ghosh (2013) used the VAR-VECM model to find out the long run and short run relationship between life insurance growth and economic growth along with Granger causality test to suggest any causal relationship. It was observed at the end of his study that there is long term relationship between life insurance industry and economic development in India, the Granger causality test suggested that life insurance sector improves the overall economic development in India. Again, several researchers, using the autoregressive distributed lag (ARDL) bounds approach to cointegration, have noted a long-run positive relationship between insurance penetration and

economic growth (Pesaran & Shin 1996; Pesaran, Shin & Smith, 2001). This means that funds mobilized from insurance business have a long run impact on economic growth.

2.6 Financial Health/ Solvency of Insurers

Financial health of an organization in general can be defined as the ability of the business to utilize its assets in order to generate revenues in an efficient manner. In the insurance industry, it can be viewed as the ability of an insurer to meet its obligations (pay claims) when due (solvency) and also manage its internal affairs efficiently without going bankrupt. Bose (2006) explains the prediction of financial health of a company as similar to the problem of predicting bankruptcy.

The financial well-being of financial institutions is one of the most rapidly growing streams of literature and the insurance sector in particular has seen extreme growth in the number of studies. Review of insurance literature shows extant studies in insurer insolvency. This can be attributed to the unique format of insurance companies' financials which does not lend itself to traditional financial accounting analysis.

2.7 Empirical Findings

The majority of studies that emphasize monitoring or predicting the financial health of insurers have focused on general or nonlife insurance (Chen, 1999; Shiu, 2004; Hrechaniuk, Lutz & Talavera, 2007; Simpson & Damoah 2009; Pervan & Pavic, 2010; Malik, 2011; Charumathi, 2012). The major theme across these studies focus on either the financial health, efficiency or the contribution of insurance to economic development (Barros, Nektarios & Assaf 2010; Bikker & Leuvensteijn, 2008). In their study to determine the association between firms' soundness and regulatory policies in the insurance industry, Pasiouras & Gaganis (2013) over the period 2003–2007 used an accounting based measure, called the Z-score to measure solvency. Their findings

were that, regulations related to both technical provisions and investments have an impact on soundness of firms.

Due to the importance of insurance to every economy, extensive research has been done on the determinants of the financial status of insurance companies, both life and non-life in the developed world (Chen, 1999; Chen & Wong, 2004; Shiu, 2004; Hrechaniuk, Lutz & Talavera, 2007; Pervan & Pavic, 2010; Ahmed, Ahmed & Usman, 2011; Malik, 2011; Charumathi, 2012). Efficiency studies have been conducted on insurance in Africa and other parts of the world (Hao, 2007; Chen, Powers & Qiu, 2009; Ansah-Adu, Andoh & Abor, 2012). Few studies, however, have so far focused on life insurance, particularly in Ghana. Likewise other studies have been conducted on the financial health and efficiency of both life and non-life industries in Asia, Europe, USA and other countries (Petroni, 2000; Rao & Srinivasulu, 2013; Huang & Eling, 2013; Haiss, & Sümegi, 2008; Ahmed, Ahmed, & Usman, 2011). Little has, however, been done on the financial health of insurers in Africa and particularly in Ghana.

In a cross-country study, Cummins, Rubio-Misas & Vencappa (2014) provided evidence on the association between soundness and competition in 10 European Union (EU) life insurance companies from 1999-2011. No evidence of any improvement in competition over the post-deregulation period 1999-2011 was found. However, using an accounting base measure (Z-score) indicated a positive relationship between competition and financial soundness.

Following Eduardo et al. (2014), this study will categorize firms into strong, moderate, weak and insolvent. For a firm to be financially healthy, it has to be in the strong category and will require only routine monitoring. The following table details the basics for categorization

Table: 2.1 Categorization of levels of solvency

CATEGORY	SOLVENCY RATIO
Strong	Greater than 2
Moderate	Less than 2
Weak	Close to 1
Insolvent	Less than 1

Source: Author (2015)

2.8.1 Firm Specific Factors and Financial Health

Based on the resource-based theory of firms, a firm's probability of survival depends on its internal characteristics and resources (Thornhill & Amit, 2003). From these resources they develop distinct capabilities to generate competitive advantage and adapt in market conditions (Pérez & Castillejo, 2008). Consequently, the theory of public interest stated that the regulators impose the regulatory framework in a way to prevent the market failure (Domas, 2003). The financial health of insurers can be influenced by both internal/firm-specific factors and external/industry-wide factors. Some studies focus on determining the effects of both factors on the financial stability of insurers (Chen & Wong, 2004; McDonald, 1992). Chen & Wong (2004) reviewed firm-specific and market factors that affect both life and non-life insurers separately. The present study, however, focuses on the firm specific determinants of the financial health of life insurers only.

Most of the firm specific factors that affect the financial soundness of an insurer are financial ratios. A financial ratio is defined as a comparison between one bit of financial information and another (Drake, 2013). A financial ratio may also be defined as a relative magnitude of two selected numerical values taken from an enterprise's financial statements. These ratios are used to

try to evaluate the overall financial condition of an organization. They are mostly obtained from the balanced sheets or financial statements of firms, in this context the annual reports by the NIC. Some of the firm specific factors that affect an insurer's financial health include financial ratios, surplus growth, operating margin, liquidity ratio and combined ratio. For the purposes of this study, certain ratios were selected based on their significance in predicting insolvency from previous literature including Chen & Wong (2004). The effects of the following ratios estimated on the financial health of Ghanaian life insurers:

Firm size is mostly measured as the total assets of the insurer and sometimes as the percentage of market share. BarrNiv & Hershberger (1990) and Cummins, Harrington & Klein (1995) studied the effect of firm size on the financial health of organizations. From their work, it was observed that larger firms or organizations with more assets are less likely to be insolvent. This is partially due to the fact that regulators are less likely to liquidate large insurers. Hence, larger firms are likely to be more financially sound than smaller ones. Variables used to measure firm size include total premium, total admitted assets, capital and surplus.

Operating margin is a firm specific variable that can affect the financial health of insurers. It is a profitability ratio that measures what percentage of total revenues is made up by operating income. In other words, it demonstrates how much revenue is left over after all the variable or operating cost have been paid. A financially sound company is therefore supposed to have a higher operating margin meaning that it makes enough income from its operating activities to cater for its costs (liabilities). The operating margin ratio, which is sometimes called operating profit margin, is the ratio of operating income to net sales. Kramer (1996) employed the use of operating margin ratio to assess the financial soundness of a company. He found the relation

between operating margin and financial solidity to be positive. BarrNiv & Hershberger (1990) found operating margin to be the best single variable that can influence life insurers' solvency.

Combined ratio is defined by the Economic Times as the sum of incurred losses and operating expenses measured as a percentage of earned premium (www.economictimes.indiatimes.com, accessed on 5th February 2015). It is a measure of the profitability of the insurer. It is the sum of two ratios, one calculated by dividing incurred losses plus loss adjustment expense (LAE) by earned premiums (the calendar year loss ratio), and the other calculated by dividing all other expenses by either written or earned premiums. Used in both insurance and reinsurance, a combined ratio below 100 percent is indicative of an underwriting profit. Combined ratio measures incurred losses and expenses as a percentage of earned premiums. A ratio above 100% means the insurance firm is losing money on its insurance operations. Below 100% suggests an operating profit.

Liquidity ratio provides information on a company's ability to meet its short-term or immediate obligations using assets that are most readily converted into cash. Assets that may be converted into cash in a short period of time are referred to as liquid assets; they are listed in financial statements as current assets. In insurance literature, liquidity ratio measures the capability of an insurer to pay liabilities when they are due. The major liabilities of an insurer are claim payment and cost of operation. The sources of liquidity for an insurer are mainly premiums, investment income and liquidation of assets (Hampton, 1993). According to Dambolena & Khoury (1980), the stability of the liquidity ratio is a necessary measure of financial solvency. Liquidity ratio is calculated as a ratio of total assets to total liabilities.

Investment performance which refers to the effectiveness of investment decisions is also a very significant determinant of financial health of insurers. Profitable investment decisions increase

the finances of an insurer. It has been found to have a negative correlation with solvency rate (Kramer, 1996). In this study, it will be measured as the investment income. For life insurers, funds (premiums) are collected in advance of paying benefits and held in reserves until claims are paid (the intermediation service).

Premiums received by insurers may not be adequate to settle claims filed by insureds, hence insurers are therefore expected to invest these premiums wisely in order to gain higher returns. This income generated from the investment helps insurers to offset any incurred losses. Studies like Yang (2006) assess the impact of investment performance of insurers. Portfolio composition of life insurance companies should mainly be long term in nature. It is evident that investment management, portfolio composition and changes overtime is not only important to the survival of any life assurance scheme but also to the attainment of the corporate mission and vision.

Premium growth is a measure of the rate of market penetration. We expect a growth in premiums to affect the financial health of an insurer positively, since this signifies better performance of an insurer. However, empirical results from previous research show that rapid growth of premium volume is a major cause of insurer insolvency (Kim et al., 1996).

Claims incurred claims are undesirable to insurers, they therefore would like to incur less claims (Owusu Ansah, 2010). The use of "claims paid" or "losses incurred" as a factor of financial soundness has attracted criticism because an unexpected up-ward change in losses (due to an environmental catastrophe or a terrorist attack) would be considered as an increased output quantity and, therefore, would result in efficiency enhancement of the respective company.

Chen & Wong (2004) also established change in asset mix and change in product mix as firm specific factors that have an effect on the financial soundness of life insurers due to the nature of their operation.

2.8.2 Distribution System and Financial Health

Producers tend to get their products on the markets after production through numerous channels. Distribution is a key determinant of success of all insurance companies. Insurance product distribution is usually through independent agents, banks or insurance brokers. These insurance intermediaries are useful both on the demand side and on the supply side. On the demand side, these intermediaries provide useful information to policyholders about the type of cover of a particular policy and reduce expenditure on information and transaction costs in insurance markets (Eckardt & R  thke-D  ppner, 2008), hence protecting their interest. On the other hand, they provide insurers information about the client in order to provide coverage and minimize adverse selection on the supply side. However, to ascertain the effect of insurance distribution system on the financial health of insurers, only the supply side is considered. Park, Lee & Kang (2009) examined the coexistence of multiple distribution systems in property-casualty insurance industry in the USA from 1990 to 2001 using Stochastic Frontier Analysis. For an insurer to remain financially sound, it must be able not only to make wise financial decisions, but to take advantage of the best methods of distribution in order to increase its policyholders. The theory to back this system of distribution can be linked to the transaction cost theory. This theory according to Allen (1999) can be explained based on the neoclassical literature on property rights theory. Bashir, Madhavaiah & Naik (2013) researched on the traditional and modern distribution channels in India. They categorized distribution systems into traditional and modern as shown in Table 2.2.

Table: 2.2 Classification of methods of insurance distribution

Traditional Channels	Modern Channels	Alternative Channels
Individual Agents	Bancassurance	Telcassurance
Corporate Agent	Micro-Insurance	Direct Internet Marketing
Broker		Shopassurance
Work Site Marketing		

Source: Bashir et al. (2013)

Bashir et al. (2013) studied attributes of these channels and also carried SWOT analysis for each channel. They concluded that the methods of insurance distribution channel adopted by an insurer have significant impact on its growth and financial wellbeing. In Ghana, insurance products are distributed through agents, brokers, micro-finance institutions (MFIs) and mobile networks. Individual agents are the key distribution channel for insurance in Ghana. According to the NIC website, there are 4,537 licensed agents currently operating in the country. With the introduction of Bancassurance as a new channel of distribution, significant improvement has been recorded by both the life and non-life companies who have adopted its use. Looking forward, corporate agents (banks and microfinance institutions) distribution channel, bancassurance is expected to witness a high growth, driven by regulatory support and increased customer base. Bancassurance is defined as an arrangement in which a bank and an insurance company form a partnership so that the insurance company can sell its products to the bank's

client base. This partnership arrangement is usually profitable for both companies. Assessment of the financial statement of the life companies in Ghana who have adopted the use of this distribution system over the years shows an increase in their gross premiums, resulting in an increase in their market share, which directly affects the financial health of insurers. Operation of bancassurance in Ghana started in 2007 with few banks like Standard Chartered bank, Unibank and insurers like Metropolitan insurance and Starlife Assurance but currently involves other banks and insurers. As at September 2013, there were about 19 bancassurance collaborations between commercial banks and insurance companies (KPMG, 2014). The choice of marketing distribution channel, according to Klumpes (2004), can significantly impact on the finances of insurance firms. The market imperfections hypothesis and the product quality hypothesis have been used by researchers including Joskow (1973) and Kim et al. (1996) to explain the existence of these systems.

2.8.3 External/Macroeconomic Determinants of Insurer's Financial Health

Aside the firm specific determinants of life insurer stability, certain industry wide factors are observed from previous literature to have an impact. These include reforms, regulations and inflation.

Inflation is defined by the Economic Times as the percentage change in the value of the Wholesale Price Index (WPI) on a year-on year basis. Basically, it can be explained as a general increase in prices and fall in the purchasing value of money. Inflation can affect the value of money or reserves by insurers over a period of time either negatively or positively. Insurers are therefore to make wise decisions on investments in order to prevent any negative impact of inflation on their reserves. Using a panel data aggregated at different frequencies for 68 economies from 1961–2000, Beck and Webb (2003) found that economic indicators—such as

inflation, income per capita, and banking sector development—and religious and institutional indicators are the most robust predictors of life insurance financial soundness.

Reforms and regulation by insurance regulators can also impact the financial soundness of both general and life insurers. Reforms may be undertaken owing to financial and economic crisis encountered (Williamson, 1994; Krozner, 1999).

Regulators may authorize reforms and restructuring in order to help organizations to overcome the problems or challenges of an old law. This could however turn out to have either a positive or negative impact on the financial stability of insurers. In Ghana, many structural reforms and regulations have taken place since the beginning of its operation. As part of the NIC's efforts to strengthen the regulation of insurance industry, the Commission introduced a new system of supervising insurance companies known as the risk-based supervision system, the arrangement will replace the existing compliance-based system and will make it possible for the regulator to supervise companies based on the level of risk identified in a particular company. Another typical example is the increase in minimum capital requirement for insurers by the NIC. This greatly affected the operating and start-up capital of insurers, especially the newer smaller firms. In this present study, reform will be captured in the regression as a dummy. Represented as 1 in the years in which major structural reforms were implemented and zero otherwise.

2.9 Theoretical Backing

Insurance regulation can be seen to be in line with both the public and private interest theories. The public-interest theory of regulation holds that regulation is designed to benefit the public by ensuring the security and safety of the public and intervening when the private market fails to allocate resources properly. In insurance regulation, the public interest theory assumes the interest of the public is at the heart of regulators hence regulators step into the markets in an

effort to correct market failure or from some political crisis and maximize social welfare (Kroszner, 2001; Hertog, 2010). The private interest theory also known as the capture theory of regulation on the other hand states that regulation does not benefit the public interest but rather individuals in the industry have incentives to implement laws that suit their interest. Regulators have the aim of also ensuring that insurers remain in operation and that the insureds do not benefit to the detriment of the insurers. Hence, protecting the private interest as well.

2.10 Definition and Concept of Regression

Regression analysis is a statistical tool for the investigation of relationships between variables. Usually, the investigator seeks to ascertain the effect of one variable on another as, for example, the effect of a price increase upon demand, or the effect of changes in the money supply upon the inflation rate (Skyes, 2008). In this study, regression analysis will be used to determine the relationship between certain independent variables, mainly financial ratios and the financial health of life insurers (dependent variable). In other words, regression analysis will be used to determine how financial ratios can predict the financial health of a life insurer.

2.11 Panel Regression

A panel is a cross-section or group of people or entities that are surveyed periodically over a given time span. A panel data can also be defined as a cross-sectional data in which economic entities are observed across time (Ahiawodzi & Sackey, 2010). The data used for this study is panel data because it employs the process of collecting sample observations from a larger population over a given time period.

Longitudinal or panel data track the same sample at different points in time. The sample can consist of individuals, households or establishments; in this study, life insurers. In contrast, repeated cross-sectional data, which also provides long-term data, gives the same survey to

different samples over time. Longitudinal data allow for the measurement of within-sample change over time, enable the measurement of the duration of events, and record the timing of various events.

Panel data have become widely available in both the developed and developing countries. In the U.S. for example, two of the most prominent panel data sets are the National Longitudinal Surveys of Labor Market Experience (NLS) and the University of Michigan's Panel Study of Income Dynamics (PSID). In a developing country like Ghana, an important source of panel data is the Ghana Living Standards Survey (GLSS) collected by the Ghana Statistical service.

Panel data usually give a researcher a large number of data points, increasing the degrees of freedom and reducing the collinearity among explanatory variables hence improving the efficiency of econometric estimates. More importantly, longitudinal data allow a researcher to analyze a number of important economic questions that cannot be addressed using cross-sectional or time-series data sets. Since longitudinal data are collected over time, they also provide researchers the ability to predict future values of a response for a specific subject. This type of inference, known as forecasting, which is a special case of prediction. In this study, the forecasting/predictive property of the longitudinal data used will enable us to determine the possible financial health of an insurer in future. Two major disadvantages of panel data are selectivity bias and heterogeneity bias.

2.11.1 Fixed Effects Models (FE)

Fixed effects models control for, or partial out, the effects of time-invariant variables with time-invariant effects. This is true whether the variable is explicitly measured or not. Fixed effect model can be estimated using statistical techniques like unconditional maximum likelihood

(UML) and conditional maximum likelihood (CML). The estimation of linear regression models when the effects of omitted individual-specific variables are treated as fixed constants over time.

In general, a fixed effect model could be written as

$$Y_{it} = \mu_i + \beta x_{it} + \varepsilon_{it}$$

In panel regressions, we can assume that there is unobserved heterogeneity across individual entities captured by the error term ε_{it} . If this unobserved individual-specific effects are correlated with the regressors x_{it} , then it is a fixed effect model. Where μ_i is the intercept which is allowed to vary with time.

2.11.2 Random Effects Models (RE)

In a random effects model, the unobserved variables are assumed to be uncorrelated with (or, more strongly, statistically independent of) all the observed variables. That is, the individual-specific effect is a random variable that is uncorrelated with the explanatory variables.

Random effects models can be estimated using Generalized Least Squares (GLS). Under the random effects model, each individual has the same slope parameters and a composite error term $\mu_{it} = (\mu_i + \lambda_t + \varepsilon_{it})$ unlike under FE where each individual has the same slope parameters but different intercept term.

Several considerations affect the choice between a fixed effects and a random effects model. First, the nature of the variables that have been omitted from the model must be known. A random effects model is best if there are no omitted variables – or if the omitted variables are uncorrelated with the explanatory variables that are in the model. This will produce unbiased estimates of the coefficients, use all the data available, and produce the smallest standard errors. More likely, however, is that omitted variables produce at least some bias in the estimates.

Again, fixed effects models provide a means for controlling for omitted variable bias if there are omitted variables which are correlated with the variables in the model. In a fixed-effects model, subjects serve as their own controls. The idea is that whatever effects the omitted variables have on the subject at one time, they will also have the same effect at a later time; hence their effects will be constant, or “fixed.” However, in order for this to be true, the omitted variables must have time-invariant (the value of the variable does not change across time) values with time-invariant effects (the variable has the same effect across time).

Tests for correlation of μ_i with independent variables are conducted to decide between random effect and fixed effect framework.

$H_0: \text{Cov}(X_1, X_2) = 0$ (no correlation between X_1 and X_2) - RE

$H_1: \text{Cov}(X_1, X_2) \neq 0$ (correlation between X_1 and X_2) - FE

X_1 and X_2 represent the adjacent data points, say data for January and February for a particular variable. For each variable, we want to know if RE and FE consider a particular variable derived over time to be independently generated or not.

The Hausman test helps to assist in choosing between fixed and random effects.

Rejection of the null favours the fixed effect model.

2.11.3 Assumptions for Regression Analysis

- First, the errors are assumed to have an expected value of zero. This means that on average the errors balance out.
- Second, it is assumed that the independent variables are non-random.
- Third, there is an assumption that the independent variables are linearly independent.

- Fourth, we assume that the disturbances are homoscedastic: This means that the variance of the disturbance is the same for each observation.
- Fifth, we assume that the disturbances are not auto correlated: This means disturbances associated with different observations are uncorrelated.

2.12 Conclusion

The present study departs from previous studies by investigating the determinants of the financial soundness of life insurers in Ghana. It will make use of financial ratios published in the annual reports of sampled life companies in Ghana as well as data on inflation from Bank of Ghana. Again, this study will make use of the unbalanced panel regression analysis method using data about the annual reports of recently registered life insurers as well as the old ones to highlight the factors that affect financial stability of life insurers.



CHAPTER THREE

METHODOLOGY

3.1 Introduction

This chapter describes the method for the study. The chapter is divided into nine sections. Section one gives an introduction to the chapter, section two describes the target population for the study while section three describes the sample and sampling procedure. Sections four focus the data used for the study. Section five, six and seven describe the model and the variable used. Section eight specifies the regression model and section nine talks about the appropriateness of the methodology used. The final section gives a conclusion of the chapter.

3.2 Target Population and Sample

The population of the study comprises all the 21 life insurance companies registered with the National Insurance Commission in Ghana as of 2013. The sample is the selected portion of the population that is being studied. Sixteen companies will be sampled out of the population of 21 based on how long they have been in operation or how long they have been registered with the NIC. For an unbalanced regression data

$$T_i \neq T$$

where T_i is the number of entities in a year i , and T is the number of entities in another year.

That is, data for some periods might be missing. For this research, all entities (insurers) are not observed in all the time periods. Sixteen life companies that were registered with the NIC between the periods of 2007 to 2013 will be used for the regression model. Panel data analysis will be employed because the data has both time series and cross sectional dimensions (the same sample of life insurers will be studied over the period of time).

3.3 Sample and Sampling Procedure

The panel data used study constituted 16 life companies, observed over a seven year period. This fits the context under which panel data can be employed. Also, an unbalanced panel was used since some entities (financial ratios) are not observed for all the years. Panel data with missing observations (unbalanced) have been studied by Wansbeek & Kapteyn (1989) and Baltagi & Chang (1994). The use of this unbalanced panel data set allows a comprehensive evaluation of the financial soundness of the Ghanaian life insurance industry, as it also includes firms that entered or left the market during the sample period. This is because some of the life companies were not in existence in 2007 where the study starts from. Panel data is best suited for this study because it allows control for omitted variable bias and permits control for factors that are unobserved and therefore cannot be included in a multiple regression.

Data on the market share, claims, premiums, combined ratio, operating margin, liquidity ratio and investment performance of the sampled population were collected and analysed using an unbalanced panel data analysis technique. As part of reforms to ensure effective operation of insurers and protection of both the public and insurers, the NIC in 2007 passed a law which mandated all insurers to distinguish their operation into two separate categories, life and non-life. Operational data on life insurance solely, can therefore be obtained beginning 2007. Consequently, data used for this study covers the year period from 2007 to 2013.

3.4 Data Collection

Secondary data comprising the market share, claims, firm size and premiums of the sampled life companies will be collected and analyzed quantitatively. The data will be sourced from annual reports and financial statements of life insurance companies from the NIC. Results will be

displayed diagrammatically as tables for easy understanding. This data comprises mainly secondary data from the annual reports published by the NIC as well as other journals, and write-ups that might have useful secondary information relevant to the study. Yearly average data on inflation was also obtained directly from the bank of Ghana.

3.5 Model Specification and Description

3.5.1 Specified Model

The independent variables that are thought to affect the financial health of life insurers include firm size (FZ), underwriting result (UR), investment performance (IP), liquidity ratio (LR), premium growth (PG), surplus growth (SG), combined ratio (CR), operating margin (OM), GDP, reforms and inflation. However, not all the variables were utilized in the regression model. Variables used were selected according to their significance in determining financial performance of insurers based on previous research.

This study employs firm size, investment performance, liquidity ratio, premium growth, operating margin, combined ratio, claims incurred, reforms and inflation as input variables in line with some of the variables used by Rai (1996); Owusu-Ansah et al. (2010) and Kader et al. (2014).

It is worthwhile to start with the variables that are thought to have an association with the response variable. This could be done by selecting variables that are intuitively appealing by using common sense and experience or based on variables from previous research. At this stage statistical analysis is not carried out. After a successful completion of the univariate analysis, variables for the multivariate model are selected. Any variable whose univariate test has p-value < 0.25 should be considered as likely candidate for the multivariate model. The use of 0.25 as a

screening criterion is based on works by Bendel & Afifi (1997), Mickey & Greenland (1989). This is because the use of large p-value has the disadvantage of including variables that are of questionable importance. The procedure for the selection of variables in the regression will be forward selection (which involves starting with no variables in the model, and then trying out the variables one by one and including them if they are statistically significant).

Variables for the Study

The study uses solvency ratio as a proxy for financial health, which is the dependent variable. Again, following Worthington & Hurley (2002), Yang (2006) and Bikker & Leuvensteijn (2008), this study assumes that, the Ghanaian insurance industry produces two outputs: premiums and investment income based on the risk-pooling and intermediation services provided. The intermediation approach developed by Sealey & Lindley (1977) on the other hand views firms as financial intermediaries that manage a reservoir of assets considered as outputs for the firm, borrow funds from policyholders which constitute the inputs to be used for production and thereafter invest the funds.

3.6 Checking for Model Assumptions

To deem a linear regression as appropriate, the underlying assumptions must be examined. Particularly the assumption of linearity, constant variance (homoscedasticity) and the normality of the residuals must be examined.

3.6.1 Checking for linearity

The linearity of the regression model can be examined by observing a scatter plot of the dependent variable against each independent variable. The scatter plot can help identify if a

linear trend exist. If a linear trend does not exist the data can then be transformed to make it linear or the underlying relationship can be studied.

3.6.2 Checking for homoscedasticity

Homoscedasticity of the residuals implies that the errors have a constant variance. The constancy of the variance of the dependent variable can be examined using various plots. A plot of the residuals against any of the independent variables, or against the predicted values can help unravel this assumption. Lagrange multiplier test for homoscedasticity can also be used to examine this assumption.

3.7 Measurement of Dependent and Independent Variables

Table 3.1 summarizes the dependent and independent variables and provides how they were measured for the purposes of this study.

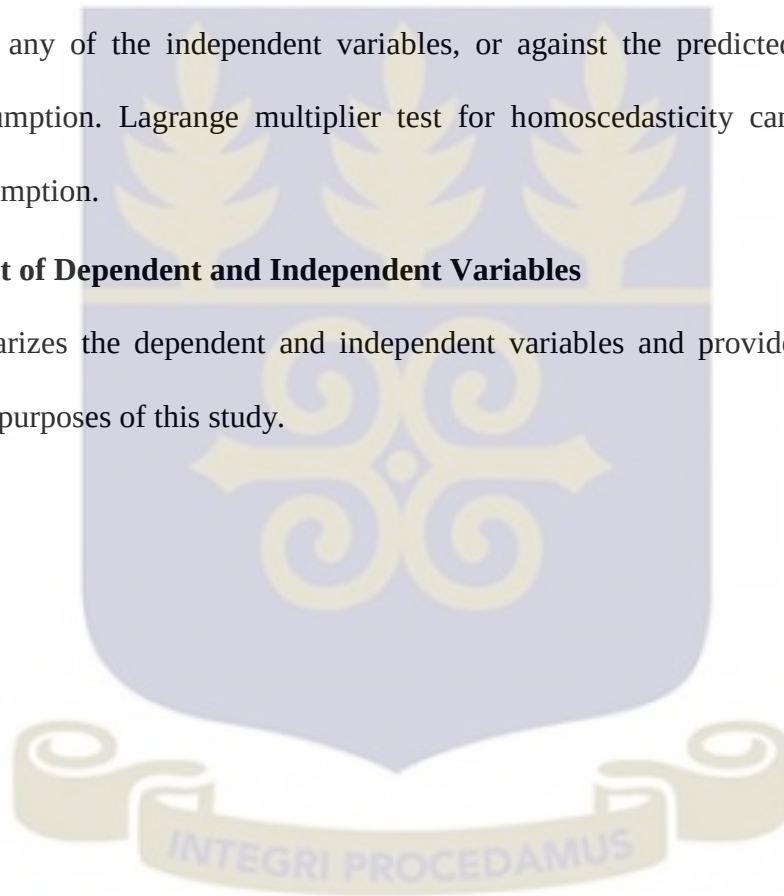


Table 3.1 Summary of Dependent and Independent Variables

VARIABLE	MEASUREMENT
SOLVENCY RATIO (SR)	$SR = \frac{\text{total assets}}{\text{total liabilities}}$
FIRM SIZE (SZ)	$SZ = \frac{\text{Gross Premium of company } X}{\text{Total Gross premium of life companies in that year}}$
INVESTMENT PERFORMANCE (IP)	Measured as investment income
LIQUIDITY RATIO (LR)	$LR = \frac{\text{current assets}}{\text{current liabilities}}$
PREMIUM GROWTH (PG)	Net premium will be used as a proxy for premium growth.
COMBINED RATIO (CR)	$CR = \frac{\text{Incurred losses} + \text{Expenses}}{\text{Earned Premium}}$
OPERATING MARGIN (OM)	$OM = \frac{\text{Net Profit}}{\text{Net Revenue (Premium + other income)}}$
CLAIMS INCURRED (CI)	Total claims incurred in a year
INFLATION (INF)	End of year value of inflation
REFORMS (RF)	1 if structural reform was implemented in year x 0 otherwise

Source: Author (2015)

To examine whether these variables impact the financial health of life insurers, the following panel regression model will be employed:

$$FH_{it} = \alpha_1 SZ_{it} + \alpha_2 IP_{it} + \alpha_3 LR_{it} + \alpha_4 PG_{it} + \alpha_5 CR_{it} + \alpha_6 OM_{it} + \alpha_7 CI_{it} + \alpha_8 IF_t + \alpha_9 RF_t + \varepsilon_{it}$$

$$\varepsilon_{it} = \lambda_i + \gamma_t + \mu_{i,t}$$

where the dependent variable (FH), is financial health of insurers. Solvency ratio (SR) will be used as a proxy for financial health.



Table 3.2 shows the expected signs of the variables used in the computation of insurer financial health.

Table 3.2 Signs of Variables Used in Computation

Variable	Expected Sign
Firm size	+
Investment Performance	+
Liquidity Ratio	+
Premium Growth	+
Claims incurred	-
Combined Ratio	-
Operating Margin	+
Inflation	-
Reforms	+

Source: Author (2015)

3.7.1 Discussion of expected signs

Firm size is expected to have a positive relation with financial health. Larger firms are likely to be more financially sound than smaller ones. This may be due to their relatively high reserve and also because larger firms have more assets (BarrNiv & Hershbarger, 1990).

Liquidity ratio is expected to show a positive relation with financial health. The higher the ratio, the easier a firm is able to meet its short term or immediate liabilities using assets that are easily converted to cash, making it more financially sound.

A positive relation is expected between investment performance and financial health. In this study, investment performance is measured as income from investment. An insurer with higher returns on investment (income) is in a better position to settle its liabilities and hence is more

financially sound. The higher the income from investment, the more financially sound the firm is.

It is expected that growth in premiums will affect the financial health of an insurer positively, since this signifies better performance of an insurer.

Claims incurred is expected to be negatively related with financial health. The higher the claims of a firm are, the more liabilities it has, making it less financially sound.

Combined Ratio is a measure of the profitability of the insurer. It measures incurred losses and expenses as a percentage of earned premiums. Combined ratio is expected to have a negative relation with financial health. A ratio above 100% means the insurance firm is losing money on its insurance operations. Below 100% suggests an operating profit. Therefore, the higher the ratio, the less financially sound the firm is.

Financial health is expected to have a positive relation with operating margin. Operating margin shows how much revenue is left over after all the variable or operating cost have been paid. A financially sound company is therefore supposed to have a higher operating margin meaning that it makes enough income from its operating activities to cater for its liabilities.

Inflation is expected to be negatively related with financial health. The higher the inflation, the less financially sound an insurer is as it results in an increase in prices. High inflation results in higher operating costs making a firm less financially sound. Insurers are therefore to make wise decisions on investments in order to prevent any negative impact of inflation on their reserves.

Reforms are expected to have a positive relation with financial health. Insurance regulators make changes to regulations and reforms in order to reduce insurer insolvency and to improve the performance of insurance companies which then benefits both insurers and insureds.

3.7.2 Testing for the Significance of the Model and Its Parameters

After estimating the coefficients, there is the need to assess the significance of the variables in the model. This usually involves formulation and testing statistical hypothesis to determine whether the independent variable in the model is significantly related to the outcome variable.

3.8 Appropriateness of the Methodology

The advantages and limitations of using panel data sets have been discussed by Hsiao (1986) and Baltagi (2001).

Panel data sets have some limitations which include bias due to sample selection problems. For the purpose of this study, the sample was selected based on the registered life companies during the particular years and based on their existence in the insurance market for at least seven years since 2007. This helps to control for the sampling bias.

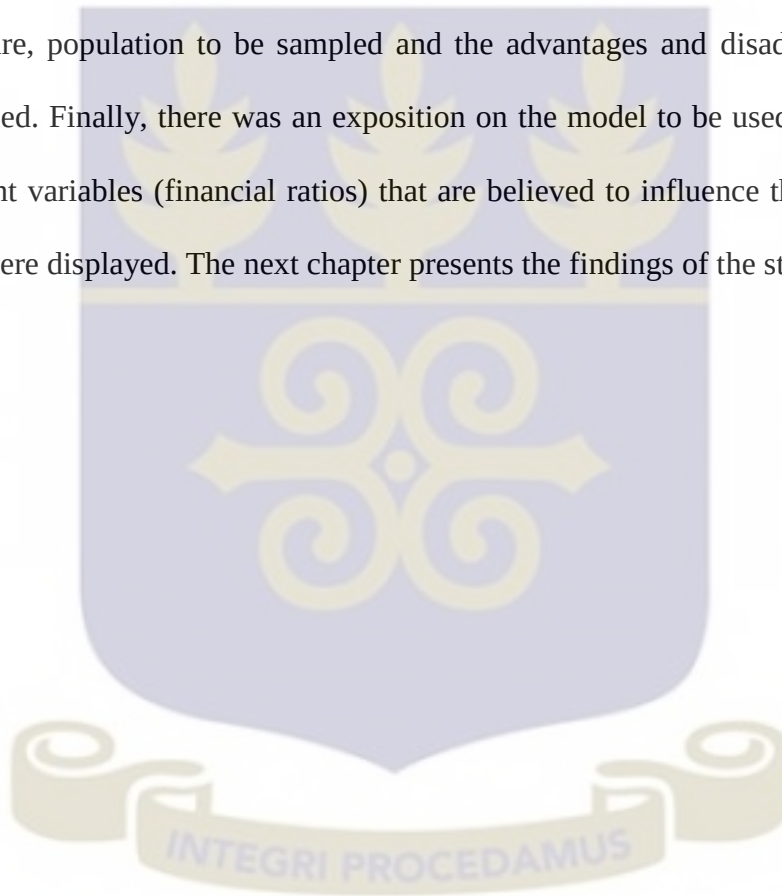
Although unbalanced panel data sets is the considered the most appropriate method for this study, it comes with some limitations. The unbalanced panel is best suited for the study because of the existence missing data points which arises as a result of late entry of some life insurers into the industry during the study period. In panel data applications, testing for random individual effects is of utmost significance. Ignoring these effects lead to huge bias in estimation (Moulton, 1986). With unbalanced panels, testing for this becomes cumbersome. However, the Breusch-Pagen test was applied in this study in order to test for these random effects.

The benefits include its ability to control for individual heterogeneity in order to restrict bias in the individual estimates. Again, considering the informative nature of the data used for this

study, we can obtain more reliable estimates and test more sophisticated models with less restrictive assumptions using a panel data technique. Furthermore, panel data sets are better able to estimate effects that are not easily detected using pure cross-sectional data (Baltgai, 1998).

3.9 Conclusion

This chapter has provided an overview of panel data and its basic concepts as well as a detailed description of the panel regression model that is used in the study. Furthermore, the data selection procedure, population to be sampled and the advantages and disadvantages of panel data were discussed. Finally, there was an exposition on the model to be used and the expected signs of dependent variables (financial ratios) that are believed to influence the financial health of a life insurer were displayed. The next chapter presents the findings of the study.



CHAPTER FOUR

DATA ANALYSIS, INTERPRETATION AND DISCUSSIONS

4.1 Introduction

This chapter presents the results of the study. The data used for the study consist of yearly data obtained from the financial reports of sixteen life insurance companies. The variables that were collected from the financial statements were Solvency Ratio (SR), Liquidity Ratio (LR), Investment performance (IP), Claims Incurred (CI), Firm Size (SZ), Combined Ratio (CR), Operating Margin (OM), Reforms (RF) and Premium Growth (PG). Data on inflation (INF) was also gathered from Bank of Ghana. The chapter begins with a description of each data set using summary statistics. The chapter then progresses with the ordinary least squares regression of all the other variables regressed on SR. This is followed by the panel regression which is in two distinct sections, the fixed effects panel and the random effect panel regression. The Hausman test was then applied to help choose the most appropriate of the two panel regressions. Lastly, the Hausman test is conducted and then the diagnostic test for the most appropriate model that is chosen since panel regression must follow certain assumptions. R software was used for all the analysis.

4.2 Descriptive statistics

Table 4.1 shows some descriptive statistics of the data used for the study. It displays the mean and standard deviation of all the nine variables used in the study. For each variable, the mean and standard deviations are computed collectively on a year-to-year basis in order to unveil the trend.

Table 4.1: Descriptive statistics

Variable	Statistic	Year						
		2007	2008	2009	2010	2011	2012	2013
PG	Mean (million)	5.76	7.36	8.37	12.37	16.67	21.98	26.67
	STDV (million)	5.94	7.58	9.86	0.14	0.22	0.30	0.04
	Min (million)	0.30	0.46	0.49	0.33	0.49	0.81	0.05
	Max (million)	21.01	27.75	33.87	47.83	16.62	99.67	126.79
SR	Mean	2.86	2.17	2.50	2.38	2.80	2.07	2.45
	STDV	2.14	1.91	1.40	0.86	3.74	0.55	1.58
	Min	0.11	0.26	1.00	1.41	0.97	1.32	1.38
	Max	15.85	8.16	6.49	4.74	16.62	3.09	7.10
LR	Mean	8.81	9.92	7.68	14.71	6.44	8.31	9.54
	STDV	1.80	1.12	1.01	0.24	0.09	0.36	0.37
	Min	1.03	0.99	1.02	0.36	0.45	0.40	0.46
	Max	3.12	3.38	9.55	3.48	1.19	2.86	3.84
IP	Mean (million)	0.69	1.00	1.96	1.90	1.61	4.29	8.94
	STDV (million)	0.59	1.09	2.10	1.95	2.00	5.16	1.54
	Min (million)	0.10	0.05	0.16	0.02	0.004	0.02	0.24
	Max (million)	2.12	4.16	7.45	6.82	6.98	17.97	57.08
CI	Mean (million)	1.37	1.74	3.70	4.08	3.45	7.11	9.31
	STDV (million)	0.06	0.05	1.32	1.39	1.68	1.93	1.24
	Min (million)	0.10	0.08	0.001	0.001	0.013	0.09	0.10
	Max (million)	2.03	2.54	5.98	9.26	9.54	11.94	13.20
SZ	Mean	0.08	0.08	8.04	0.07	0.06	0.06	0.07
	STDV	0.10	0.08	0.41	0.08	0.08	0.10	0.09
	Min	0.01	0.005	0.14	0.0005	0.0004	0.001	0.001
	Max	0.34	0.30	0.50	0.26	0.268	0.31	0.31
CR	Mean	1.36	1.94	4.47	1.91	0.90	5.79	1.17
	STDV	0.84	3.54	11.76	3.78	0.59	11.59	0.59
	Min	0.03	10.66	0.02	0.000	0.17	0.08	0.299
	Max	2.73	0.03	43.49	13.69	2.30	43.02	2.404
OM	Mean	0.76	0.26	0.79	0.23	0.12	0.57	0.419
	STDV	0.20	0.26	0.19	0.32	0.09	0.26	0.28
	Min	0.001	0.001	0.0001	0.01	0.006	0.03	0.002
	Max	0.66	0.67	0.81	0.93	0.344	0.64	0.64
INF	Yearly Average	10.73	16.46	19.30	10.79	8.73	8.15	11.64

Table 4.1 shows a summary statistics of the data used for this study. Summary statistics are used to summarize a set of observations in order to communicate the information about the data set as simply as possible. The table shows the mean, standard deviations, minimum and maximum values of the variables used in the study across the years. From the table, it is observed that most of the values were increasing, decreasing or inconsistent over the years. This means that the financial ratios were not following a uniform trend over the study period, some insurers were solvent in certain years but insolvent in others. The standard deviations vary widely between the companies and over time. The large standard deviations can be attributed to the fact that some life companies are bigger than others in financial terms.

We estimated pooled Ordinary Least squares (OLS) regression for comparison with the panel regression as shown in Table 1, 2 and 3 in the appendix. The pooled OLS estimator ignores the panel structure of the data and simply estimates the parameters of the model. In this regard, the OLS regression does not consider heterogeneity across groups (life companies) or time. It assumes that the data comes from homogenous entities over time. Since R software was used, the data was specified as a panel data, with the type of company represented by the data ID and years as the time parameter.

The significance level of its regression was 5%. Hence, any p-value of the coefficients that is less than 0.05 represents a significant predictor of solvency. The coefficient of the constant in the model, LR, CI, IP, SZ, CR, OM and INF are all less than 0.05 hence they are all significant predictors of solvency except PG and RF. The positive coefficients of PG, LR, IP, OM and SZ show that they are positively related to solvency. This means that an increase in these variables associated with the life insurance companies will cause their financial health to increase positively and vice versa. However, the coefficient of CI, INF and CR are negative, indicating

that they have an inverse relationship solvency. This also means that an increase in these variables will cause a decrease in the financial health of the life companies.

The ANOVA Table 2 in the appendix displays the overall significance of the model. It shows whether the overall regression coefficients are significant. The table gives an indication that the regression model is significant in totality and hence the interpretation of the coefficients makes sense. This is because the p-value of the F-statistics (0.0005) is less than the level of significance value of 5% (0.05) hence we reject the null hypothesis that the model is not a good fit. We therefore conclude on the alternate hypothesis that the model is a good fit of the data.

The value of the adjusted R-square indicates that in considering homogeneity across companies and over time, 52.99% of the variability in the financial health was explained by the independent variables. After the OLS estimates, it is laudable to test the data if there exist any panel effect. If there exists no panel effect, the OLS will be appropriate otherwise we go ahead to estimate the random and fixed effect model to choose the appropriate one.

Table 4.2 shows the Breusch-Pagan Lagrange multiplier test for panel effect. The null hypothesis of this test is that there is no panel effect (meaning that OLS is better) and the alternate is that there is a panel effect, meaning that OLS is not appropriate and hence panel regression must be used.

Table 4.2: Testing for panel effect

Chi-square value	Df	p-value
98.129	1	0.0002

As can be seen, the p-value of 0.0002 is less than 0.05. Here we reject the null hypothesis and conclude that the OLS is not appropriate and that panel regression analysis should be considered.

That is, there is evidence of significant differences across the life companies, therefore we cannot run a multiple OLS regression.

4.3 Fixed Effect Panel Regression

This is known as a “fixed effects” regression because it holds constant (fixes) the average effects of each life company. In the fixed effects model, the individual-specific effect is a random variable that is allowed to be correlated with the explanatory variables.

Table 4.3: Unbalanced Fixed effect panel Regression estimates

Coefficients	Estimate	Standard Error	t-value	Pr(> t)
Intercept	3.25E-04	3.02E-05	10.7436	0.000000
PG	-3.97E-02	4.23E-02	-0.9378	8.120E-1
LR	2.14E-05	1.24E-06	17.2742	2.129E-2
CI	-9.25E-05	8.65E-06	-10.6925	6.281E-3
IP	9.80E-05	5.77E-06	16.9800	6.031E-4
SZ	6.23E-01	4.19E-02	14.8783	8.123E-4
CR	-2.00E-01	1.08E-02	-18.4907	0.301E-4
OM	2.21E-05	1.50E-06	14.7333	7.125E-4
INF	-3.42E-03	1.20E-04	-28.5000	1.045E-3
RF	4.56E-04	6.11E-04	0.7466	1.236E-1

Table 4.3 shows the fixed effects regression coefficients and their corresponding p-values. Again the significance level of the regression was 5%, hence any p-value of the coefficients that is less than 0.05 shows that it is a significant predictor of solvency. The coefficient of the constant in the model, LR, CI, IP, SZ, CR, OM and INF are all less than 0.05 hence they are all significant

predictors of solvency except PG and RF. The positive coefficients of IP, SZ and OM show that they are positively related to solvency. This means that an increase in these variables associated with the life insurance companies will cause their financial health to increase positively and vice versa. However, the coefficient of PG, CR, INF and CI are negative, indicating that they have an inverse relationship with solvency ratio. This also means that an increase in these variables will cause a decrease in the financial health of the life companies.

4.3.1 Diagnostics for the Fixed Effects Panel Regression Model

Table 4.4: Regression statistics (Fixed effect)

R²	Adjusted R² value
0.7361	0.5418

The R^2 is the coefficient of determination. It measures the variability in the dependent variable that has been explained by the independent variables. The value of R lies between 0 and 1. The closer the value of R^2 to 1 the better the model fits the data. The value of the adjusted R^2 shows that in considering homogeneity across companies and over time, 54.18% of the variability in the financial health was explained by the independent variables.

Table 4.5: ANOVA results (Fixed effect)

	Sum of squares	Df	F-statistics	Pr(> t)
Regression	28.23	9	23.246	0.000
Residual	10.12	75		
Total	38.35	84		

The ANOVA result (Table 4.5) shows the overall significance of the model. It shows whether the overall regression coefficients are significant. The table gives an indication that the regression model is significant in totality and hence the interpretation of the coefficients makes sense. This is because the p-value of the F-statistics (0.000) is less than the level of significance value of 5% (0.05) hence we reject the null hypothesis that the model is not a good fit and conclude on the alternate hypothesis that the model is a good fit of the data.

4.4 Relationship between firm size and financial health

From the fixed effect model, it was realised that firm size has a positive significant impact in financial health of life companies. However, the question of when the positive effect of firm size on financial health ceases is yet to be ascertained. That is, if a firm increases in size to infinity, will it continue to positively impact on financial health? Or is there a point at which an increase in firm size no longer has a positive effect on financial health? To answer this question, a quadratic model was fitted to financial health (dependent variable), with an extra independent variable the square of firm size. The result of this regression is displayed in Table 4.7, 4.8 and 4.9. The turning point of this model is then used to determine the maximum firm size of a life company in relation to its financial health. From the regression, the quadratic model was given as;

$$y = 3.40E - 6 + (2.14E - 5)a - (6.12E - 6)b + (9.70E - 7)c + (1.80E - 2)x - (9.07E - 2)x^2 - (9.12E - 1)d + (5.40E - 3)e + (4.77E - 3)$$

Where

a= liquidity Ratio

b= claims incurred

c= investment performance

x= size

$x^2 = (\text{firm size})^2$

d= combined ratio

e= operating margin

f=inflation g=reforms

Now since at the maximum point $\frac{dy}{dx} = 0$,

We differentiate the above equation partially with respect to x and equate it to zero

$$\frac{\partial y}{\partial x} = 1.80E - 2 - (2 * 9.07E - 2)x = 0$$

$$x = \frac{1.80E - 2}{2 * 9.07E - 2}$$

$$x = 0.9923$$

From the result above we expect that the ratio of a firm's gross premium to the total gross premium, which was used to measure market share should be 0.9923 before the positive impact of size can no longer exist on its financial health. From the data used for this present study, it is no life company exhibited such a large market share. We therefore conclude that an increase in firm size has a positive impact on financial health of life companies in Ghana until the ratio of its gross premium to the total gross premium reaches 0.9923.

Table 4.6: Unbalanced Fixed effect panel Regression estimates (including size square)

Coefficients	Estimate	Standard Error	t-value	Pr(> t)
Intercept	3.40E-06	3.31E-07	10.2719	2.100E-4
PG	-1.80E-06	2.10E-06	-0.8571	6.129E-1
LR	2.14E-05	1.34E-06	15.9701	2.482E-2
CI	-6.12E-06	2.50E-07	-24.4800	4.125E-3
IP	9.70E-07	4.30E-08	22.5581	4.013E-2
SZ	1.80E-02	2.10E-03	8.5714	5.131E-4
SZ ²	-9.07E-02	1.15E-02	-7.8870	4.205E-3
CR	-9.12E-01	1.13E-01	-8.0708	2.106E-2
OM	5.40E-03	3.50E-04	15.4286	3.246E-2
INF	-4.77E-03	5.10E-04	-9.3511	1.0034E-2
RF	9.80E-03	2.37E-02	0.4139	4.056E-1

Table 4.7: ANOVA results

	Sum of squares	Df	F-statistics	Pr(> t)
Regression	34.28	10	25.438	0.000
Residual	11.23	74		
Total	45.51	84		

The ANOVA result (Table 4.7) shows the overall significance of the model. It shows whether the overall regression coefficients are significant. The table gives an indication that the regression model is significant in totality and hence the interpretation of the coefficients makes sense. This is because the p-value of the F-statistics (0.000) is less than the level of significance value of 5% (0.05) hence we reject the null hypothesis that the model is not a good fit and conclude on the alternate hypothesis that the model is a good fit of the data.

Table 4.8: Regression statistics

R²	Adjusted R² value
0.7532	0.5173

The value of the adjusted R-square shows that in considering homogeneity across companies and over time, 51.73% of the variability in the financial health was explained by the independent variables.

Also, Table 4, 5 and 6 in the appendix shows the results of the random effects regression coefficients and their corresponding p-values. Again the significance level of the regression was 5%, hence any p-value of the coefficients that is less than 0.05 shows that it is a significant predictor of solvency. The coefficient of the constant in the model, LR, SZ, IP, CI, CR INF and OM are all less than 0.05 hence they are all significant predictors of solvency except PG and RF.

The positive coefficients of LR, SZ, IP and OM show that they are positively related to solvency. This means that an increase in these variables associated with the life insurance companies will cause their financial health to increase positively and vice versa. However, the coefficient of PG, CI, INF and CR are negative, indicating that they have an inverse relationship solvency. This also means that an increase in these variables will cause a decrease in the financial health of the life companies. The interpretation of the coefficients is the average effect of the independent variable over the dependent variable when the independent variable changes across time and between entities by one unit.

The ANOVA analysis (Table 5 in the appendix) shows the overall significance of the model. It shows whether the overall regression coefficients are significant. The table gives an indication that the regression model is significant in totality and hence the interpretation of the coefficients makes sense. This is because the p-value of the F-statistics (0.0023) is less than the level of significance value of 5% (0.05), hence we reject the null hypothesis that the model is not a good fit and we conclude the alternate hypothesis that the model is a good fit of the data.

The value of the adjusted R-square from Table 3 in the appendix shows that in considering homogeneity across companies and over time, 52.92% of the variability in the financial health was explained by the independent variables.

4.5 Hausman test

Table 4.9: Hausman test for best model

Chi-square value	p-value
1.012	0.0491

To decide between fixed or random effects we run a Hausman test with the null hypothesis that the preferred model is random effects versus the alternative to the fixed effects (see (Green, 2008)). It basically tests whether the unique errors are correlated with the regressors, the null hypothesis states they are not. Since the p-value of the test is less than 0.05 we reject the null hypothesis. Therefore, we conclude that fixed effect is the preferred model for this study. Hence our conclusions are now based on the fixed effect model. Consequently the tables and diagnostics below are all based on the fixed effect model. Below are the diagnostic tests as applied to fixed effect panel regression model.

4.6 Diagnostic Tests for the fixed effects.

According to the panel regression, it is necessary for the errors to be serially uncorrelated and also to be homoscedastic (that is the errors need to have a constant variance). It is also relevant to test for time-fixed effect to see if there is the need to consider the effect of time. The study also checked for cross-sectional dependence/contemporaneous correlation in the data set.

4.6.1 Testing time-fixed effects.

The null is that no time-fixed effects needed.

Table 4.10: Testing for time effect

F-value	Df	p-value
0.1259	8,73	0.9501

If there is a cause to suspect that there are time-specific effects, which affect all individuals in the same way, then an extended model can be estimated by including a dummy variable for each time period. This means that if there is the presence of time effect, the model has to be extended to include the time factor. Now, since the p-value = 0.9501 is greater than 0.05 we conclude on

the null hypothesis that there is no significant time effect. Hence there is no need to consider a new model that takes into consideration the effect of time.

4.6.2 Testing for serial correlation

Table 4.11: Testing for serial correlation

Chi-square value	Df	p-value
0.7124	6	0.2321

Table 4.11 shows the test for serial correlation. One assumption of the panel regression is that the errors must be serially uncorrelated as it has the tendency of inflating the errors associated with the model. The table shows the Breuch-Godfrey/Wooldridge test for serial correlation in the panel model. Since the p-value is greater than 0.05, it is concluded that there is no serial correlation in the random effect model.

4.6.3 Testing for cross-sectional dependence/contemporaneous correlation: using Breusch-Pagan LM test of independence

Table 4.12: Testing for cross-sectional dependence

Chi-square value	Df	p-value
0.7321	122	0.2451

The null hypothesis in the B-P/LM tests of independence is that residuals across entities are not correlated. B-P/LM tests are used to test whether the residuals are correlated across entities.

Cross-sectional dependence can lead to bias in the test results (also called contemporaneous correlation). The Breusch-Pagan LM test for cross-sectional dependence in panels shows that there is no cross sectional dependence in the model. The chi-square value of 0.7321 with p-value of 0.2451 means that there is no cross sectional dependence. This is good for the study since the bias in the estimates of the model is not inflated by correlated residuals among the different life companies.

4.6.4 Breusch-Pagan test for Heteroscedasticity

Table 4.13: Testing for heteroscedasticity

Chi-square value	Df	p-value
0.9129	9	0.0923

One major assumption of regression is that the errors must be homoscedastic (that is a constant variance must be assumed). The results show the absence of heteroscedasticity of the Breusch-Pagan test for heteroscedasticity shows that the errors of the fixed effect model is homoscedastic since the p-value is greater than 0.05. The null hypothesis of the test is that the errors have equal variances while the alternate is that the errors are not constant. Hence the assumption of equal variances is satisfied.

4.7 Categorizations of the solvency ratios

The table below shows the year on year solvency margin of the sixteen life insurance companies involved in the study. It shows that over the seven year period of the study, there have been 3 cases of insolvency, 20 cases of weak solvency, 31 cases of moderate insolvency and 46 cases of strong solvency within the study period (from 2007 to 2013).

Table 4.14: Categorization of solvency ratios

Year	Solvency margin			
	Insolvent (%)	Weakly solvent (%)	Moderately solvent (%)	Strongly solvent (%)
2007	1 (8.3)	2 (16.7)	1 (8.3)	8 (66.7)
2008	1 (7.7)	2 (15.4)	4 (30.8)	6 (46.2)
2009	0 (0.0)	2 (15.4)	4 (30.8)	7 (53.8)
2010	0 (0.0)	2 (13.3)	9 (60.0)	4 (26.7)
2011	1 (6.3)	2 (12.5)	5 (31.3)	8 (50.0)
2012	0 (0.0)	5 (31.3)	4 (25.0)	7 (43.8)
2013	0 (0.0)	5 (33.3)	4 (26.7)	6 (40.0)
Total	3 (3.0)	20 (20.0)	31 (31.0)	46 (46.0)

Source: Author (2015)

The categorizations were made as follows; SR less than 1 means insolvent, SR from 1 to 1.49 means weakly solvent, SR from 1.5 to 1.99 means moderately solvent and SR greater than 2 means strongly solvent.

4.8 Discussion of Findings

This study provides an interesting insight into insurance sector of Ghana, focusing primarily on life insurance. The study discovered that from annual reports published by the NIC, a trend of positive growth was recorded in the last decade. Although general insurance has the largest proportion in Ghana, the life sector has recorded a significant increase in the number of insurers, gross premium and number of policyholders. The current monitoring procedure of the NIC which ensures compliance with insurance regulations is not comprehensive enough and does not serve as a good warning system for detecting future insolvency as previously hypothesized (NIC, 2009).

To begin with, the study addressed both the firm specific and macro factors that affect life insurer's financial soundness and used panel regression analysis to assess the impact of some firm specific factors on a sample of life insurers in Ghana. Solvency Ratio (SR), which was used as a proxy for Financial health was subdivided into four mutually exhaustive classes such that the solvency ratio of each life insurer over the years fall within a particular group. The categorizations were, insolvent, weakly solvent, moderately solvent and strongly solvent. The results showed that over the period of the study, there were few occasions where some life insurance companies in Ghana became insolvent. The licenses of these companies were not revoked by the NIC, but the NIC changed its monitoring approach to help these companies in business.

In addition, the present study found that most life insurance companies were solvent most of the time during the study period, based on their financial statements. This conclusion was drawn based on the study's categorization of life insurer solvency into insolvent, weakly solvent, moderately solvent and strongly solvent. It was shown that less than 40% of the sampled life insurers were between moderately solvent and insolvent, with majority of them being weakly insolvent, while few were completely insolvent in certain years based on their financial ratios.

This study examined the solvency regulatory framework in Ghana and looked at the factors that can affect solvency and their impact on financial health. A close look at the data collected and according to KPMG 2014, there has been a tremendous growth in the Ghanaian life insurance industry from 16 registered life insurers in 2007 to 21 in 2014.

The following section summarises the main findings of this study and discusses the impacts of the selected independent variables on the financial health of life insurers. Findings of the effects of the seven predictor variables on financial health are discussed as follows;

- Firm Size; as shown in the unbalanced fixed effect Table 4.6, firm size (SZ) was observed to have a positive coefficient, hence a positive relationship with financial health. That is, larger firms were seen to be more solvent after the analysis. This finding is in line with existing literature, (Chen & Wong, 2004). Intuitively, a life insurer with a larger firm size like SIC is unlikely to go insolvent since it has a larger market share and higher capital. The point at which SZ ceases to have a positive impact on FH was calculated as 0.9923.
- Investment Performance is also shown in Table 4.4 to have a positive relationship with financial health. Intuitively, this finding is expected since an insurer that makes wise investment decisions is expected to gain more interest from investments and hence improve its financial soundness. Investment is one of the major ways of ensuring the financial health of insurers. Since life policies are long term in nature, the ability of an insurer to make wise investment decisions that will yield good returns is very essential in ensuring that they are able to meet their future obligations as well as operating in an effective manner.
- Liquidity Ratio, which is computed as the ratio of current assets to current liabilities also has a positive relation with financial health as expected. Solvency ratio, which was used as a proxy for measuring financial health is a ratio of total assets to total liabilities. Consequently, liquidity ratio, which is a subset of the solvency ratio is expected to have a positive relation. A high value of liquidity ratio, means an insurer is better capable of meeting its demands and therefore has a low probability of going insolvent.
- Operating Margin also showed a positive relation with financial health as displayed in Table 4.4. This result is in line with studies by BarNiv & Hershbarger (1990) and Kramer

(1996). The operating margin gives how much revenue is left after all operating costs have been catered for. A higher value therefore implies that a life insurer is financially sound since it has more revenue after payment of operating cost.

- Claims Incurred which measures the amount of claims received by an insurer per year was seen in Table 4.4 to have a negative relationship with financial health as expected. This is in line with previous literature including Owusu Ansah et al. (2010). An insurer incurring a smaller amount claims is more financially sound than one with lots of claims per year.
- Combined Ratio is a measure of profitability showed a negative relationship with financial health after analysis of the data. This is in line with expectations at the beginning of the study, which stipulated that an insurer with a smaller percentage (below 100%) to use a smaller amount of money for insurance operations compared to one who's combined ratio is above 100%. The life insurers with higher values of combined ratio were not making an underwriting profit, which meant a loss on insurance operations. This then resulted in weak financial health or insolvency of those life insurers.
- Premium Growth which shows the growth in premiums collected was shown at the end of the analysis to be an insignificant predictor of financial health. Its sign after the regression is also not in line with what was expected at the beginning of the study but is, however, in line with previous studies (Kim et al., 1996; Chen & Wong, 2004; Luhnén, 2009).

Although this study did not focus on financial performance, the positive relation of investment performance and negative effect of premium growth to the financial health of Ghanaian life insurers highlights the differences between financial health and financial performance. In that,

while premium growth is positively related to financial performance, it shows a negative relation to financial health. Again, investment performance also shows a negative relation to financial performance (Akotey et al., 2013) but a positive relationship with financial health. Hence a company exhibiting good financial performance is not necessarily financially sound.

The analysis of the data gathered disagrees with Chen and Wong (2004) conclusion that combined ratio has a positive relation with solvency. This could be as result of the geographical differences or difference in the computation of ratios or the data collected. The evidence from this study is, however, in line with other studies on insurer insolvency including Simpson & Damoah (2009) who stipulate that the system used by the NIC to monitor insolvency is not comprehensive enough.

Considering the macro factors discussed in chapter two, the effect of regulation may have an impact on financial health of life insurers. Major structural reforms took place in 2007, 2009 and 2013 in the Ghanaian insurance industry. As shown in Table 4.1.6, only one life company was insolvent in 2007 while 8 were strongly solvent, based on the categorization of the present study. In 2013, however, there was no insolvent life company, 5 were weakly solvent, 4 moderately solvent and 6 strongly solvent. This shows an improvement in the financial health of the insurers which can be attributed to the major reforms implemented in those years. Bonin, Hassan & Watchel (2005) studied the effects of reforms and regulation on the financial soundness of banks and found a direct relationship. Brissimis, Delis & Papanikolaou (2008) also found a positive relation between reforms and bank financial performance. The p-value of reform which served as a control variable in the regression was below 5%, making it insignificant. Hence according to the study, reform is not a significant determinant of financial health of Ghanaian life insurers.

Nevertheless, inflation which increased significantly from 10.5% in 2006 to 12.7% in 2007 and to 20.1% in 2009 (KPMG, 2010) is inversely related to investment yield/performance. This relationship is however only true in the long run. Mishkin (1992) and Khan & Senhadji (2001) found no empirical evidence of the Fisher effect, which postulates a high correlation between level of interest rates and inflation in the short run but support the existence of long-run Fisher effect. Fluctuation of inflation rates as can be observed in the Ghanaian context over the sampled period would therefore have an impact on financial health. This is in line with the findings of this study as years with significant differences of inflation levels did not exhibit significant change in solvency as shown in Table 4.15. For example, from 2007 to 2009, inflation increased from 12.7% to 20.1%, in 2007 one company was insolvent, 2 companies were weakly solvent, 1 company was moderately solvent and 8 companies were observed to be strongly solvent according to the present study. In 2009, no company was insolvent based on the results of the study, 2 were weakly solvent, 4 were moderately solvent and 7 were strongly solvent, which does not show much difference over those year periods. From the regression, inflation showed a negative relation with financial health. Hence, the higher the inflation, the less financially sound an insurer becomes. Overall, the macro factors as well as the firm-specific factors can be said to have impacted on the financial health of the sampled life insurers.

4.9 Conclusion

Thus the main results and findings of the model used in the study are presented. To satisfy the objectives of this study, descriptive statistics, contingency tables were provided. Also, the main statistical tool used for the analysis was the multiple ordinary least squares regression, and panel regression. The unbalanced panel regression was employed in determining the effect of some

financial indicators of the financial health of some selected life companies. Finally, the chapter discussed the major findings of the study.



CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATION

5.1 Introduction

The chapter provides a summary of the findings as well as the conclusions, recommendations and suggests areas for future research. The main aim of the present study was to investigate determinants of financial health of life insurance companies in Ghana. The discussion is organized around the three main objectives of the study.

5.2 Summary

The study began with an overview of insurance in general, its contribution to the economy, life insurance insolvency and the need to monitor insurers to ensure financial health and protect policy holders. Since insurer insolvency is quite common, the study reviewed existing literature in this field and found that monitoring, regulation and proper assessment of financial statements of insurers by regulators can reduce insurer insolvency by putting measures in place to serve as an early warning system.

To evaluate the effect and impact of some financial variables on the solvency of the life companies, a multiple regression and panel regression was adopted. First an ordinary least squares regression was used without considering the difference in entities (life companies). The results of this showed that OM, LR, IP and SZ are positively related to solvency. This result is in line with studies conducted by Chen & Wong (2004), Cummins, Harrington & Klein (1995) and Yang (2006). This means that an increase in these variables associated with the life insurance companies will impact positively on financial health and vice versa, while CI, INF and CR can have a negative impact on the financial health of life insurance companies.

In conducting the panel regression two separate analysis were performed. The fixed effect and random effect panel regressions were conducted. To choose the more appropriate of the two, the Hausman test was conducted to choose the best among the two. The result of the Hausman test showed that the fixed effect panel regression was the most appropriate. Hence all conclusions and consequences follow from the results of the fixed effect panel regression.

The diagnostic tests for panel regression were tested to ensure model adequacy. The tests conducted showed that the assumptions of homoscedasticity, serial correlation, cross-sectional dependence correlation are satisfied.

Although the research only tests the effects of firm-specific variables of insurers on their solvency, it also offers an insight into the possible effects of other industry-wide variables like inflation, methods of insurance distribution and reforms and regulation. The study then goes on to conclude that these macro variables could be significant determinants of an insurer's financial soundness. The study therefore still carries important implications for future researchers. The variables studied may help examine financial health of insurers within different financial environments.

5.3 Conclusions

Findings from the study show a positive relation between financial health and reforms, from the years 2007 to 2013, there was a general increase in the number of weakly solvent insurers. This could be attributed to the increase in the number of life insurers which made it necessary for the NIC to put in place new reforms and regulations. Inflation, claims incurred and combined ratio also showed a negative relation to financial health. Findings from the study revealed that a rise in SZ, LR, IP and OM can increase the solvency ratio of an insurer, hence making it more

financially sound. CI, CR and INF on the other hand, must be low in order to increase financial soundness.

Careful monitoring of these ratios in the annual financial statements of these companies by the NIC will go a long way in preventing future insolvencies. This will subsequently protect the interest of policyholders and serve as a source of financial stability for the Ghanaian economy.

5.4 Potential Areas of Application

This study serves as an insight into areas that influence the decision of the public on taking life policies, management of life companies and regulators of insurance who work as monitors and decision makers.

As custodians of insurance and all related matters, regulators must ensure proper monitoring of insurers, which is key in detecting and preventing future insolvencies. With the intention of effectively operating life insurance policies to improve the financial sector of the Ghanaian economy, it is imperative to know the core factors and principles that cause financial distress among insurers. Studying and monitoring these factors as published by the insurers in their annual financial statements can lead to better financial performance of life insurers and serve as a financial booster to the economy as a whole.

Policyholders are also able to make confident decisions about taking up life policies when they are assured of the financial soundness of the insurers and have no doubt of any uncertainties like insolvency. Many people are affected aside the state when an insurer becomes insolvent. Due to the long term nature of life insurance, unlike general insurance, insureds are better able to reap its savings benefit if the insurers are financially sound and there's no risk of future insolvency.

Management of the insurance companies are the greatest beneficiaries of this study. Monitoring and assessing of these determinants of insolvency can make them restructure their operations in order to prevent bankruptcy. If, for example, the investment profit of a life insurer is not appreciable enough, management can adopt steps in order to make better investment decisions which will in turn make the insurer financially sound. Another typical example is to develop innovative life policies that will attract more customers in order to increase their market share, which is seen to have a positive relation with financial stability.

5.5 Recommendations

5.5.1 Recommendations for Management, Policyholders and Investors

In order to ensure financial stability of insurers, it is essential to adopt a solvency regulatory framework that monitors the financial position on a timely basis. This framework should be able to detect early signs of insolvency and prevent the future bankruptcy among insurers.

Due to the relationship that exists between solvency ratio (SR), premium growth (PG), combined ratio (CR), operating margin (OM), claims incurred (CI), investment income (IP) and firm size (SZ) it is highly recommended that life insurance companies pay attention to these indicators as some of them could have a devastating impact on their solvency and competitiveness in the business. It is also necessary that life companies monitor other financial indicators like gross margin percentage, financial leverage and return on equity, as they could contribute to their continual stay in business.

To detect early signs of insolvency, the NIC, in addition to move towards the Risk Based Supervision approach, monitor these financial ratios and intensify field inspections as well as ensuring compliance with insurance regulation. This can serve as an early warning system in

determining distressed insurers. In order to achieve better overall performance, policy makers of the insurance industry must also put in place measures to ensure better corporate performance of the existing companies to make the selling of life insurance appealing to consumers.

5.5.2 Recommendations for Future Research

The following areas could be addressed in future research in order to increase robustness and applicability of the model: Alignment of the dimensions, completeness of the model and coverage of the dimensions. The effect of other financial variables on the solvency of life insurance companies can also be considered using other statistical tools.

It is also recommended that future researchers assess the robustness of the new solvency regulatory system which is yet to be put in place by the NIC. This system is expected to follow a Risk Based Supervision Approach. Again, future researchers can compare the robustness of the solvency regulatory framework currently in use by the NIC and the Risk Based Supervision method and see which one fits more in the Ghanaian context in preventing insolvency.

5.6 Limitations of the Study

Notwithstanding the benefits of this study, there are certain limitations and drawbacks which did not guarantee a hundred percent accuracy of findings. Some of these limitations include the cost of undertaking the study in terms of moving about to obtain some data that was not readily available on the financial statements from some of the registered Life Insurance Companies mainly due to security reasons and for the confidential nature of some of the data required. It is for this reason that the NIC has mandated all insurers to ensure that their annual financial statements conform to international standards. This will make a routine assessment of their financial characteristics easier.

Finally, the topic was limited in terms of the time range. Due to the broad nature of the industry, a longer duration would have been ideal for accurate information to be derived but this, however, was impossible because data on life insurance solely in Ghana are time bound, starting from 2007.



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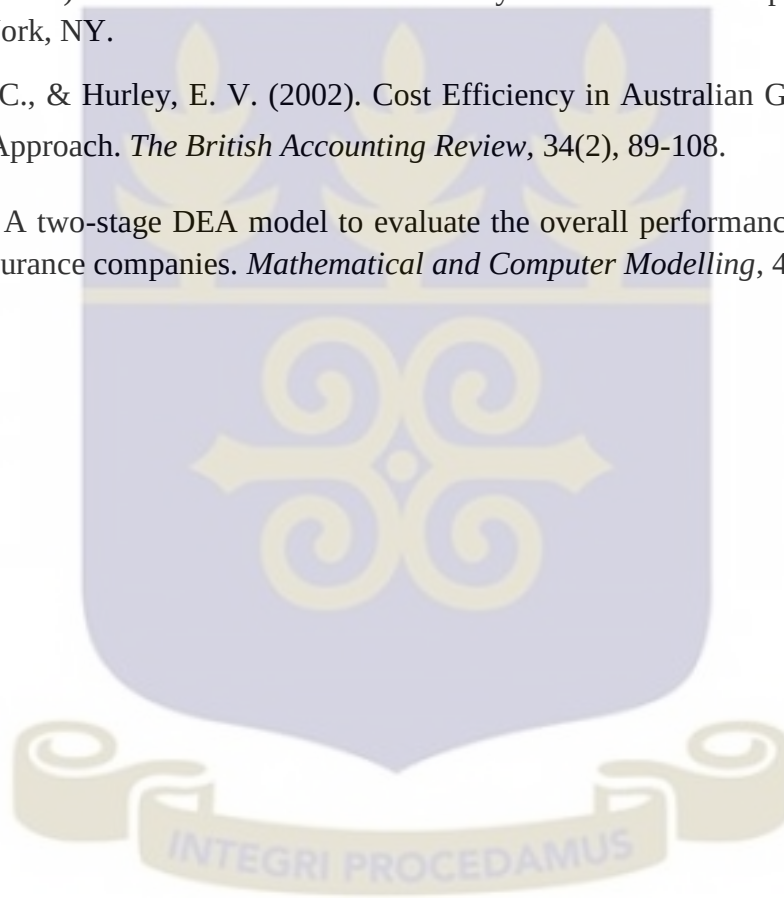
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APPENDICES

APPENDIX A: R-CODES

```
install.packages("plm")
```

```
library(plm)
```

```
# For installing the panel regression packages in R
```

```
pdata<-plm.data(mydata, index=c("Company","Year"))
```

```
# This makes the R-program identify the data as panel, with the panel ID being the insurance co  
mpany
```

```
pooling<-plm(SR~PG+LR+CI+IP+SZ+CR+OM,data=pdata, model="pooling")
```

```
summary(pooling)
```

```
# This specifies the regression model without assuming any panel
```

```
fixed<-plm(SR~PG+LR+CI+IP+SZ+CR+OM,data=pdata, model="within")
```

```
summary(fixed)
```

```
# This specifies the fixed effect model
```

```
random<-plm(SR~PG+LR+CI+IP+SZ+CR+OM,data=pdata, model="between")
```

```
summary(random)
```

```
# This specifies the random effect model
```

Hausman test

```
phptest(fixed,random) # For testing the best of fixed and random effect model
```

Testing for time-fixed effects

```
fixed.time<-plm(SR~PG+LR+CI+IP+SZ+CR+OM+factor(Year),data=pdata, model="within")
```

```
summary(fixed.time)
```

Testing for cross-sectional dependence correlation: using Breusch-Pagan LM test of independence

```
install.packages("lmtest")
```

```
library(lmtest)
```

```
pcdtest(fixed, test = c("lm"))
```

Testing for serial correlation

```
pbgtest(random)
```

APPENDIX B**ORDINARY LEAST SQUARES MODEL****Table 1: Unbalanced OLS Regression estimates**

Coefficients	Estimate	Standard Error	t-value	Pr(> t)
Intercept	3.54E+00	3.29E-01	10.77019	1.125E-4
PG	7.87E-07	2.47E-06	0.31911	7.015E+1
LR	1.29E-01	1.11E-02	11.68084	8.934E-4
CI	-4.36E-05	2.80E-06	-15.59868	6.530E-4
IP	1.41E-03	9.48E-05	14.87908	9.832E-4
SZ	9.43E-06	5.30E-07	17.80219	8.571E-4
CR	-4.29E-01	3.65E-02	-11.76051	5.620E-4
OM	1.95E-01	1.19E-02	16.36525	7.370E-3
INF	-9.87E-03	4.53E-04	-21.79470	2.311E-4
RF	9.23E-04	9.85E-04	0.93696	8.721E-1

Table 2: ANOVA results (OLS)

	Sum of squares	Df	F-statistics	Pr(> t)
Regression	47.13	9	26.80	0.0005
Residual	17.60	90		
Total	64.73	99		

Table 3: Regression statistics (OLS)

R²	Adjusted R² value
0.7280	0.5299

RANDOM EFFECT MODEL**4.6 Random Effect Panel Regression****Table 4: Unbalanced Random Panel Regression**

Coefficien	Estimate	Standard Error	t-value	Pr(> t)
Intercept	1.32E+00	7.62E-02	17.2841	1.2341E-2
PG	-2.04E-07	5.80E-07	-0.3521	9.9021E-1
LR	2.93E-01	2.01E-02	14.5771	9.3084E-3
CI	-2.84E-05	1.82E-06	-15.6088	3.7128E-3
IP	4.12E-06	3.30E-07	12.4848	3.4981E-4
SZ	2.90E-07	1.78E-08	16.2949	3.6120E-5
CR	-9.91E-01	8.27E-02	-11.9831	2.2401E-3
OM	9.48E-01	5.99E-02	15.8280	3.2347E-2
INF	-4.56E-03	4.13E-04	-11.0412	2.0012E-3
RF	4.22E-04	5.89E-04	0.7170	2.0241E-1

Table 5: ANOVA results (Random effect)

	Sum of squares	Df	F-statistics	Pr(> t)
Regression	29.19	9	21.642	0.0023
Residual	11.24	75		
Total	40.43	84		

Table 6: Regression statistics (Random effect)

R²	Adjusted R² value
0.7220	0.5213