UNIVERSITY OF GHANA

RISK BASED SUPERVISION OF INSURANCE IN GHANA: PROSPECTS AND CHALLENGES

SOLOMON TWUMBARIMA
(10255645)

THIS THESIS IS SUBMITTED TO THE SCHOOL OF GRADUATE STUDIES, UNIVERSITY OF GHANA, IN PARTIAL FULFILMENT OF THE REQUIREMENT FOR THE AWARD OF THE MASTER OF PHILOSOPHY DEGREE IN RISK MANAGEMENT AND INSURANCE

JUNE, 2015

DECLARATION

I do hereby declare that this work is the result of my own research and has not been presented by anyone for any academic award in this or any other University. All references used in the work have been duly acknowledged.

I bear sole responsibility for any shortcomings.

…… ……

SOLOMON TWUMBARIMA DATE

(10255645)

CERTIFICATION

I hereby certify that this dissertation is supervised in accordance with the procedures laid down by the University.

……..… ……

DR. ALBERT GEMEGAH DATE

(Principal Supervisor)

……..…… …….

DR. CHARLES ANDOH DATE

(Co-Supervisor)

ABSTRACT

The purpose of the study is to investigate susceptible risk activities of insurers from the new risk-based supervision framework and determining whether a significant difference exists between the inherent risk exposures of insurers and their risk management control functions. The development of better and effective strategies for prioritizing resources as a way improving the financial health of insurance companies coupled with risk management controls to avoid insurers' insolvency has been the main aim of the new risk-based supervisory framework. In order to identify threats and devise measures to tackle and avoid insolvency of insurance firms, it is critical to investigate the activities of insurance firms and determine the significant characteristics of those activities that contribute to financial unhealthiness.

A survey study involving 200 respondents were randomly selected from insurers in the Ghanaian insurance industry for this study. Various descriptive statistics, test of mean difference and the probit regression model were used in this study to help achieve study results. The results of the study showed that significant factors of an insurer's insolvency are contributed by both inherent risk activities and risk management control functions, albeit dominated by the inherent factors. The effect of significant inherent risk activities of insurer's is twice as high as the risk management control activities of insurance companies. Insurers risk profile comprises the intrinsic business risk activities of insurers, their operational management and their risk control and supervision functions.

The significant risk activities identified are toward insolvency of insurance companies, therefore the study recommends that insurers prioritize risk activities and provide risk mitigating tactics; regulatory authority must reorganize supervisory controls and provide technical assistance to help insurers keep abreast of their ever-changing risk profiles.

DEDICATION

This work is dedicated to God Almighty for His persistent care and protection and to my wife who believed that to be successful one must be educated.

ACKNOWLEDGEMENT

I express my profound and deepest gratitude to the Almighty God. Had it not been for His grace I couldn't have come this far.

To Dr. Albert Gemegah and Dr. Charles Andoh, I say a big thank you and God richly bless you for your time, guidance and support. Also to Caleb Boadi and Francis Kuditcher, I couldn't have done without you as well. I say a big thank you and may the Almighty God bless you abundantly.

TABLE OF CONTENTS

LIST OF FIGURES AND TABLES

LIST OF ABBREVIATIONS

ASM	Available Solvency Margin
df	Degrees of freedom
EPD	Expected Policyholder Deficit
EU	European Union
FATF	Financial Action Task Force
FAST	Financial Analysis Solvency Tools
FSB	Financial Services Board
IAIS	International Association of Insurance Supervisors
IRIS	Insurance Regulatory Information System
MCR	Minimum Capital Requirements
NAIC	National Association of Insurance Commissioners
NIC	National Insurance Company
ORSA	Own Risk and Solvency Assessment
RBC	Risk Based Capital
RBS	Risk Based Supervision
RMCF	Risk Management Control Functions
RSM	Required Solvency Margin
SCR	Solvency Capital Requirements
SVS	Superintendencia de Valores Seguros
TIFS	Training Initiative for Financial Supervision
UK	United Kingdom
XBRL	eXtensible Business Reporting Language

CHAPTER ONE

INTRODUCTION

1.1 Background of Study

A major aim of the insurance industry is for insurance businesses to operate on a financially sound basis that will contribute to the efficient allocation of resources, effective management of risk, promotion of economic growth and mobilization of long-term savings (IAIS, 2003). For the insurance industry to benefit and better protect policyholders there is the need for sound macroeconomic policies that are essential for the effective performance of insurance supervisory regime. As a measure of protecting policyholders and providing secure treatment of transactions, the regulatory body for insurance business in Ghana, the National Insurance Commission (NIC) in the year 2008 pushed for a solvency regime aimed at denying insurance companies with weak financial standing the opportunity to undertake bigger business transactions (NIC, 2008). Notwithstanding the determination of the regulatory authority to promote the usefulness of the solvency regime and the effectiveness of performance of insurance companies, the solvency regime was criticized as not being suitable for the stable macroeconomic environment with low interest rates (NIC, 2008). There was the need for a critical assessment of the regime because most industry practitioners did not fully understand the guidelines needed to ensure solvency, most especially the weighting factors and procedures (NIC, 2008).

In an attempt to address the inefficiencies and gaps of the 2008 solvency framework, the NIC introduced a new solvency framework in January 2012 which had separate solvency requirements for life and non-life companies and took into account major risks faced by the

market (NIC, 2012). The2012 framework clearly indicated the allowable capital resources and minimum solvency capital requirement insurance companies must have to be approved as financially healthy in order to operate in the insurance market. The NIC adopted and modified the EU-based Solvency II framework which seeks to specifically reduce the risk of an insurer failing to honour its liabilities as they fall due; reduce the risk of policyholders incurring losses in the event of a firm being unable to honour claims; provide better information and oversight to the regulatory bodies and increase confidence in the insurance sector (Moody's Analytics, 2011). In the light of this, it is critical to investigate the significant activities of insurance firms in Ghana and determine whether their financial characteristics and their risk management control activities are appropriate to make them financially healthy.

In its continuous quest to provide a more effective monitoring regime of the financial soundness of the insurance companies in Ghana, the NIC has recently indicated that it shall be revising its current solvency regime by introducing an early warning system that will help insurance firms detect and prevent insolvency. The new regime employs some qualitative means of assessing the financial soundness of insurance companies. However, stakeholders have strongly raised objections to the proposed regime as being too subjective and would rather want a more objective measure using quantitative methods in the assessment of insurance companies (NIC, 2014). It has also been criticized as adding unnecessary costs to the already stretched finances of insurance companies who are supposed to employ further risk management control functionaries. This study provides an assessment on the qualitative activities of the new risk-based framework which is more subjective, prospects these activities from the view point of the insurance industry

of Ghana and quantify the likelihood of these significant activities causing insolvency of insurers.

Presenting the situational analysis of the regulatory framework above, there is the need to present an in-depth quantitative method that will consider management of the major technical activities and financial risks to which insurance companies are exposed. The study based on the new risk-based regulatory and supervisory framework, assesses the risk exposures of insurers, quantify these risk activities and recommend to insurers' strategies for improving for battling insolvency issues to best provide protection to policyholders. This study will provide insurers a focus on managing all the risks they face and enable them to operate much more efficiently.

1.2 Problem Statement

When a company has assets at least equal to its liabilities, then the company easily pays their liabilities from their assets. However, when the liability increases unexpectedly over its assets, then the company will be declared insolvent (Charumathi, 2012). One of the principal objectives of insurance business regulation is the need to protect the interest of and secure fair treatment of policyholders. To achieve this objective, regulatory authorities use alternative measures such as Solvency Capital Requirements (SCR) and Minimum Capital Requirements (MCR) to predict early warning of insurer insolvency (Pitselis, 2009).

Prediction of insurance company's insolvency has emerged as an important problem in the field of financial research (Díaz-Martínez, Fernández-Menéndez, Segovia-Vargas & Pozo-García, 2004). Globally, insolvencies of insurance companies are matters of great concern. For instance, in the USA, Palande, Shah and Lunawat (2003) found that over a period 25 years there were 300 insolvencies of insurance companies in the insurance market. This is not far from the report of the Insolvency Service of the UK that compulsory liquidations and creditors' voluntary liquidations were some methods used to prevent several corporate insolvencies, particularly in England and Wales (The Insolvency Service, 2014). As part of predicting insolvency of the insurance market in the US, researchers identified three major techniques that were used by the National Association of Insurance Commissioners (NAIC) to predict insurer insolvencies (Best, 2007). NAIC introduced the Insurance Regulatory Information System (IRIS) ratios, a system that established and operated to monitor the financial condition of insurers for the purposes of detecting financial distress and preventing insolvency. Risk-based capital (RBC) adequacy was developed by the NAIC and it is the minimum theoretical amount of capital that an insurance company needs to support its overall business operations. RBC is used to set capital requirements considering the size and the degree of risk taken by the insurer. Although RBC standards and FAST scores, provided by regulators (NAIC) had significant explanatory power in identifying weak insurers, Pottier and Sommer (2002) study showed that these methods are not any better than AM Best's Capital Adequacy Ratio. There is a clear indication that several risk-based systems designed to determine insurance weaknesses have suffered critiques and therefore requires new or constant review of such systems.

Studies have generally been devoted to identifying the main causes of insurers' insolvency, prediction of insolvencies of companies and review of solvency margins (Charumathi, 2012; Gour & Gupta, 2012; Díaz-Martínez et al., 2004; Sharma, 2002). For example, Sharma (2002) studies found that operational risks (operational failure related to inexperienced or incompetent management, fraud); underwriting risks (inadequate reinsurance program and failure to recover from reinsurers, higher losses due to rapid growth, excessive operating costs, poor underwriting process); insufficient provisions and imprudent investments are the main cause of insurers insolvency. Also, Gour and Gupta (2012) conducted a study by reviewing solvency margin in India. The authors revealed, that solvency of a life insurer is heavily dependent on the returns received from total investible funds and the interest rate. In regard of several researches that seek to assess the solvency II common universal regulatory system, their various suggestions of future research were toward the need of assessment of a new framework (Eling, Schmeiser & Schmit, 2007; Pitselis, 2009). Studies have not focused on how Risk-based Supervisory Framework is used to assess risk of firms, which prompt for more research studies in this area. This study looks at a situation from the African insurance industry and in particular assessing the solvency of the insurance companies in Ghana.

The implications of Solvency II are slightly more complex (Zweifel, 2014). In order to prevent the insurance companies in Ghana from insolvencies, there is a need to assess whether the supervisory framework reflects the increasing presence in the market of financial conglomerates and groups; and as well as financial convergence in the Ghanaian insurance market (IAIS, 2003). Supervisors around the world are looking at replacing current solvency regimes by moving away from the compliance regime to a risk-based regime. There is a need for a critical assessment of

the new RBS regime because most industry practitioners do not fully understand the guidelines needed to ensure solvency (NIC, 2008). According to a presentation of the World Bank (2010), there is a need for insurance regulatory bodies to identify the critical risk exposures of insurance companies and their vulnerability to potential adverse experience through focused review of the company's management risk exposures. In the context of Sub-Saharan Africa, particularly in Ghana, the study considers several macroeconomic factors and therefore assesses the solvency of the insurance companies. Towards the end of the study, details on the assessment of the new risk based supervisory framework and identifying the significant activities that will contribute to the insolvency of insurers and the various strategies enforced to assess and limit the scope of insurer risk exposure are studied.

1.3 Research Purpose

The study seeks to investigate the characteristics of inherent risk activities and risk management control functions of the Ghanaian insurance industry that significantly contributes to financial health. The study quantifies the likelihood of the risk management control functions and the inherent risk activities of insurers causing insolvency to insurers.

1.4 Objective of the Study

The main objective of this project is to assess the appropriateness of the RBS regime set up by the regulatory body. In particular, this study seeks to;

a) Investigate the various risk factors that are highly susceptible to insolvency of the insurance firms.

b) Determine the likelihood of the risk characteristics causing insurer's insolvency.

c) Determine whether significant difference exists between the inherent risk exposures of the insurer's and their risk management control functions as proposed by RBS regime.

1.5 Research Questions

a) Which of the various risk factors faced by insurers are highly susceptible to insolvency of the insurance firms?

b) What is the likelihood of the risk-based supervision characteristics causing insurer's insolvency in Ghana?

c) Is there a real difference between the inherent risk exposures of insurer's and their risk management control functions proposed by the RBS regime?

1.6 Significance of the Study

The information from this study provides insurance regulatory bodies, the insurance companies in Ghana, other policymakers and program administrators the significant risk activities of insurers, determine whether a difference exist between the risk management control functions of insurers and their significant inherent activities and subsequently provide the likelihood of significant activities causing insolvency of insurers. This will help both the regulator and insurers to devise strategies for the implementation of the RBS regime and also help insurers develop effective strategies to improve financial health and avoid insolvency.

1.7Scope and Limitation of the study

This study is limited only to assessing the characteristics of the new risk-based supervision framework of insurers in the Ghanaian insurance industry. It is also limited to the perception of the managerial staff in the insurance companies in Ghana who were available during the study period to contribute.

1.8 Chapter Outline

This study is organized in five chapters

Chapter one gives an overview of the background to the study, the problem statement, the purpose of the study, the objectives and research questions, and the significance of the study.

Chapter two examines relevant literature and establishes links between previous work and this study. Literature on solvency, risk based supervision, a standard model for Solvency II, insolvencies and other relevant research area will be reviewed.

Chapter three draws attention to the methods used in collecting relevant data for testing the research hypothesis and research questions. This chapter further outlines the research design and methodology used. This chapter covers the study setting, population and sampling, data collection, data processing and analysis, ethical considerations, validity and reliability of the research and the limitations encountered during the data collection. Key methods of analysis, including the target population, data collection method, analytical techniques and the study instruments are provided.

Chapter four presents the results of the research and discusses the findings based on the data analysed, including all data presentation, analysis and discussion of findings. The objective of this chapter is to report the problem investigated, results founded and the conclusions reached.

Chapter five presents the summary, conclusions and recommendations of the study. This chapter highlights the core of the study, answers researched questions, provides recommendations and draws attention for further studies.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

Risk based supervision approach to monitoring insolvency issues is purposely made to help mitigate the uncertainties in the solvency I and the solvency II approach. This chapter of the study examines the relevant literature and establishes a link between previous work and this study. Toward the end of this study, the literature on the insolvencies, standard models of insolvency, risk based supervision, empirical reviews and other relevant research areas are reviewed.

2.2 Solvency Supervision Definitions

Solvency supervisions are intended for giving guidance to insurance companies for the promotion of their effective performance in order that they build capacity to pay every single obligation as and when it falls due. As a measure of determining the organization's characteristics that are befitting to avoid insolvencies, insurance firms are obliged to follow certain approaches and mandates that serve as criteria for monitoring the financial conditions of insurance firms for the purposes of detecting financial distress and providing timely decisions to prevent their unhealthiness. In order to achieve the above, the solvency I, solvency II and the new risk based supervision methods are developed to help mitigate the risk of insolvency. Below are various definitions unraveling methods used to measure the probability of insolvency of the insurance sector.

Solvency I

The solvency I framework also known as the solvency margin indicates "the amount of regulatory capital an insurance company is obliged to hold against unforeseen events" (Quaglia, 2014). This mechanism was put in place to establish more realistic minimum capital requirements, but it did not reflect the true risk faced by insurance companies and paved way for the solvency II supervisory regulatory model (Chandra, Shekhar, Kumar & Warrier, 2008).

Solvency II

The solvency II model based on economic principles for the measurement of assets and liabilities was developed in such a way that it was able to solve the issues that were not captured in the solvency I model. The Solvency II sets out to establish its new set of capital requirements, valuation techniques, and governance and reporting standards to replace the existing and outdated Solvency I requirements (KPMG, 2011). It was able to provide market consistency in the balance sheets, provides risk-based capital assessment of the insurance companies, determine the own risk and solvency assessment (ORSA) of the firm's activities, include senior management accountability and also provided a supervisory assessment of insurance companies' activities. Considering all the activities and gaps that were filled by the solvency II, Zweifel (2014) indicated that Solvency II was slightly more complex and as such required a robust model that provides several risk-based systems designed to determine insurance weaknesses that have suffered critiques in the Solvency II model.

Risk Based Supervision

Risk-Based Supervision from the presentation of World Bank defines RBS as "a structured process aimed at identifying the most critical risks that face each company and through a focused

review by the supervisor to assess the company's management of those risks and the company's financial vulnerability to potential adverse experience" (World Bank, 2010). Training Initiative for Financial Supervision TIFS (2012) indicated that this new risk-based solvency assessment framework promotes risk based supervision by identifying riskier undertakings and riskier parts of undertakings for supervisory scrutiny. This study will therefore test the risk-based supervisory framework for the insurance companies in Ghana so as to determine the riskier undertakings of firms in order to provide time leading decisions to insurance companies and also to provide the supervisory committee necessary areas for scrutiny.

2.3 Solvency Regulatory Directives

2.3.1 Solvency I review

Solvency Ratio is the ratio of Available Solvency Margin (ASM) to the Required Solvency Margin (RSM), which indicates the financial health of an insurance firm (Charumathi, 2012). The solvency margin (solvency I) stipulates that the value of an insurance company's assets should exceed the value of its liability (Gour & Gupta, 2012). Whereas the ASM of the insurance company measures the excess value of assets over the value of life insurance liabilities and other liabilities of a policyholder's and shareholder's funds. Eling *et al.* (2007) showed that in the EU directives 2002/13/EC for nonlife insurers, it is made clear that the solvency I addressed many of the coordination issues across regulatory bodies and provided an initial rule based set of minimum capital requirements.

Although Solvency I provided relatively modest modifications to the capital standards originally introduced in the 1970s, Zweifel (2014) showed that this model is focused on the relationship between solvency and capital. This model was therefore not robust enough to allow insurers to react to changes in market conditions affecting the risk characteristics of assets. Solvency I was anticipated to actuate guarantors to take a riskier position than they would on their own, thus having an impact of running counter to stated regulatory objectives. Because of the non-robustness of the Solvency I, a more advanced method that does not only provide new methods for calculating capital requirements, but also presents new internal control systems and management styles, expanded lists of the types of risk that should be covered, and appropriate means of communication between companies, supervisory authorities, and financial markets was identified (Bonson, Cortijo, Escobar & Flores, 2010).

Properties and Regulatory Requirements of the Solvency I

The Solvency I regulatory framework introduced in the 1970s required insurers to calculate their solvency margins in order for them to assess the capital requirement to avoid insolvency. According KPMG (2011), regulatory requirements for the Solvency I required insurers to ensure that their surplus capital and their technical provisions were adequate to avoid insolvency where the surplus capital refer to that part of the available solvency margin that is held by an insurer in excess of the Solvency Capital Requirement whereas technical provision' is a part of the provision separated for presentation purposes, referring to parts subject to uncertainty(Buckham, Wahl & Rose, 2010).

2.3.2 Solvency II Review

The solvency II, a UK based legislative programme that introduces a more harmonized EU-wide insurance regulatory regime, provides not just capital assessment of the financial health of the insurance companies, as was done by the former directive. The solvency II provides a uniform and enhanced level of policyholder protection that is more robust and includes non-zero failure regime (KPMG, 2011). Eling *et al.* (2007) indicated that solvency II seeks to provide guidance to insurance companies not only of their capital adequacy and solvency, but the availability of a broad range of tools to cover full causal chain, and also provide an assessment management quality and adequacy of internal systems.

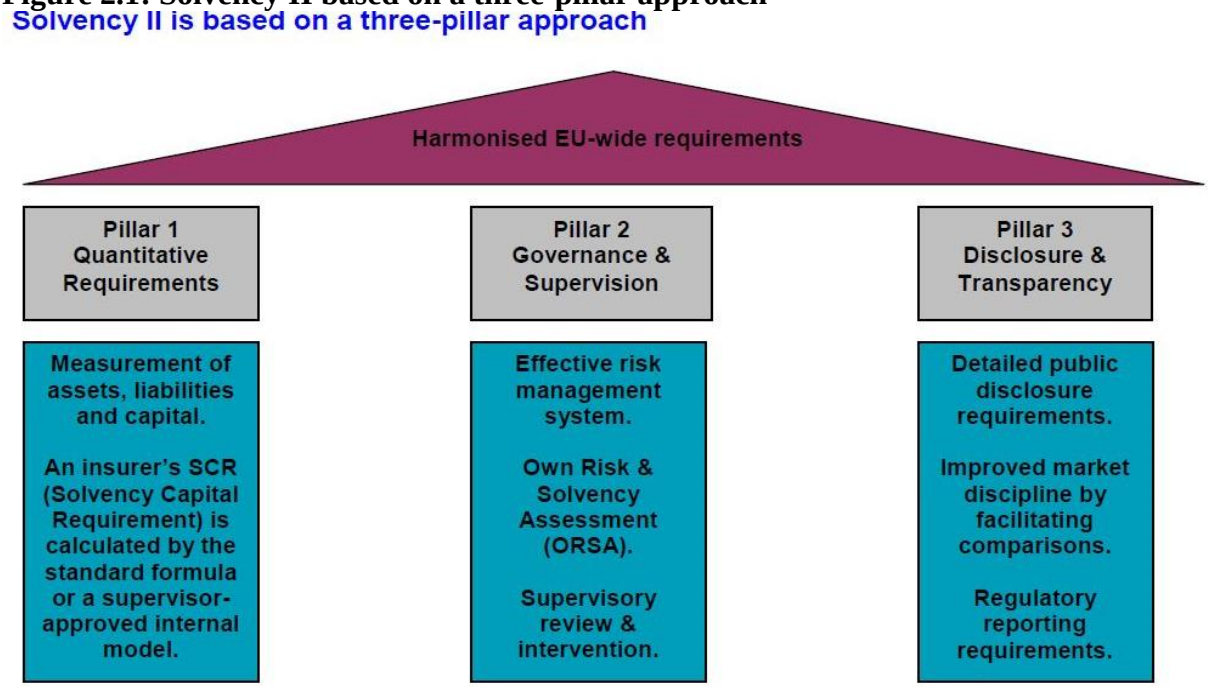
To analyze the way in which the insurance industry is facing the review of its regulatory framework with respect to the levels of solvency margins that insurance entities should maintain, Bonson *et al.* (2010) showed that technological systems, such as the eXtensible Business Reporting Language (XBRL), are necessary to support the consolidation of financial information and also to ensure the digital transparency of the insurance organizations that are engaged in this new regulatory challenge. It is asserted that the new regulatory directives developed to ensure insurance firms perform efficiently have received critiques. Zweifel (2014) indicated that at least for insurers who complain initially about the solvency norm, Solvency II may still cause insurers to pursue a riskier underwriting and investment policy than absent regulation, but less risky than under Solvency I. The Solvency II implies a change of philosophy that is significantly affecting the methods of risk measurement, the role played by the supervisory authorities, and the priority of corporate transparency in the strategies of insurance entities. However, for better achieving the mission of solvency II and reaching international experience in insurance supervision, it is

necessary to provide modernization to the processes of supervision measures of the Solvency II by considering the concepts of the risk-based supervision model (SVS, 2006).

Properties and Regulatory Requirements of the Solvency II

The comprehensive and risk-sensitive framework of the Solvency II has vast improvement on the previous which is supposed to use economic evaluation principles in providing solvency assessment to the insurance industry (Sharara, Hardy & Saunder, 2010). The Solvency II model is a more comprehensive and risk-sensitive framework providing a total balance sheet economic capital assessment tool to allow insurers to determine their own statutory capital needs using internal models that have been vetted by the supervisor. It is focused on an enterprise (or holistic) risk management approach toward capital standards (Eling *et al.*, 2007). Therefore, the regulatory requirements of Solvency II have developed on the solvency I which offers relatively modest modifications to capital standards of insurance firms. Specifically, the Solvency II is based on a three-pillar approach to solvency in the areas of Pillar 1 (Quantitative Requirements), Pillar 2 (Governance & Supervisions) and Pillar 3 (Disclosure & Transparency). The figure below summarizes the solvency II three-pillar approach. Lloyd's (2010) indicated that Pillar 1 requires insurers to demonstrate that they have adequate financial resources, Pillar 2 deals with an insurer's governance, internal controls and risk management processes whiles the Pillar 3 includes requirements for public disclosure and reporting to national supervisors.

Figure 2.1: Solvency II based on a three-pillar approach



Source: Lloyd's (2010)

2.4 Risk-Based Supervision

The development of the insurance market has entailed greater complexity and sophistication in the business of insurers. Integrating risk, capital and performance management can help an insurance organization find an appropriate balancing point while allowing them to meet stakeholder demands (KPMG, 2013). Due to the development of new types of insurance, new forms of commercialization, increased competition, and the dynamic nature of risks, companies have had to generate new mechanisms and tools of risk management, so in practice it is very difficult to keep the rules updated and compliant with the risks faced by the insurers(SVS, 2006). This means that a supervision system based on the compliance of rules is not as effective when monitoring and mitigating the risks that could affect the company's solvency. In other to mitigate the issues raised, the risk-based supervision that involves assessing whether an insurer's

governance, risk management and internal controls are adequate, and whether the solvency and liquidity of the insurer are adequate to withstand unexpected shocks is now adored by most regulators (FSB, 2010).This study will look at identifying the inherent risk factor(s) and risk management control functions that are susceptible to insolvency of insurance firms in Ghana. Due to the study focus, the factors found in risk-based supervisory framework are assessed.

Properties of the Risk Based Supervision

Risk based supervision as defined above help insurance companies to find an appropriate balancing point, keep to rules updated and complying with the risk faced and also determine whether the solvency of an insurer is adequate to avoid unexpected loss (KPMG, 2013; FSB, 2010; SVS, 2006). In order to comply with the new risk-based solvency regulatory framework factors and/or properties of the framework it is necessary to take a closer look at how the significant activities such as the inherent risk and the management control functions of an insurance company impact the insurer's business.

2.4.1 Inherent Risk Categories

"Inherent risk refers to the probability of loss arising out of circumstances in an environment. The environment is defined as circumstances, influences, competitive stresses, cultural, demographic, economic, natural, political, regulatory, and technological factors that affect the survival of operations and growth of an insurance company. The descriptions of inherent risks should be read within the context of the following definitions of inherent risk factors.

Credit risk

Credit risk arises from counterparty's inability or unwillingness to fully meet its on- and/or off-balance sheet contractual obligations. Exposure to this risk results from financial transactions with a counterparty including issuer, debtor, borrower, broker, policyholder, reinsurer or guarantor.

Market risk

Market risk arises from changes in market rates or prices. Exposure to this risk can result from market-making, dealing, and position-taking activities in markets such as interest rate, foreign exchange, equity, commodity and real estate. Interest rate risk and foreign exchange risk are described further below:

Interest Rate Risk

Interest rate risk arises from movements in interest rates. Exposure to this risk primarily results from timing differences in the reprising of assets and liabilities, both on- and off-balance sheet, as they either mature (fixed-rate instruments) or are contractually reprised (floating-rate instruments).

Foreign Exchange Risk

Foreign exchange risk arises from movements in foreign exchange rates. Exposure to this risk mainly occurs during a period in which the insurer has an open position, on- and off balance sheet, and/or in spot and forward markets.

Insurance Risk

Product Design and Pricing Risk

Product design and pricing risk arises from the exposure to financial loss from transacting insurance business where the costs and liabilities assumed in respect of a product line, exceeds the expectation in pricing the product.

Underwriting and Liability Risk

Underwriting and liability risk is the exposure to financial loss resulting from the selection and approval of risks to be insured, the reduction, retention and transfer of risk, the reserving and adjudication of claims, and the management of contractual and non-contractual product options.

Operational Risk

Operational risk arises from problems in the performance of business functions or processes. Exposure to this risk can result from deficiencies or breakdowns in internal controls or processes, technology failures, human errors or dishonesty and natural catastrophes.

Liquidity Risk

Liquidity risk arises from an insurer's inability to purchase or otherwise obtain the necessary funds, either by increasing liabilities or converting assets, to meet its on- and off-balance sheet obligations as they come due, without incurring unacceptable losses.

Legal and Regulatory Risk

Legal and regulatory risk arises from an insurance company's or related party's non-compliance, or potential non-compliance, with legislation, and includes reputational risk.

Strategic Risk

Strategic risk arises from an insurer's inability to implement appropriate business plans, strategies, decision-making, resource allocation and its inability to adapt to changes in its business environment.

2.4.2 Risk Management Control Functions (RMCF)

Operational Management

Operational management is the planning, directing and controlling of the day-to-day operations of an insurer's business activities.

Financial Analysis

Financial analysis is the function that performs in-depth analyses of the operational results of an insurer and reports them to management. Effective reporting is a key to this function, as the operational results affect strategic and business decisions made by management and the board. This function is generally only found as a separate unit in larger insurers.

Compliance

Compliance is an independent function within an insurer that:

- Sets the policies and procedures for adherence to regulatory requirements;
- Monitors the insurance company's compliance with these policies and procedures; and
- Reports on compliance matters to the managing executives and the Board.

Internal Audit

An internal audit is an independent function within an insurer that assesses adherence to and effectiveness of operational and organizational controls. In addition, internal audit may also

assess adherence to and effectiveness of compliance and risk management policies and procedures.

Risk Management

Risk management is an independent function responsible for planning, directing and controlling the impact on the insurer of risks arising from its operations. The function is generally only found as a separate unit in the larger insurers, and may address the following:

- Identification of risks;
- Development of measurement systems for risks;
- Establishment of policies and procedures to manage risks;
- Development of risk tolerance limits;
- Monitoring of positions against approved risk tolerance limits; and
- Reporting of results of risk monitoring to managing executives and the board.

Managing Executives

The managing executives are that senior management within the insurer that is responsible for planning, directing and controlling the strategic direction and general operations of the insurer. Their key responsibilities include to:

- Ensure organizational and procedural controls are effective;
- Ensure compliance with approved policies and procedures;
- Develop strategies and plans to achieve approved strategic and business objectives; and
- Develop sound business practices, culture and ethics.

Board of Directors

The Board of Directors is responsible for providing stewardship and management oversight for the insurer. Its key responsibilities include to:

- Ensure management is qualified and competent;
- Review and approve organizational and procedural controls;
- Ensure principal risks are identified and appropriately managed;
- Review and approve policies and procedures for the insurer's major activities;
- Review and approve strategic and business plans; and
- Provide for an independent assessment of management controls." (FSB, 2010)

2.5 Empirical Studies

Solvency is defined as having enough value in the form of assets of your business to cover all of the liabilities of the business. An overview of solvency supervision, including the effects on the solvency position of insurance companies, the role of government for protecting the public in case of insolvency, examining the coherence of solvency and predicting insolvencies of insurance companies globally is on the rise (Filipovic & Vogelpoth, 2008; Pitselis, 2008; Gour & Gupta, 2012; Joo, 2013). Due to the critique of the solvency I which has paved way to the Solvency II, several researchers are focused on assessing how appropriate the new framework will do to provide an effective supervisory framework (Eling, Schmeiser & Schmit, 2007; Pitselis,2009; Bonson *et al*., 2010; Peleckienė & Peleckis, 2014; Zweifel, 2014). The solvency of a business at any point in time is shown on their net worth statement; solvency is determined by identifying the relationship between the assets, liabilities and equity of a business at a given point in time. Most studies focused on solvencies use companies' balance sheets and other financial characteristics to determine the effects of the solvency position of the insurance

companies (Pitselis, 2008; Pitselis, 2009; Gatzert & Martin, 2012).By so doing the adequacy of the funds required by a company in order to remain healthy and avoid insolvency is determined.

Filipovic and Vogelpoth (2008) on examining the whether the Swiss Solvency Test (SST) risk measure is a coherent measure of risk, showed that SST lacks monotonicity in general and therefore proposed a greater coherent risk measure to solvency test which is majorized by SST. A similar study by Wagner (2014) tried to provide an appropriate choice of risk measures in the solvency assessment of insurance companies. The research showed using the distribution-free approach of the normal power approximation to indicate that an appropriate choice of risk measure for solvency assessment is by the simultaneous monitoring of the ruin probability and EPD leading to a satisfactory result guaranteeing the constant level of customer protection (Wagner, 2014). These studies indicate that model misspecification will have a great impact on determining the solvency status of an insurance company. It is, however, asserted that solvency risk assessment tools should pass through thorough scrutiny before it is implemented as a supervisory framework for insurance companies. Schmeiser, Siegel and Wagner (2012) indicated that the risk of model misspecification and its impact on solvency measurement in the insurance sector is of major concern. Their study simulating results suggested that the sensitivity of solvency capital as a risk measure, but not as it is in regulatory practice underestimates the actual misspecification risk that policyholders are exposed to. This study throws more light on the characteristics that are captured in the new risk based supervisory framework that makes solvency risk measures robust but not included in the previous solvency supervision frameworks. It is therefore necessary to determine whether the risk-based solvency framework is able to capture all requirements necessary to determine the insurer's insolvency.

Analysing the way in which the insurance industry is facing the review of its regulatory framework with respect to the levels of solvency that insurance entities should maintain is a major concern in recent studies (Bonson et al., 2010; Gour & Gupta, 2012; Zweifel, 2014). On reviewing the solvency margin of insurance industry in India, Gour & Gupta (2012) used the ratio of the amount of ASM to the amount or RSM to indicate that the solvency of a life insurer is heavily dependent on the returns received from total investible funds and the interest rate. In search of the right supervisory framework for solvency, Gatzert and Martin (2012) using the current standard model of Solvency II and an internal approach showed that the solvency capital requirements strongly depends on the quality and composition of an insurer's asset portfolio and that model risk in regard to model choice and calibration plays an important role in the quantification.

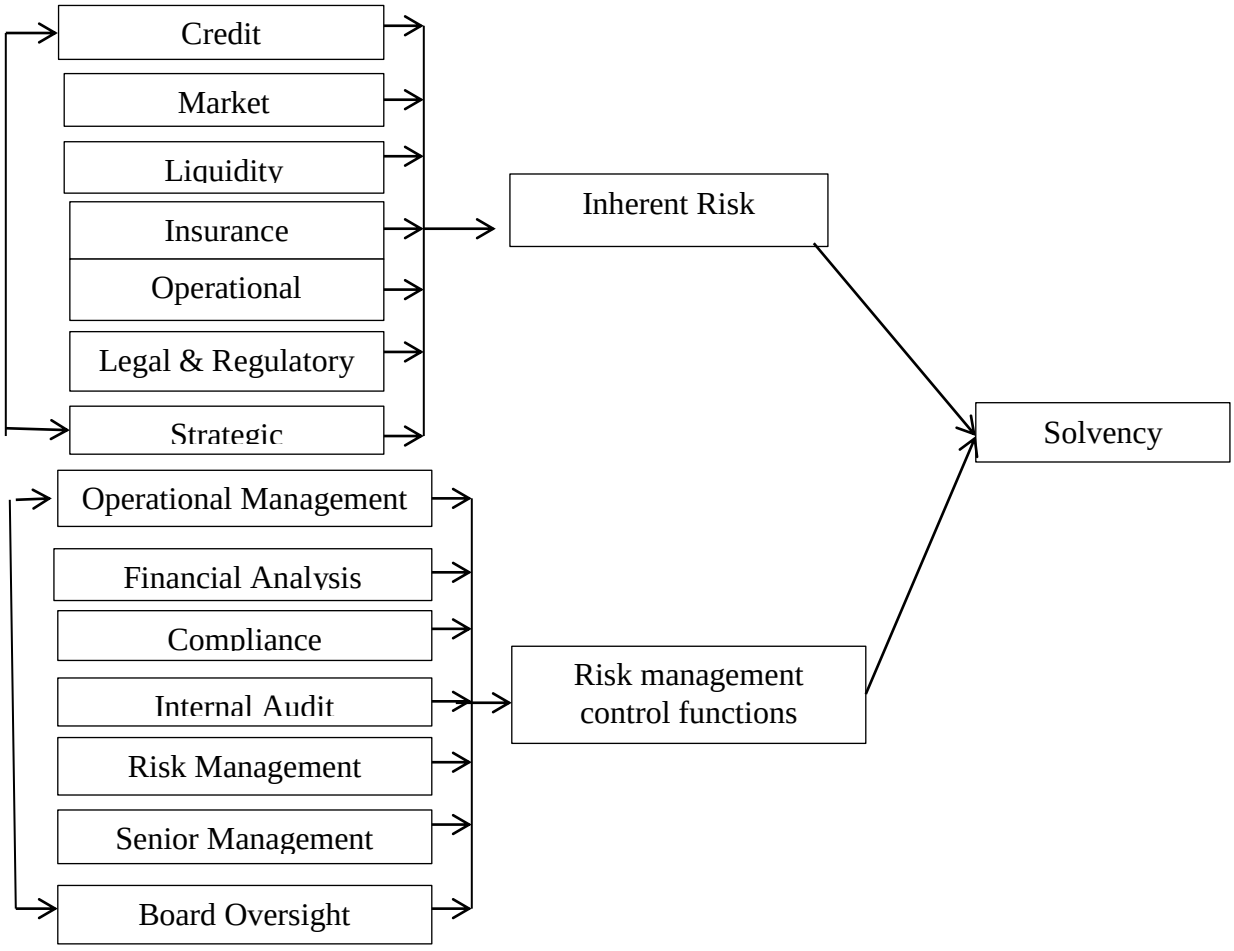
Protecting policyholders' interests in a good solvency control regime within the insurance industry is very important to handling conflicts of interest and providing equal information to customers. A risk-based supervision with greater focus on solvency requires changing regulations as well as methods of supervision. Adopting a risk-based approach implies the adoption of a risk management process for dealing with insolvency (FATF, 2009). This process encompasses recognizing the existence of the risk(s), undertaking an assessment of the risk(s) and developing strategies to manage and mitigate the identified risks. FSB (2010) showed that the core objective of ensuring the financial soundness of insurers is by assessing whether an insurer's governance, risk management and internal controls are adequate, and whether the solvency and liquidity of the insurer are adequate to withstand unexpected shocks. Considering the several solvency framework discussed, we can infer that the risk based supervisory

framework is risk focused; places reliance on oversight of risk management control functions, including the work of internal audit; and also relies on the work done by third parties like the external auditors and statutory actuaries.

2.6 Conceptual Framework

Miles and Huberman (1994) defined a conceptual framework as a visual or written product, one that "explains, either graphically or in narrative form, the main things to be studied; the key factors, concepts or variables and the presumed relationships among them". The conceptual framework of this study is constructed by the researcher based on the underlined properties of the risk-based supervisory framework discussed in the section 2.3 above. Since the risks associated with the compliance-based approaches are that they may lead to excessive focus on observed non-compliance and to insufficient understanding of key business drivers and flaws in risk management practices of insurers. Further, a compliance-based approach tends to be retrospective and may fail to identify the major risks that insurers may face in the future. The risk based takes a closer look at all activities of the insurance companies facilitating a proactive supervision in line with global trends (FSB, 2010).

Figure 2.2: Conceptual framework (RBS Framework)



Source: Author's construct

In as much the supervisory framework is there to determine whether an insurance company is fit to stand unexpected loss based on the inherent risk faced and the risk management control functions, from the conceptual view, it is asserted that the dependent variable is the solvency status (Solvent/Insolvent) whiles the independent variables are the risk management control functions (RMCF) and the inherent risk factors.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter presents the process and methods used in collecting, collating and analysing data from this study. This chapter presents views of respondents on the new risk-based supervisory framework of the insurance industry and how it relates to determining the insolvencies of the insurance industry. Based on the nature of the objective of the study, a cross-section survey of the insurance companies in Ghana is done to help achieve study objectives. Section 3.2 describes, the research design and approach, section 3.3 indicates the various sources of data that were used and the type of data from these sources, sample size and data analysis. It also presents the regression model used in testing for the objectives set out by this study. A provision of the various test of the core assumptions of regression analysis that were undertaken to ensure the output of the analysis is consistent with standard regression analysis were also previewed in this section. Section 3.4 presents the methods that were used to organize and analyse the data. Finally, section 3.5 provides the ethical consideration of the data collection method.

3.2 Research Approach and Design

Research design is the strategy for conducting a research project. According to Bryman and Bell (2003), a research design provides a framework for the collection and analysis of data. There are two major approaches to research methodologies, namely; qualitative and quantitative research methodologies. Qualitative research is an array of interpretative techniques which seek to describe, decode, translate and otherwise come to terms with the meaning, not the frequency, of

certain more or less naturally occurring phenomena in the social world. Qualitative research is concerned with collecting and analysing information in as many forms, chiefly non-numeric, as possible.

Quantitative research is concerned with the collection and analysis of data in numeric form. Shown by Blaxter, Hughes and Tight (1996), quantitative research "tends to emphasize relatively large-scale and representative sets of data, and is often, falsely in our view, presented or perceived as being about the gathering of `facts'". Quantitative research consists of those studies in which the data concerned can be analysed in terms of numbers.

The study was designed using the quantitative research approach; where data analysed was drawn from life and non-life insurers. With the quantitative approach, the research needs to explore and reach out more respondents for the study. Most often, quantitative research lays the initial groundwork for future research, frequently used in business research in the form of attitude surveys. This provides a broader focus and definite answers to specific research issues. Since the study objective is to provide key issues and key variables of the risk-based supervision framework, the study falls within the survey design of a quantitative approach.

The reasons for selecting the survey design were to generate quantitative descriptions of the key characteristic of the study population about the issue of the new risk-based supervision framework. The cross-sectional survey method was also employed to enable the researcher collect consistent information from the study population. The survey data is gathered once during

a period of days, weeks or months of which the study was done. Thus, this study used purely quantitative analyses to help achieve the study objectives.

3.3 Data Collection and Analysis

This study is a cross-section survey study of the insurance industries in Ghana. Data collection was restricted to employees and management staff specifically in the regulation of the twenty five non-life insurance companies and twenty one life insurance companies in Ghana (NIC, 2015). Questionnaires are distributed to the management staff and employees of the insurance industries to assess their situation about the objectives of this study in Ghana. The questionnaires were answered by managerial staff and other employees. The questionnaire is grouped in five main sections where the first section seeks for the demographic information of study respondents, second section looks at determining the awareness of respondents on the new risk-based supervision industry, the third section looks at the analytical framework of the new risk-based supervision characteristics, the section four determine respondents perception of risk faced by insurance companies to insolvency and the last section looks at the challenges that management perceive implementing risk-based supervision will bring to their company.

3.3.1 Target population

A population is the total collection of elements or participants about which the researcher makes some inferences (Cooper & Schindler, 2003). Bless and Higson-Smith (2000) also define a population as a complete set of events, people or things on which the focus of the research falls

for which the researcher has an interest and wants to determine some characteristics. According to Fraenkel and Walled (2000) population is the largest group to which one hopes to apply the result. In this study the population is the insurance companies in Ghana. A sample was selected from mainly management staff and other employees of insurance firms in Ghana.

3.3.2 Sample size

A sample in a research study refers to any group on which information is obtained (Fraenkel &Wallen, 2000). Fraenkel and Wallen (2000) explained that any sample that has less than 20 to 30 individuals within it is too small since it constitutes a small percentage of the population. Alreck and Settle (2007) have also indicated that a sample size of 10% of a population is enough to obtain adequate confidence. The Greater Accra region was the main focused area selected because all the head offices of the insurance firms in Ghana are located within this region and it will be easier to get managerial staff with in-depth knowledge on the new risk-based supervision on providing better insurance health. The respondents were randomly selected from two strata being managerial staff and other employees. A simple random sampling was used, “this was to ensure that each different possible sample of the desired size has an equal chance of being the one chosen” (Peck & Devore, 2008). The questionnaires were randomly discharged face to face to the managerial staff and other employees of the insurance companies. To ensure that the responses are representative of the population, a sample of 200 respondents was selected for the study from a population of about 800.

3.3.3 Data collection instruments and method

Instrumentation is the process of collecting data; it involves the selection or design and the administration of the instrument (Fraenkel & Wallen, 2000). The device this study adapted to collect the data was a questionnaire which is a document containing a number of questions to be investigated (Kumekpor, 2002). The choice is because questionnaires are usually cheaper, ability to collect data over a wide geographical area within a short period of time. In addition, questionnaires also offer the opportunity for respondents to remain anonymous and also do not take a lot of time from the respondents when they are responding to the questionnaire as compared to the other forms (Neuman, 2007).

Closed and open-ended questions used to solicit views from selected respondents. A five point likert scale starting from 1 (Strongly Disagree) to 5 (Strongly Agree) was used to determine the inherent risk factors and risk management control functions to insolvency of the insurance firms. However, on determining the risk faced by insurance companies to insolvency, a scale of a low of one (1) being low risk and a high of three (3) being at high risk were used. Other questions about the demographics of the respondents were asked as well as the insurance company of work, and their insurance practiced areas. The questionnaires were administered by the researcher to the respondents of the insurance industry who were given about 35 minutes to complete them. The process lasted for about 2 weeks and where explanations and clarifications were needed the researcher was quick to assist.

3.4 Methods of Data Analyses

On analysing the data received, descriptive statistics and graphical methods were used to summarize data including a measure of central tendency (mean, median, and mode), normality, and measures of variability (range and variance) were firstly done on all the items. Creswell (2012) stated that, data analysis requires that the researcher be comfortable with developing categories and making comparisons and contrasts. It also requires that the researcher be open to possibilities and see contrary or alternative explanations for the findings. Creswell (2012) posits that the process of data analysis is eclectic, there is no right way. The data were analysed using Stata, a complete, integrated statistical package that provides everything needed for data analysis. The package provides important analysis such as frequencies and percentages. Descriptive statistics and inferential statistics such as the probit regression and test of difference between means (t-test) analysis were used to achieve the study objectives.

Probit regressions will be performed with solvency status as the dependent variable (Solvent/Insolvent) and the inherent risk factors and management control functions as the independent variables. The model posits the dependent variable as binary discrete phenomenon which takes a form of a dichotomous variable. The mean of the dichotomous variable equals the proportion of cases with a value of 1, and can be interpreted as a probability. The probability of a firm being solvent or insolvent is influenced by the level of risk the firm encounters, and the various management control functions of the firm.

In view of the dichotomous nature of the dependent variable, this study will use the probit regression analysis to better determine the probability of an insurance firm being insolvent or not based on the risk-based supervision framework.

3.4.1 Probit regression with multiple regressors

The mean of the dichotomous variable equals the proportion of cases with a value of 1, and can be interpreted as a probability. Although it is possible to represent the two values with any numbers, employing variables with values of 1 and 0 has advantages. Many social phenomena are qualitative rather than quantitative in nature, thus an event occurs or it does not occur, a person makes one choice but not the other, an individual or group passes from one state to another (Pampel, 2007). Binary discrete phenomena usually take the form of a dichotomous variable. By using the multivariate probit model, which is a generalization of the probit model, we can estimate binary outcomes jointly, also in case of correlated binary outcomes. In our case the probit model is appropriate also for jointly predicting correlated choices on an individual-specific basis (Greene, 2003; Wooldrige, 2012), without imposing any decisional structure.

For this study our specified probit model becomes;

$$\Pr(Y = 1|X=x_1,X = x_2, \ldots,X = x_n) = \Phi(\beta_0+ \beta_1x_1 + \beta_2x_2 + \ldots + \beta_nx_n)$$

where Φ is the cumulative normal distribution function.

$z = \beta_0+ \beta_1x_1 + \beta_2x_2 + \ldots + \beta_nx_n$ is the "z-value" or "z-index" of the probit model.

β_1 is the effect on the z-score of a unit change in x_1, holding constant all other variables.

The probit regression analyses determine the relationship between multiple independent variables (inherent risk factors and risk management control functions) and a single dichotomous dependent variable (insolvency status). The choice of this model was based on the fact that the desired result "Insolvency Status" could be obtained through the analysis of a dichotomous variable. With this model, we test simultaneously the probability that an insurance firm's risk taking decisions and its management control functions would determine their insolvency or solvency. The response variable Y is a nominal variable with possible values of 0 and 1. That is

$$Y = \begin{cases} 1\,, & Insolvent \\ 0\,, & Otherwise \end{cases}$$

3.4.2 Conditions for Probit Model:

The probit model satisfies these conditions:

- Pr(Y = 1|X) to be increasing in X for β_i>0, and
- $0 \leq \Pr(Y = 1|X) \leq 1$ for all X

The use of multivariate probit (MVP) model allows us to estimate jointly a system of equations, meaning the probability of different choices at the same point of time but allowing also for systematic correlations between the choices and controlling for mutual correlation between their errors. Vasisht (2007) indicated that in order to explain the behaviour of a dichotomous dependent variable we have to use a suitably chosen Cumulative Distribution Function (CDF). Probit models rely on this assumption of normality of the distribution of the errors.

3.4.3 Test for Difference in Means

The t-test is used for comparing the means of two samples (or treatments), even if they have different numbers of replicates. In simple terms, the t-test compares the actual difference between two means in relation to the variation in the data (expressed as the standard deviation of the difference between the means). Considering the objective of this study that seek to determine whether a difference exist between the inherent risk exposures of the insurer and their risk management control functions in relation to insolvency, the two sample t-test is used to test this assertion. The test statistics t is

$$t = \frac{\bar{x}_1 - \bar{x}_2}{\sqrt{\frac{s_1^2}{n_1} + \frac{s_2^2}{n_2}}}$$

where $\bar{x}_1 \; and \; \bar{x}_2$are the means of the two samples, $s_1^2 \; and \; s_2^2$ are the sample variance of the two samples and $n_1 and \, n_2$are the sample sizes or the number of observations for each sample respectively.

Then this test statistic will have a t-distribution with the following degrees of freedom (df):

$$\frac{\left[(SE_1)^2 + (SE_2)^2\right]^2}{\frac{(SE_1)^4}{n_1 - 1} + \frac{(SE_2)^4}{n_2 - 1}}$$

where $SE_1 = \frac{s_1}{\sqrt{n_1}} \; and \; SE_2 = \frac{s_2}{\sqrt{n_2}}$ (Peck & Devore, 2008)

3.4.4 Conditions for two sample t-test

- The simple random sampling method is used for each sample.
- The samples are independent.

- Each population is at least 10 times larger than its respective sample.
- Each sample is drawn from a normal or near-normal population. Generally, the sampling distribution will be approximately normal if any of the following conditions apply:
    - The population distribution is normal.
    - The population data are symmetric, unimodal, without outliers, slightly skewed

3.4.5 Variable selection

The goal of a statistical model is to select the variable(s) of the risk-based supervision framework that result in the best prediction of insolvency. That is to obtain a model most parsimonious that still explains the data very well. To achieve this goal, we must have:

- The dependent variable for the model which is identified as the insolvency status.
- A set of independent variables that are put under two main broad categories; the inherent risk activities and the risk management control functions. Following these categories the inherent risk are identified as credit, market, liquidity, insurance, operational, legal and regulatory, and strategic risk. Meanwhile the management control functions are also identified as operational management, financial analysis, compliance, internal audit, risk management, senior management and board oversight.

It is worthwhile to start the variables that are thought to have association with the response variable. This is done by selecting variables that are intuitively appealing to determine the response variable with statistical analysis. Now the selection process is done using a univariate analysis for each variable. The most desirable univariate analysis involves fitting a univariate logistic regression (probit) model to obtain the estimated coefficient.

3.5 Ethical Issues and Considerations

The ethical considerations that guided the research for this study were that the researcher sought the consent of all respondents, acknowledged all sources of knowledge to avoid any form of misinterpretation of questions and held respondents' information as confidential as possible.

3.6Limitations to the methodology

The study is limited by respondents' subjective assessment of the new risk-based supervisory framework and their willingness to respond. Some study respondents were reluctant to answer questionnaire which required us to exert some minimum pressure on them. Some respondents also partially answered the questionnaire but these had to be rejected for the study. The sampling was also limited to specific group of workers (insurance companies' staff).The study assumed normality of the response data due to the sample size even though the test of normality of the response data showed otherwise. Probit models require normal distribution of data and the study's assumption of normality is a limitation to the model.

3.7 Conclusion

After the significant variables are selected, the model can then be used to predict the insolvency of an insurance firm.

CHAPTER FOUR

DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter presents the analysis and the discussion of the results obtained from the study. The study based on respondents' perception on the various items (variables) found in the analytical framework of the new risk-based supervision. A sample of 200 respondents who were directly associated with insurers was selected for the study. The chapter begins with several descriptive statistics of the various responses that were received from the survey, provides respondents biographic information of the study. This is then followed by identifying the study respondents awareness of the new-risk based using various descriptive statistics. The chapter continued by performing a more rigorous test on the various variables of the analytical framework of RBS, and risk faced by insurance companies to help answer the objective of the study. The Stata software and the R-software are used in this study to help prepare the data obtained and provide various statistical analyses to the study. Toward the end of this study, data received are presented in graphs and values that helped the study answer its objectives.

4.2 Demographic Characteristics

The demographic characteristics of study respondents have been previewed in this section indicating the calibre of people who were used in this study. This information helps build confidence in the results of the study. Demographic characteristics such as the employment status of respondents and their insurance practice areas were assessed.

As shown in the table 4.1 below it is indicated that the majority of the study respondents were in the managerial position, while few were non-managerial staff of the insurance companies. 67.5% of the study respondents were managerial staff of the insurance companies under study whereas 32.5% were staff in non-management position of the insurance companies. We can infer that since most of the respondents are managerial staff they were able to provide for the study the required knowledge on the new risk-based supervision framework.

Table 4.1 : Study Respondent's Employment Status

Status	Frequency	Percent
Managerial Staff	135	67.5
Other Staff	65	32.5
Total	**200**	**100.0**

Considering the insurance practice areas of study respondents, we assessed that a higher number of the respondents are from the non-life insurance practice areas with an indication of 59.0% while 41.0% of the respondents were in the life insurance practice area. The study respondents are dominated by responses from the non-life insurance areas because the line of business in the insurance industry in Ghana is dominated by the non-life insurance businesses (NIC, 2015). The study selected the respondents randomly in such a way that the responses from the study is not biased in anyway, but are actually a representative of the population understudy.

Table 4.2: Insurance Practice Area

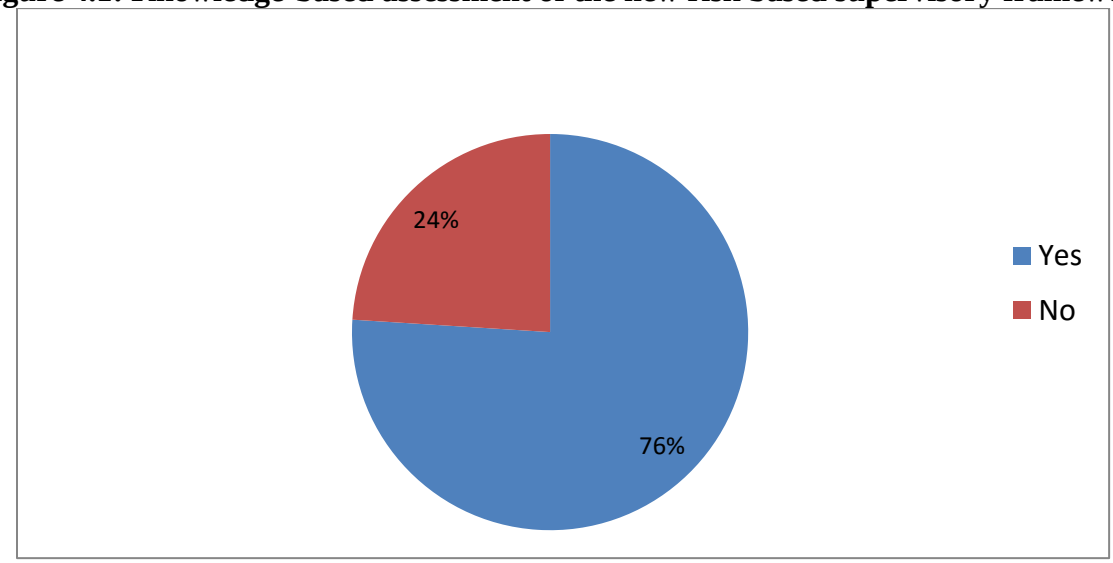
Area	Frequency	Percent
Life Products	82	41.0
Non-Life Products	118	59.0
Total	**200**	**100.0**

4.3 Awareness of the New Risk-Based Supervisory Framework

On the assessment of the awareness of the new risk based supervision framework, respondents were assessed on knowledge-based and practical skills. The graph (figure 4.1), table 4.3 and table 4.4 below inform us of the level of knowledge and practice based awareness of the risk-based supervisory framework.

In the knowledge assessment distribution graph, 76 percent of the respondents indicated their awareness of the RBS framework while the rest 24 percent indicated little awareness of the RBS framework. It is asserted that the sample respondents understudied are aware of the issue and therefore provided accurate responses to the study.

Figure 4.1: Knowledge-based assessment of the new risk based supervisory framework



On identifying which insurance practice area were more aware of the new risk-based supervisory framework, table 4.3 presents the summary of findings in a cross tabulation. This indicates respondents' knowledge of assessment based on the insurance practice areas. It was found that majority of the participants recorded were aware of the new RBS framework. Moreover, these participants were seen to come from the life insurance business areas

contributing to 81.7% of its total participants. Comparatively, we can assess that the proportion of respondents who indicated little awareness of the new RBS framework were from the non-life insurance businesses (28%) more than that of life insurance businesses (18.3%). It is envisaged that there is less education amongst the management and staff of the non-life insurance industry than the life insurance area.

Table 4.3: Insurance Practice Area and Awareness

Insurance Practice Area	Are you aware of the new risk based and supervisory framework?		
	Yes	**No**	**Total**
Life Products	67(81.7%)	15(18.3%)	82
Non-Life Products	85(72.0%)	33(28.0%)	118
Total	**152**	**48**	**200**

As indicated from the results above the management staff of the non-life insurance sector are not much aware of the supervisory framework than managers from the life product. The study tested whether this assertion is statistically true. The chi-square test of significance dependency of two groups to RBS framework awareness is shown in table 4.4.

Table 4. 4: Relationship between insurance practice area and awareness of RBS framework

Awareness of new risk based supervisory framework	Pearson's Chi-square	df	P-value
Life Products * Non-Life Products	2.482	1	0.115

The result above indicates that the awareness of the RBS framework is not significantly related to the insurance practice areas. Thus the chi-square value of 2.482 and p-value of 0.115 indicate that respondents' awareness of the new risk based supervisory framework is not dependent on their practice areas. Thus, comparing the p-value of 0.115which is greater than the0.05 level of

significance we do not reject the null hypothesis and claim that awareness of the new risk based supervisory framework is not dependent on respondents practice area.

After assessing respondents' awareness of the framework, the study further interrogated respondents on the feasibility of the framework based on their practical experience. On this issue respondents were asked to indicate whether upon their knowledge of the new risk based supervision and their practical experience, they think the RBS can predict or determine the level of insolvency of insurance companies. In assessing this issue, respondents were asked to rate their perception on a rating scale of a low of 1 (strongly disagree) and high of 5 (strongly disagree). In Table 4.5 we can envisage that majority of respondent indicated that the new BRS framework will contribute to determining the insolvency of an insurance company. 82.5% of the respondents purports that when supervisors implement the new risk based supervision, it can reduce the risk of insolvency of insurance companies. Contrary to this a few of 8.5% indicated that they do not think the RBS will well determine insurance insolvency. However, it is also indicated that 9.0 percent of the respondents were indifferent about this issue, an indication that they were incapable of making judgment on this issue. Since the result of this issue supports the majority, we can infer that the RBS framework will help insurance better assess their insolvency status.

Table 4.5: RBS Framework Assessment

Scale	Frequency	Percent
Strongly Disagree	2	1.0
Disagree	15	7.5
Neutral	18	9.0
Agree	165	82.5
Total	**200**	**100.0**

4.4 Descriptive Statistics of Various RBS Variables

This section provides descriptive statistics on the various analytical factors of the new risk-based supervisory framework. In assessing the inherent risk variables, respondents from the insurers were asked to rate various risks faced by insurance companies as regards their contribution to insolvency. On the scale of a low of 1 (minimum) and a high of 3 (maximum) the various risks faced by insurance companies are rated. The standard deviation values indicate the severity of how these risks activities impact on insolvency. As shown in the Table 4.6 below, we can envisage that the most pertinent risk faced by insurance companies in Ghana is identified as the liquidity risk posed by insurers' activities. Meanwhile the reinsurance risk of the companies is also identified to be a major concern risk faced by insurers. It is posited that liquidity risk faced by insurers and their reinsurance decisions are very risky to firms.

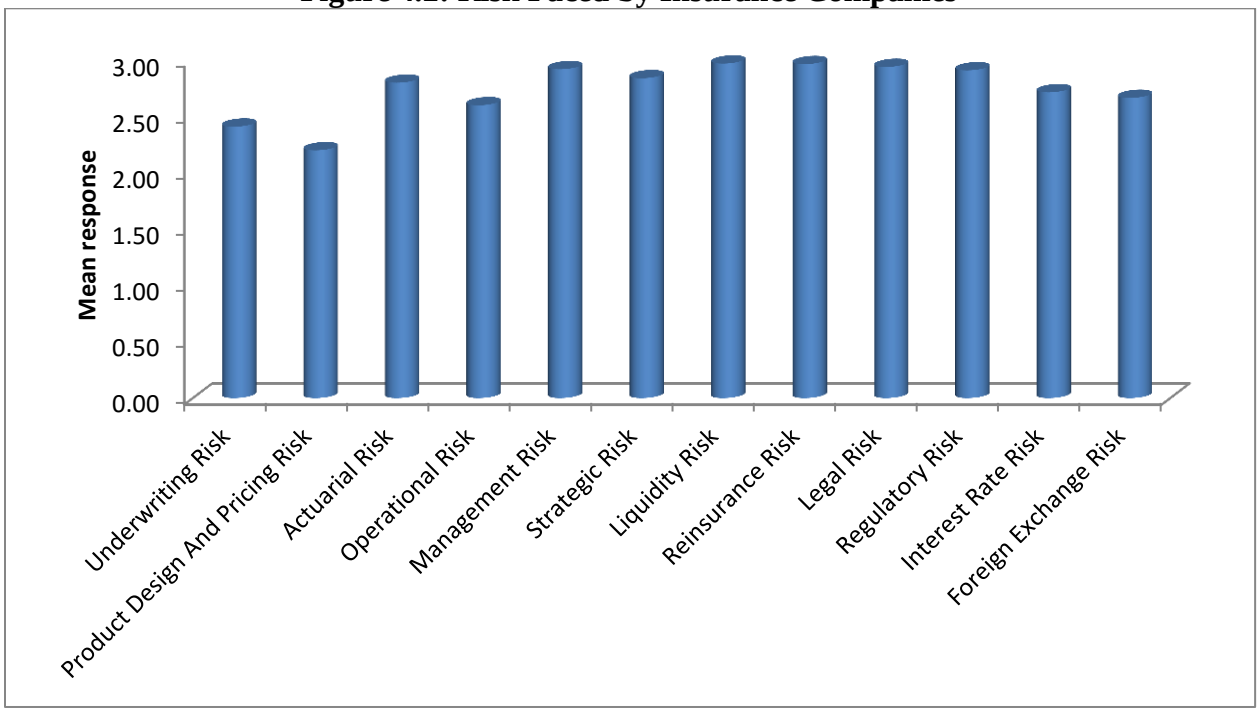
Table 4.6: Risks faced by Insurance Companies

Risk	N	Min.	Max.	Mean	Std. Deviation	Coefficient of Variation
Underwriting Risk	200	2.00	3.00	2.4100	0.49307	0.2046
Product Design And Pricing Risk	200	1.00	3.00	2.2000	0.80825	0.3674
Actuarial Risk	200	1.00	3.00	2.8000	0.59309	0.2118
Operational Risk	200	2.00	3.00	2.6000	0.49113	0.1889
Management Risk	200	2.00	3.00	2.9200	0.27197	0.0931
Strategic Risk	200	1.00	3.00	2.8400	0.44201	0.1556
Liquidity Risk	200	1.00	3.00	2.9700	0.22214	0.0748
Reinsurance Risk	200	1.00	3.00	2.9650	0.23248	0.0784
Legal Risk	200	1.00	3.00	2.9400	0.31126	0.1059
Regulatory Risk	200	1.00	3.00	2.9100	0.33100	0.1137
Interest Rate Risk	200	1.00	3.00	2.7150	0.47424	0.1747
Foreign Exchange Risk	200	1.00	3.00	2.6650	0.49396	0.1854

The high values of the mean responses indicate that there is high level of convergence on the respondents' perception that these factors impact on insurers' insolvency. We can therefore

indicate that product design and product pricing have less relatively impact on insolvency of insurance companies as compared to other risk activities. The coefficient of variation provides a measure of variability of means between two or more data sets. It shows the extent of variability in relation to the mean of the population. From the values of the coefficient of variation we can assess that on average the liquidity risk of insurers is a significant risk activity faced by insurers since it has the smallest coefficient of variation value indicates that there is a less variability in the response to this assertion. For better visualization of the insurance risk activities that are susceptible to insurers insolvency, figure 4.2 below clearly indicates that the liquidity risk, reinsurance risk, legal risk, management risk, and regulatory risk contributes to insolvency mightily as identified by insurers. Other risk activities such as product design and pricing, underwriting risk and operational risk compared with other risk identified above to be less risky.

Figure 4.2: Risk Faced by Insurance Companies



Respondents were also required to rate their responses on a scale of low of 1 and a high of 5, providing their assessment of the inherent risk and the various risk management control functions of insurance firms that contributes to insurers' insolvency. A threshold of 2.5 on the rating scale help the study justify respondent's assessment on the issue raised. A mean response greater than or equal to 2.5 indicates that the study respondents are in agreement on the issue raised, whiles values less than 2.5 tells that respondents do not accept that the variable under study will contribute to the insolvency of insurance companies. Based on the acceptance and rejection scale we assess the contribution of each of the factors to identifying insolvency of the insurance companies.

Table 4.7: Analytical Framework for RBS

Analytical Framework for RBS	Mean	Std. Deviation	Coefficient of Variation
Inherent Risk			
The amount of our insurance company's capital and the type of risks faced by the insurance company (Capital)	3.8050	0.4561	0.1199
Loss provisions for bad investments and loans (Asset Quality)	3.5300	0.5663	0.1604
The level and type of reinsurance employed by a company will affect the risk profile of the insurance	3.6600	0.6375	0.1742
Insufficient company earning profits to maintain capital healthy levels, pay shareholder dividends, meet expectations for improvements in operations, as well as pay ongoing liability commitments	3.9050	0.4659	0.1193
Insufficient liquidity given the nature of its business	3.9450	0.3501	0.0887
Assets and liabilities inappropriately matched in terms of maturity dates	3.8350	0.6783	0.1769
Risk management control functions			
Reserves not calculated based on relevant legal requirements and reasonable assumption	3.4750	0.5754	0.1656
In capable, unfit and bad professional managers	3.2150	1.0556	0.3283
Inappropriately monitored and bad internal controls by professional managers.	3.3400	0.8822	0.2641
Poor managerial skill in risk identification, risk measurement, risk assessment and risk management procedures and processes in place	3.4250	1.0535	0.3076
Treasury operations well managed	2.6600	1.3241	0.4978
Insurance company owning subsidiaries	2. 4700	1.1426	0.4626
The subsidiary investments present risk to the financial health	3.7450	0.5845	0.1561

From Table 4.7 above, the mean, standard deviation and coefficient of variation of the responses to the new risk-based factors are shown. It is shown that the highest mean response recorded from these factors was 3.9450 and a lower mean response of 2.4700. It is clear from the mean responses that insurers mostly agree that the highest contributing factor to insurers' insolvency is liquidity due to the nature of insurance business. Additionally, study respondents perceive that insufficient business earning profits to maintain capital health levels and pay all ongoing liability commitment could lead to insurer's insolvency. Insurance company owning subsidiaries and the

treasury operation of insurance companies has minimum values indicating that respondents perceive that these factors have less impact on insolvency of firms.

4.5 Assessing a Significant Activity to Insolvency

In determining the risks arising from the inherent risks activities and risk management control functions of the insurance firms, the study considered the degree of probability based on the responses of insurers to determine potential insolvency of firms. Determining the degree at which risk management control functions and inherent risk contribute to insolvency, significant activities of both the risk management control functions and inherent risk factors are considered. Summated averages of responses of the significant variables are used to determine the net risk for each latent variable of the study. To determine the solvency direction of the risk identified (inherent and risk management), the probit model is used to statistically determine the size of each variable to solvency.

Table 4.8: Dependent variable: Probability of an insurance company being insolvent

	Estimate	Std.Error	Odds ratio	p-value
Intercept	4.3150	2.7753		0.1200
Inherent Risk	1.7456	0.7509	5.729	0.0071**
Risk Management	1.1010	0.4292	3.007	0.0103*
R^2	0.683			
Wald-chi square	118.570			
P-value	0.000			

The above probit regression indicates the significance of the risk activities toward insolvency. Considering the inherent risk from various significant activities of the insurers, the result

suggests how each of the significant risk activities of insurers relatively impacts insolvency. The odds ratio provides a relative measure of risk, telling us how much more likely it is for the inherent risk activities and risk management control functions to expose insurers to insolvency. Considering the odds ratio for inherent risk activities of the insurance companies, a value of 5.729 from the study indicates that respondents perceived that significant inherent risk activities of insurers is 5.729 times likely to cause insolvency of the insurers. In relation to the risk management control functions of insurers, it is also perceived with an odds ratio of 3.007 that significant risk management control functions are 3 times likely to cause insolvency of insurance companies. P-values of the various significant risk activities indicates how statistically significant these assertions are. Comparatively, we can infer that risk posed by inherent risk to insurance insolvency is quite high as that which arises from risk management control activities. Significant risk activities from inherent risk are twice likely to cause insolvency than the significant risk management control activities of insurers. This result is consistent with a study by Nierop and Stenstrom (2002) which showed that the EU's insolvency regime in an international context is explicitly identified by the directives of the risk inherent in the application of one categorical and inflexible principle regarding the choice of law. The study suggests that a more detailed assessment of specific risk should be done in order to prioritize the risk and subsequently provide a risk response.

4.6 Test of difference between Inherent Risk and Risk Management Control Functions

This section of the study looked at assessing whether a difference exists in the significant activities that contribute to insolvency risk of the insurance companies. Data obtained from responses on the inherent risk activities and risk management control functions were used to

obtain the result of the study**.** The table 4.9 below is the descriptive statistics of the inherent risk of insures and their risk management control functions**.**

Table 4.9: Descriptive statistics of Inherent Risks and Risk Management Control Function

Statistics	***Inherent Risk***	***Risk Management Control***
Mean	3.780	3.589
Standard Error	0.021	0.025
Median	3.833	3.571
Mode	4.000	3.571
Standard Deviation	0.299	0.358
Sample Variance	0.088	0.128
Kurtosis	2.112	-0.519
Skewness	-0.967	-0.068
Range	1.833	1.571
Minimum	2.667	2.857
Maximum	4.500	4.429

It can be shown that inherent risk recorded the highest mean, as compared to the risk management control function. This indicates that inherent risk is more likely to determine insolvency than that of the risk management control function. It is shown by the inherent risk and risk management control activities mode responses of 4 and 3.571 respectively that the study respondents agree to the assertion that both inherent risk and risk management control activities determine insurers insolvency. We can infer that the inherent risk activities have more impact on insurer's insolvency. Considering the various descriptive above, it is not indicative whether a statistical difference exists between inherent risk and the risk management activities. A test of difference helps to better determine any difference.

Hypothesis

H_0: There is no statistical difference between inherent risk and risk management control activities towards insolvency

H_1: There is a statistical difference between inherent risk and risk management control activities towards insolvency

Table 4.10: Test of difference between the means of inherent risk and risk management control activities towards insolvency

	t-stat	df	P-value
Inherent risk * Risk management activities	5.8216	398	0.016

Decision Rule

Reject H_0if the P-value is less than the level of significance (0.05) or Reject H_0if the T-Stat is greater than t-critical. We fail to reject otherwise.

Conclusion

From the t-test table above, we can infer that that there is a significant difference between the inherent risk and risk management control activities. This is because the P-value 0.016 < 0.05, falling into the rejection region. Clearly there is enough evidence to conclude that a difference exists in between the two major risk activities that determines insurer's insolvency. The insurers should be informed that their risk profile comprises their intrinsic business activities, operational management and their control and supervision functions.

4.7 Diagnostics of Variables

In order to ensure that data used in the study have met the assumptions of the test statistics used in this study, several diagnostic tests such as the tests of normality of data and the assumption

of equal variances are shown in this section. The assumptions of the test of difference and the assumptions of a probit regression for the two main variables of interest, the inherent risk activities and the risk management control functions of the study are performed.

Test of Normality

The study test the normality of the two major significant activities that are identified to determine the insolvency status of insurance company; the inherent risk activities and the risk management control functions. Using responses from the study, perception of the respondents was assessed whether it follows normality. The Shapiro-Wilk normality test was used to determine this assertion. The table below indicates the assumption of normality of responses.

Table 4.11: Shapiro-Wilk test of normality

Constructs	W	p-value
Inherent Risk	0.905	5.2821e-10
Risk management	0.9731	0.0006848

The value of the test statistics and the p-values provide an indication of the normality test of significant variables under study. The p-value tells us the chances that the sample comes from a normal distribution. It was found that the p-values for both constructs are all less than the significance alpha value. That is a p-value < 0.05. This value fall in the rejection region, an indication that the null hypothesis is rejected, meaning responses from the study are not normally distributed. However, in applying a rule of thumb for sample sizes greater than 30, it could be safely concluded that the responses assume normality.

Test of Variance

The test of assumption of equality of variances for this study is also computed to help the study better construe a test of difference between the inherent risk and the risk management control functions. This test was done to help select the t-test that is appropriate for the samples. The F-test is used for this assumption, since t-test revolve around the assumption of equal variances or unequal variances. The study null hypothesis states equal variances and otherwise for alternative.

Table 4.12: Test of Equality of Variance (Levenes test)

	F-stat	**P-value**
Inherent risk * risk management	0.7656	0.674

Considering the test of equality of variances, it is asserted that the p-value of 0.674 is greater the 0.05 level of significance an indication that the variance assumes equality. We can infer that there is no statistical evidence to proof that the variances of responses from the study are not equal. We therefore based on this assumption to select t-test that assumes equality of variances to help determine the differences that exist between the significant inherent risk activities and the risk management control functions of an insurance company.

4.8 Challenges posed by the new risk-based supervision

A review of literature suggests that the new risk-based supervision increase consistency in supervisory action; provide to insurers an approach which is proactive to deal with insolvency problems and provide confidence in the insurance and financial industries (Stewart, 2007).

However the implementation of risk based supervision is to adapt and continuously improve risk management practices and systems of insurers. Brunner, Hinz and Rocha (2008) inform that challenges of implementation are in many aspects similar to those faced by bank and insurance supervisors.

In this study, we asked insurers under study to indicate the challenges they perceive to arise through implementation of this supervisory framework. Respondents' views have been summarized in this study and themes have been developed to communicate the views of the study respondents. From the respondent's view point it is assessed that the following are the major challenges that the insurance industry faces in the implementation of the new risk-based supervisory framework. As shown in literature, it is indicated that complying with the new framework is a major challenge faced by the insurance companies (IAIS, 2015). This is not far from the study results that showed the following challenges:

- Ensuring that all licensed insurers comply
- Existing policy detractions from some requirements of the new supervisory framework
- Restructuring of operational and internal risk governance processes
- Changing of organizational culture to embrace the new risk-based framework.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter summarizes the entire study while it attempts to highlight the key findings of the study as well as suggesting ways in which policy makers, stakeholders of the insurance industry and firm specific companies can identify the significant risk activities to insolvency and recommend directions to which risk managers should follow tackle insolvency.

5.2 Summary of findings

The study established the various significant risk activities that are likely to contribute to insurer's insolvency. Due to this, the study was targeted at determining the highly susceptible risk activities of insurers, explore the risk-based supervision characteristics that impact on insurer's insolvency and also determine whether a significant difference exists between the inherent risk exposures of the insurer's and their risk management control functions. The research sought insurers view on the new risk-based supervisory framework in Ghana, based on a rated scale of questions and results from 200 employees of insurers perception has been used in this study to provide decisions. From the data as analysed in chapter four above, below are the summary of the findings.

- Based on the results from demographic information by insurers, it is asserted that most of the respondents of the study were managerial staff of the insurance companies. The majority of the managerial staff and employees of the insurance companies were also

within the non-life insurance practice area. The sampling was randomly done such that respondents were truly representative of the population under study.

- The study also solicited respondent's awareness of the study area and it was shown that insurers were abreast of the new risk-based supervisory framework and therefore provided succinct information for the study. On determining awareness based on respondents practice area, it is assessed that most of the respondents from life insurance practice area were much aware of the area of study than that of the non-life insurance practice area.

- The study revealed that the significant activities of insurer insolvency are mostly inherent risks. The insurer's insolvency risk is mostly determined by insurer's liquidity risk and insufficient company earning profits to maintain capital healthy levels, pay shareholder dividends, meet expectations for improvement in operations as well as ongoing liability commitment. Considering the risk management control functions, we assessed from the study that the subsidiary investments of the insurers also present a significant risk to insolvency, whiles poor managerial skill of management was not an exception.

- In determining the degree of probability at which significant risk activities impact on the insolvency of firms based on responses from insurers, the degree at which risk management control functions and inherent risk contributes to insolvency were assessed. The study showed that the effect of significant inherent risk activities of insurer's is twice as high as the risk management control activities of insurance companies. Thus,

significant risk activities from inherent risk are twice likely to impact on insolvency than the significant management activities of insurers will do.

- The study also identified that the challenges of implementing the new risk-based supervision are in many aspects similar to those faced by banks. It is asserted that a challenge such as compliance by the insurance industry to the framework, existing measures detraction, already existing regulatory structures may affect the full implementation of the framework.

5.3 Conclusion

There has been the quest to assess the risk activities of the new risk-based supervisory framework and better provide knowledge on their significant effect on insolvency in insurance companies. In the interest of policyholders and to provide secure fair treatment of risk by insurers, this study has assessed the various activities of risk and provided decisions on them.

The study has identified that both risk management control functions and inherent risk activities of the Ghanaian insurance industry will contribute to insolvency. Subsequently the study has provided major determinants of insolvency of insurance companies, and quantified the risk management control functions and inherent risk of insurers.

5.4 Recommendations

The study provides lessons to the supervisory regulatory authorities and insurance companies on the new risk-based supervisory framework. All felt that the significant risk activities are geared

toward insolvency of an insurance company, therefore the study recommends the following to stakeholders.

Prioritize Risk Activities: Insurers and risk managers should devise strategies that will help fight significant risk activities based on their probability of causing insolvency. Regulatory bodies should provide risk assessment of insurers on inherent risk activities in order to provide better risk management control decisions to avoid insolvency.

Reorganize Supervisory Controls: Due to the issue of non-compliance that may arise from implementation, the study recommends that authorities should not underestimate the amount of change. Insurers should get people who understand the nitty-gritty of the new risk-based supervisory framework so that they can provide better decision for an insurance company in order to avoid insolvency.

Provide Technical Assistance: For insurance companies to better manage their risk using the new risk-based framework, regulatory bodies should provide technical support to firms so as to help insurers deal with the technicalities of the framework. This will enhance supervisory approaches to keep abreast of the ever-changing risk profiles of insurance companies.

5.5 Directions for future Studies

On the whole, it can be said that it was worth investigating more about the risk activities of insurers that will contribute to the solvency of insurers. It is envisaged that the inherent risk

activities of insurance firms significantly cause insolvency. Further study should focus on determining how the individual inherent risk factors and those of the risk management control functions significantly impact on insolvency. This will help insurers prioritize their strategy in tackling insolvency and also help regulatory bodies apply appropriate weights or rankings to the activities of insurers as a way of predicting insurers' insolvency.

REFERENCES

Alreck, P. L., & Settle, R. B. (2007).Consumer reactions to online behavioral tracking and targeting. *Journal of Database Marketing & Customer Strategy Management*, *15*(1), 11-23.

Best A.M. (2007). *Insurers' insolvency*, available at www.ambest.com(accessed on February 2015).

Blaxter, L., Hughes, C., & Tight, M. (1996).*How to Research*, Buckingham, Open University Press.

Bless, C., & Higson-Smith, C. (2000). *Fundamentals of social science research: an African perspective*. Juta.

Bonson, E., Cortijo, V. Escobar, T., & Flores, F. (2010). Solvency II and XBRL: new rules and technologies in insurance supervision. *Journal of Finance Regulation and Compliance*, 18(2), 144-157.

Brunner, G. G., Hinz, R., & Rocha, R. D. R. (2008). Risk-based supervision of pension funds: a review of international experience and preliminary assessment of the first outcomes. *World Bank Policy Research Working Paper Series, Vol*.

Bryman, A., & Bell, E. (2003). 2007. *Business research methods*. New York: Oxford University Press.

Buckham, D., Wahl, J., & Rose, S. (2010). *Executive's guide to solvency II*. John Wiley & Sons.

ChandraShekhar, P. Kumar, N., &Warrier, S.R. (2008). *Journey of insurers' solvency regulations-2007 and beyond*. Available at www.actuaries.org/Boston2008/Papers/IPM5_Preeti_Nandha_Warrier.pdf (accessed on December 2014).

Charumathi, B. (2012). On the Determinants of Profitability of Indian life insurers–an Empirical Study. In *Proceedings of the world congress on Engineering*, 1, 4-6.

Cooper, D. R., & Schindler, P. S. (2003). Business research methods.

Creswell, J. W. (2012). *Qualitative inquiry and research design: Choosing among five approaches*. Chicago: Sage.

Díaz-Martínez, Z., Fernández-Menéndez, J., Segovia-Vargas, M.J., & Pozo-García, E.M. (2004). See5 Algorithm versus Discriminant Analysis. An Application to the Prediction ofInsolvency

in Spanish Non-life Insurance Companies.*Investment Management and Financial Innovations*, 100-112.

Eling, M., Schmeiser, H., & Schmit, J. (2007). The Solvency II process: Overview and critical analysis, *Risk Management and Insurance Review*, 10 (1), 69-85.

Filipovic, D., & Vogelpoth, N. (2008).A note on the Swiss Solvency Test risk measure.*Insurance: Mathematics and Economics*, 42, 897–902.

Financial Action Task Force (FATF) (2009).*Risk-based approach: Guidance for the Life Insurance Sector*. FATF Secretariat, France.

Fraenkel, J. R., & Wallen, W. E. (2000).*How to design and evaluate educational research*. New York, NY: McGraw Hill

FSB-Financial Services Board (2010).*Proposed Prudential Risk-based Supervisory Framework for Insurers.* Menlo Park: Pretoria. Available at: www.fsb.co.za/.../insurance/.../CnsltPaprPrudRskSprvsnfrmwk.pdf(accessed January 2015).

Gatzert, N., & Martin, M. (2012). Quantifying credit and market risk under Solvency II: Standard approach versus internal model. *Insurance: Mathematics and Economics*, *51*(3), 649-666.

Gour, B., & Gupta, M.C. (2012).A Review on Solvency Margin in Indian Insurance Companies. *International Journal of Recent Research and Review*, 11, 43-47.

Greene, W. H. (2003). *Econometric analysis*. Pearson Education India.

IAIS (2015). *Risk-based Supervision in Inclusive Insurance*. Report of the 11th A2ii – IAIS Consultation Call; Eschborn, Germany.

IAIS (2003). *Insurance core principles and methodology*. International Association of Insurance Supervisors, Singapore.

Joo, B. A. (2013). Analysis of Financial Stability of Indian Non-Life Insurance Companies. *Asian Journal of Finance & Accounting*, *5*(1), 306-319.

KPMG (2013).*Revisions to the Risk-Based Capital Framework: How will RBC2 and ERM affect insurers in Singapore*. KPMG International, A Swiss Entity: Singapore.

KPMG LLP (2011).*Solvency II: A closer look at the evolving process transforming the global insurance industry*. Delaware limited liability partnership, U.S.A.

Kumekpor, T. K. (2002). *Research methods and techniques of social research*. Accra: SonLife Press & Services.

Lloyd's (2010).*Solvency II online tutorial. Lloyd's Insurance Company (China) Limited*, Azia Center, Shanghai.

Miles, M. B., & Huberman, A. M. (1994). *Qualitative data analysis: An expanded sourcebook*. Sage.

Moody's Analytics, (2011). *Essential insight serving global financial markets*. Available at: http://www.moodysanalytics.com/, (accessed July 2014).

National Insurance Commission-NIC (2008).*Annual Report*, NIC Accra: Ghana.

National Insurance Commission-NIC (2014).*Solvency risk based supervision Symposium*, NIC Accra: Ghana.

National Insurance Commission-NIC(2015). Insurers in the Insurance Industry of Ghana, Available at: http://www.nicgh.org/live/en/?pg=116&pp=94 (accessed June 2015).

Neuman, W.L, (2007). *Basics of Social Research: Qualitative and Quantitative Approaches* (2nd edition). Boston: Pearson Education.

Nierop, E., & Stenstrom, M. (2002). Cross-border aspects of insolvency proceedings for credit institutions. A legal perspective. In *European Central Bank, International seminar on legal regulatory aspects of financial stability, Basel* (pp. 21-23).

Palande, P. S., Shah, R. S., & Lunawat, M. L. (2003). *Insurance in India: Changing policies and Emerging opportunities*. SAGE.

Pampel, F.C., (2007). Quantitative Applications in the Social Sciences. SAGE, Boulder.

Peck, R., & Devore, J. (2008).*The exploration and analysis of data* (sixth edition). Thomson Learning, Inc.

Peleckiene, V., & Peleckis, K. (2014). Solvency II assumptions for increasing the international competitiveness of EU insurance industry. *Procedia-Social and Behavioral Sciences*, *110*, 822-831.

Pitselis, G. (2008). An overview on solvency supervision, regulations and prediction of insolvency. *Belgian actuarial bulletin*, *8*(1), 37-53.

Pitselis, G. (2009). Solvency supervision based on a total balance sheet approach. *Journal of Computational and Applied Mathematics*, 233, 83-96.

Pottier, S., & Sommer, D. (2002). The effectiveness of public and private sector summary risk measures in Predicting insurer insolvencies. *Journal of Financial Services Research*, 21(1): 101-116.

Quaglia, L. (2014). *The European Union and Global Financial Regulation*. Oxford University Press.

Schmeiser, H., Siegel, C., & Wagner, J. (2012). The risk of model misspecification and its impact on solvency measurement in the insurance sector. *The Journal of Risk Finance*, *13*(4), 285-308.

Sharara, I., Hardy, M., & Saunders, D. (2010).Regulatory Capital Standards for Property and Casualty Insurers under the US, Canadian and Proposed Solvency II (Standard) Formulas. *CAS, CIA, and SOA Joint Risk Management Section*.

Sharma, P. (2002). *Prudential supervision of insurance undertakings*. Conference Secretariat: UK's Financial Services Authority

Stewart, F. (2007). Experiences and challenges with the introduction of risk-based supervision for pension funds. *Available at SSRN 1813759*.

SVS, (2006).*New risk-based solvency supervision model for the Chilean insurance industry*. Superintendencia de Valores Seguros (SVS); Chile.

The Insolvency Service (2014).*Statistics release: Insolvencies*. National Statistics; GOV.UK

TIFS (2012).*Risk Assessment Framework (RAF) in Poland - risk-based and prospective approach to insurance supervision*. Training Initiative for Financial Supervision (TIFS).

Vasisht, A. K. (2007). *Logit and probit analysis*. Available at: www.iasri.res.in/.../5-Logit% 20and% Probit, 20. (accessed March 2015).

Wagner, J. (2014). A note on the appropriate choice of risk measures in the solvency assessment of insurance companies. *The Journal of Risk Finance*, 15 (2), 110- 130.

Wooldridge, J. (2012). *Introductory econometrics: A modern approach*. Cengage Learning.

World Bank (2010). *Risk based supervision-visuals-Mar 2001*. Available at: http://www1.worldbank.org/finance/assets/images/Risk_based_supervision_-_visuals_-_Mar_2001.pdf. (Accessed December, 2014).

Zweifel, P. (2014). Solvency regulation of insurers: A regulatory failure? *Journal of Insurance Issues*, 37 (2): 135–157.

QUESTIONNAIRE

I am a graduate student of University of Ghana Business School (MPHIL Risk Management & Insurance) researching on the topic "RISK BASED SUPERVISION OF INSURANCE IN GHANA, PROSPECTS AND CHALLENGES". I will be grateful if you could respond to this questionnaire as part of my data collection for my research in partial fulfillment of the requirements for the award in MPHIL Risk Management & Insurance. The study is strictly for academic purposes only and all information obtained will be treated with the confidentiality it deserves. Thank you.

Section A: Demographic Information

1. Name of Insurance Company

   _____

2. Employment status(Please tick[√])
   Managerial staff [ ] Other[specify] _____
3. Insurance practice area(Please tick[√])
   Life Products [ ] Non-Life Products [ ]

Section B: Risk based Supervision awareness

4. Are you aware of the new risk based and supervisory framework (Please tick[√])
   Yes [ ] No [ ]

5. Do you think when supervisors implement the new risk based supervision can reduce the level of insolvency of insurance companies.(Please tick[√])
   Strongly disagree [ ] Disagree [ ] Not sure [ ]
   Agree [ ] Strongly agree [ ]

6. What (**one**) activity do you think is much an advantage to determine insolvencies from the new supervisory framework?
   ……

Section C: Analytical Framework for RBS

7. How do you rate the following **inherent risk factors and risk management control functions to insolvency of insurance firms**? Strongly Disagree(1), Disagree(2), Neutral(3), Agree(4), Strongly Agree(5)

	1	2	3	4	5
The amount of our insurance company's capital and the type of risks faced by the insurance company (Capital)	1	2	3	4	5
Loss provisions for bad investments and loans (Asset Quality)	1	2	3	4	5
The level and type of reinsurance employed by a company will affect the risk profile of the insurance	1	2	3	4	5
Reserves not calculated based on relevant legal requirements and reasonable assumption	1	2	3	4	5
In capable, unfit and bad professional managers	1	2	3	4	5
Inappropriately monitored and bad internal controls by professional managers.	1	2	3	4	5
Poor managerial skill in risk identification, risk measurement, risk assessment and risk management procedures and processes in place	1	2	3	4	5
Insufficient company earning profits to maintain capital healthy levels, pay shareholder dividends, meet expectations for improvements in operations, as well as pay ongoing liability commitments	1	2	3	4	5
Insufficient liquidity given the nature of its business?	1	2	3	4	5
Assets and liabilities inappropriately matched in terms of maturity dates?	1	2	3	4	5
Treasury operations well managed	1	2	3	4	5
Insurance company owning subsidiaries	1	2	3	4	5
The subsidiary investments present risk to the financial health	1	2	3	4	5

Section D: Risk Faced by Insurance Companies

1. How do you rate the following **risk faced by insurance companies to insolvency**? Low(1), Minimal(2), High(3)

	1	2	3
Underwriting Risk	1	2	3
Product Design And Pricing Risk	1	2	3
Actuarial Risk	1	2	3
Operational Risk	1	2	3
Management Risk	1	2	3
Liquidity Risk	1	2	3
Strategic Risk	1	2	3
Reinsurance Risk	1	2	3
Legal Risk	1	2	3
Regulatory Risk	1	2	3
Interest Rate Risk	1	2	3
Foreign Exchange Risk	1	2	3
Credit Risk	1	2	3

Section E: Challenges RBS implementation

What challenges do you perceive implementing Risk Based Supervision will bring to your company?

……

……

……

……

……

……

……

……

Thank You

Solomon Twum Barima