

**THE EFFECT OF ENTERPRISE RISK MANAGEMENT ON CAPITAL
ALLOCATION AMONG INSURANCE COMPANIES IN KENYA**

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DECLARATION

This research project is my original work and has not been presented for examination to any other university.

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This research project has been submitted for examination with my approval as the university supervisor.

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DEDICATION

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LIST OF ABBREVIATIONS AND ACRONYMS

APT	Arbitrage Pricing Theory
CAR	Capital Adequacy Ratio
CAPM	Capital Asset Pricing Model
CRO	Chief Risk Officer
ERM	Enterprise Risk Management
GDP	Gross Domestic Product
IRA	Insurance Regulatory Authority
MIP	Medical Insurers Providers
MPT	Modern Portfolio Theory

ABSTRACT

The objective of the study was to determine the effect of ERM on capital allocation among insurance firms in Kenya. Insurance companies offer protection to policyholders in return for a premium payment. They are required to pay the claims as they fall due and therefore, capital must be held by the companies' in order to fulfill the promise under all circumstances. Companies should accurately assess the amount of capital that is adequate to keep a business solvent. Recently, a risk based capital regime has been introduced in Kenya. The model encompasses all risks a company faces and ensures that they maintain sufficient capital to meet their obligations. Ideally, an insurance company should hold capital commensurate to its size and risk profile. Therefore, ERM is very crucial in the capital allocation process. Prior studies conducted have not examined the relationship between these two variables. The population of the study includes all insurance companies, however, a sample of 34 companies was examined. Secondary Data was collected from Insurance Regulatory Authority and Insurance companies financial reports. A regression analysis was used in the data analysis. The results revealed that underwriting profits /loss, market risk exposure, credit risk exposure, revenue and net liquid assets significantly affect the allocation of capital among insurance companies. The regression equation revealed that underwriting profits /loss, market risk exposure, credit risk exposure and revenue had a positive relationship with capital allocation of insurance companies. The study also found that there was a negative relationship between net liquid assets and capital allocation of insurance companies. The study emphasized the need for companies to manage the related risks through ERM in order to reduce the required capital. The study also revealed that revenue, net liquid assets and market risk exposure were all significant variables. Revenue, an indicator of operational risk, was the most significant variable and therefore operational risk management would yield the significant results in terms of reducing the capital to be allocated to an insurance business.

CHAPTER ONE: INTRODUCTION

1.1 Background of the study

The main goal of ERM is to maximize shareholders 'wealth; this is done by protecting and enhancing the share value. ERM addresses different aspects of a business covering both the strategic and operational angles. These covers: research, business development, marketing, operations, management, business controls, risk management, financing, forecasting and financial data. (Chapman, 2007). Businesses experience constant change and therefore require a robust approach to manage their risk exposure (Chapman, 2007). ERM has shifted from the 'silo' approach of risk management and takes into account a corporate wide view (Jabour & Kader, 2015) and has received a lot of acceptance in the recent years due to the incompleteness of the silo approach which fails to encompass all risks (Barton, Shenkir, & Walker, 2002).

Research indicates that many financial institutions have developed the ERM framework while others are at the implementation stage. Emphasis has been put on the importance of a CRO as well as development of an ERM framework. In Kenya for example, the insurance regulator (IRA) issued guidelines on risk management with the aim of ensuring that insurance and reinsurance companies are managed in a sound and prudent manner. Further, taking into account the complexity of insurance business, regulators globally have introduced risk based capital models that encompass all risks and ensure that insurance companies maintain sufficient capital to meet their obligations. Besides looking at the capital adequacy, such models support in the assessment of the key risks, namely: operational risk, market risk, insurance risk and credit risk (Jabbour and Kader, 2011).

Insurance companies offer protection to policyholders in return for a premium payment. They are required to pay the claims as they fall due and therefore, capital must be held by the companies 'in order to fulfill the promise under all circumstances. In order to mitigate the risk of insolvency and ensure the objective of maximizing shareholders' wealth is met, companies should accurately assess the amount of capital that is adequate by allocating the capital to different units (Vercour, 2013). A number of researches have been conducted on specific risks and not on an integrated risk management approach. In addition, several researches focused on the effect of ERM on firms' performance both globally and locally but little has been done on the effect of risk management on capital allocation on companies in the insurance industry (Jabbour and Kader, 2011). This study will therefore assess the impact ERM has on capital allocation on insurance companies.

1.1.1 Enterprise Risk Management

According to COSO (2004), ERM ensures all policies and procedures effected by board of directors, management and other personnel are adhered to in order to meet business objectives and manage risks appropriately within the company's overall risk appetite. This process enables regular reviews which reflect the changing business environment. Risk management is moving away from the 'traditional risk management' approach to a holistic approach which considers all types of risks the company is likely to face. The silo risk management approach may not achieve the objective of risk management unless it's combined into a comprehensive framework at the entity level (Siokis, 2001). The principal objective of ERM is to increase the net assets (or shareholders' funds) by managing risks appropriately and hence allocating capital to business ventures in an efficient manner (Perrin, 2004). Zeppetella (2002) shows that a number of insurance companies have come up with risk management strategies to manage solvency and

capital allocation among business entities. Adoption of ERM has introduced a lot of changes in how insurers operate (Acharya, 2008).

Further, risk-based capital models, have increased accountability in insurance firms since it represents risk profiles (Mikes, 2009). RBC provides a holistic approach of risk management and takes into account the size and risk profile of a company. It takes into account material risks that are likely to be faced by the insurer. Insurance firms deal with a number of risks, this include; market, credit, insurance and Operational risks. Operational risk is seen as the most important risk domain by U.S. corporate executives (Perrin, 2004). Operational risk covers both internal and external business activities. Unlike market risk and credit risk, there is no accepted approach to quantify operational risk. Insurance risk is the risk of holding inadequate premium and claims reserves, such that the actual claims end up being higher than the estimated provisions. Credit risk is the risk that counterparties in a transaction default. For insurers, the main sources of credit risk include: premium receivables, bank deposits, reinsurance exposures and corporate debt instruments held (IRA, 2016).

Market risk arises when the value of the financial instruments held reduces due to market movements, namely: interest rates, inflation, exchange rates, or other macro-economic factors and hence leading to lower profits and shareholders' funds (Nocco and Stulz, 2006). Market risk is associated with the soundness of a company's statement of financial position and the risk inherent in the investment portfolio. Apart from the above mentioned risks which are key in determining the capital adequacy of an insurer, other risks that are considered include: Liquidity risk which arises from inability to raise funds to meet obligations as and when they arise, Strategic risk (risk associated with a business model and how company intends to position itself

in the market); Contagion risk (risk arising from one source, however, the impact affects a huge chunk of a business); and Related party risk (risk arising from members of a larger group/holdings) Nyagah (2012).

1.1.2 Capital Allocation

Capital allocation involves apportioning of capital to different business units that are being run by a company (Cummins, 2000). Profitability of a business unit can be significantly affected by capital allocation (Boddof, 2008). Optimal capital allocation ensures that capital is apportioned in a way to maximize shareholders' wealth subject to the risk taken. Consequently, it is important to be able to measure appropriate variables that quantify return and risk. Risk capital is commonly used as a measure of capital allocated to an insurance company. This is a measure of the amount of capital that is adequate to cushion a business against the risks that it faces (IRA, 2016). Unlike regulatory capital which does not allow for the specific nature of an institution's risks adequately, risk capital ensures that all risks undertaken are well allowed for (Insitute & Faculty of Actuaries, 2016). This capital is measured by fitting a model that best quantifies the underlying risks, namely: operational risk, credit risk, business/insurance risk and market risk (Wang, 2016). The structure of a standard model derived statistically has been agreed upon in most jurisdictions across the world and mainly the European Union's Solvency II model and Kenya's Insurance Regulatory Authority's Risk Based Capital (RBC) model. However, the parameters (or risk charges) applied in these models differ due to the market differences.

Capital ensures that a company will meet its obligations when there is a strain in the business. In case the capital goes below the required margin, the insurer should inject the additional amount to meet the requirements. Policyholders provide the initial capital to the insurance industries through purchase of policies that protect them against unwilling financial incidents (Vercour,

2013). Every insurer should ensure the economic capital is properly determined and allocated across the different lines of insurance (Vercour, 2013).The firm's ability to remain a going concern can be measured by capital adequacy (Jabbour, 2011). Adequate Capital is required for insurers to absorb significant unforeseen losses. Capital ensures that in difficulties, an insurer will meet its obligations to policyholders (Jabbour and Kader, 2015).If capital fall shorts of capital requirements, an additional amount of capital is required for regulatory purposes.

There are various capital allocation methods, these include; Capital Asset Pricing Model (CAPM), Value at Risk, percentage of average assets, regulatory guidelines / risk based capital, top down, relative ranking and market comparable. A part of some or all of these methods could be used in order to build an appropriate capital-allocation mechanism for a firm (Weiner, 1998).As indicated above, insurance companies can use varying approaches to allocate capital. However, the methods and their role in maximizing value are not empirically examined. Moreover, there is no comprehensive study on how ERM impacts selection and assessment of the various approaches of allocating capital (Jabbour and Kader, 2011). This research will illustrate the relationship between the ERM and Capital allocation and its impact. This study will help improve the existing literature.

1.1.3 Enterprise Risk Management and Capital Allocation

A recent shift in calculation of capital has to a larger extent improved the implementation of ERM. Risk management is a major concern for both senior management and shareholders for insurance firms. This is because it ensures all relevant material risks on an insurers' overall financial position are appropriately and adequately recognized and encompasses all risks

including those that are operational and those not easily quantified. The major issue in insurance is the efficiency and effectiveness of capital investment in generating sustainable returns (Hoyt and Liebenberg, 2011).

Capital is placed in an insurance company to support the risks emanating from the business. Ideally, the risks are quantified across the different business units and the risk capital that is adequate to cushion those risks is determined (Aziz and Rosen, 2004). Risk is a crucial element in determining the amount of capital to hold for a business as the more risk a business carries, the more capital needed to back the risks. Therefore, it is very important to manage the underlying risks adequately in order to ensure that excessive capital is not tied to a business, but any excess is deployed to other return generating business ventures (Jabbour and Kader, 2011).

Capital allocation practices are shifting towards risk based approach; a good example is the risk based capital which as earlier indicated which encompasses all risks inherent in businesses. A proper capital allocation strategy should ensure that the shareholders' funds increase through generating adequate returns; this fulfills the purpose of ERM (Nocco and Stulz, 2006). On the other hand specific capital allocation practices may misguide financial decisions (Grundl & Shmeiser, 2007). A survey revealed that the primary objective of ERM is to create and increase the shareholders' funds through appropriate risk management decisions and capital allocation. It is through the ERM framework that a firm is able to evaluate the performance of the various business ventures owned by the firm in terms of profitability as well as the ability to meet the cost of capital (Cummins, 2000).

1.1.4 Insurance Firms in Kenya

The Insurance Act (CAP 487) of the laws of Kenya is the principal legislation that governs the insurance industry in Kenya. The Insurance Regulatory Authority (IRA) regulates the industry. The regulated entities include; insurance and reinsurance companies, insurance intermediaries (medical insurance providers , agents and brokers) and other service providers (that is, claims settling agents, loss assessors, surveyors, investigators and risk managers) all of whom are licensed by the Insurance Regulatory Authority (IRA). As at today, there are a total of 55 regulated insurance underwriters operating in the Kenyan market out of which 51 are insurance companies and 3 reinsurance companies. Further, the insurance companies are divided into three; 26 underwriters for general (non-life) insurance business, 15 underwriters for long term (life) business and 11 underwriters under composite insurance (underwriting both life and general business).

The insurance industry in Kenya was reported to be growing rapidly compared to other countries in Africa (Sigma 4/2015). Currently, the overall insurance penetration as a percentage of the GDP is at 2.93%, almost triple that of Tanzania and Uganda (EY report). Kenya is also reported to be the largest market in East Africa. Some of the locally registered insurance companies have established subsidiaries and associate companies within the East African Community. The industry continues to experience significant growth as foreign investors seek to invest in our market. Some of the foreign entrants include: Saham Group, Barclays Group, Leapfrog, Prudential Life Assurance and Allianz group.

The insurance sector is however faced with constant changes from various regulatory bodies. The industry has recently phased out from rule based regime to risk based regime. In the new regime, the Insurance Regulatory Authority introduced the Risk based Capital which requires an

insurer to hold capital commensurate to its size and risk. This provides a holistic approach to risk management (IRA, 2016). The new capital requirements may strain the insurers and possibly have an impact on their capital injection frequencies. Thus, insurers need to enhance their risk management systems and capital allocation mechanism.

Financial performance is a building block to the capital allocation process and therefore financial risk management is important in any capital allocation process. Inefficient allocation of capital leads to higher capital requirement to support the underlying huge risks which may not even be generating adequate risk premium to cover the risks. This ends up leading to lower return on capital employed and hence, reducing the shareholders' funds. This study therefore provides a rationale that ensures maximization of shareholders' funds by optimally allocating capital to the various business units owned by a firm. This will be achieved through effective risk management by applying ERM framework (IRA, 2016).

1.2 Research Problem

The insurance industry is a major contributor to the world economy. This is well demonstrated by the wide coverage of this industry across the globe with some of the major insurance providers spreading their operations in various countries with the aim of maximizing returns. However, there are a number of challenges which come up while making the decision as to whether to start a new business unit in a given country or even whether to continue, vary or totally discontinue operations for an existing unit. These relate to: regulatory constraints, environmental and social differences and in some instances, limitation of specialized skills within the jurisdictions where the companies intend to set up offices (Perrin, 2004).

One major challenge that faces these organizations is how much capital outlay should be set aside for each business unit that is being operated under the group. Regional insurers have traditionally relied on the minimum capital requirements stipulated by the insurance regulators in the different countries. Several regional insurance regulators base the minimum capital requirements on a “one-size-fits-all” approach where a flat amount is set for all insurers. This approach poses challenges to the regional insurers since in most cases, it does not reflect the kind of strategy undertaken by the organizations and even the underlying risks. Further, this does not take into account the size and nature of the different business units, hence deemed unfair.

Consequently, regional companies end up with capital deficits after a period of operation requiring them to inject unplanned capital to the business units affected. A second disadvantage of the regulator’s approach of determining the required capital is that it is difficult to optimize returns subject to allocated capital since the companies end up injecting capital to the various business units without understanding the kind of returns that they will derive from the units. This sometimes contradicts the underlying principle on which the businesses are set up – that is, to maximize returns for shareholders who have placed the capital.

It is therefore imperative that the regional insurers adopt an approach that ensures efficient capital allocation to the various business units in order to ensure that the objective of shareholders’ is achieved. To ensure that the capital held is adequate to cover the risks undertaken by the business, there is need to ensure that there is a linkage between the capital and the risks undertaken (Jabbour and Kader, 2011). An insurer should consider its size and risk profile while determining the capital to be allocated. Underlying risks are considered as a basis of effective capital allocation, however, many companies have not implemented/developed enterprise risk management frameworks. Further, the RBC model introduced in Kenya

introduced risk capital charges on the various risks to help companies manage their risks and maintain efficient capital. Therefore, a proper risk management will improve the capital adequacy of an insurer (IRA, 2016). However, many insurers do not appreciate the effectiveness of the model. This continues to be a challenge in the insurance industry in Kenya.

Different studies in Kenya have focused on specific risks and their effect to financial performance, these include; credit risk management (Njiru, 2003; Kioko, 2008; and Wambugu, 2008), information systems risk management (Weru, 2008) and foreign exchange risk management (Kipchirchir, 2008). So far, no study has been conducted locally on the impact of ERM on capital allocation among insurance companies. Global studies also reveal that much has been done on benefits of ERM and not on impact of ERM on capital allocation. It is therefore evident that there is no distinct proof of the impact of ERM on capital allocation. This presents a gap as far as studying the control of ERM practices on capital allocation of insurance firms is concerned. The research question was therefore, what is the effect of enterprise risk management on capital allocation among insurance firms in Kenya?

1.3 Research Objective

To determine the effect of ERM on capital allocation among insurance firms in Kenya.

1.4 Value of the Study

Senior executives and board directors need to understand and appreciate the concept of risk management in relation to capital allocation. It will help the shareholders to understand the importance of identifying, monitoring and mitigating the inherent risks.

This study is important to insurance firms as it shows the value of having and implementing enterprise-wide risk management measures in their organizations to maintain an efficient capital adequacy.

Scholars will get more knowledge on enterprise risk management among insurance firms or any other firm in Kenya. Further, this can be used as a guide for purposes of furthering future research.

CHAPTER TWO: LITERATURE REVIEW

2.1 Introduction

This chapter covers the; theoretical and empirical studies (both local and international) and the conceptual framework.

2.2 Theoretical Review

There are various theories that are related to enterprise risk management. The theories have been borrowed from finance literature. These theories are CAPM, Modern Portfolio Theory and Arbitrage pricing theory.

2.2.1 Modern Portfolio Theory

The MPT theory emphasizes on the idea of risk and return. The focus of management as dictated by this theory is to choose a portfolio that ensures lower risk while trying to increase the potential returns (Markowitz, 1952). The theory determines high returns for a given level of risk. MPT explains the concept of diversification in investing, where the various assets held within a portfolio change their values in different directions. For example, when interest rates increase, the value of bank deposits increase in value due to high income earned whereas the value of traded bonds reduce. The MPT relies on the idea that a well-diversified portfolio is expected to have lower risk than individual risks from the assets when considered separately (Markowitz, 1952).

Like ERM, MPT theory looks into all risks in a portfolio where all risks are correlated (Nocco and Stulz, 2006). The theory looks into the holistic risk management hence brings out the

relationship with ERM. Further, insurance companies invest on behalf of the policyholders and therefore must ensure that the portfolios they invest in maximize returns and minimize risks.

2.2.2 Capital Asset Pricing Model

CAPM determines cost of capital on firms as well as the performance of the underlying portfolios being managed. The theory explains the relationship between risk and return thus represents an extension and simplification of the model by Markowitz (1952). Unlike the portfolio theory where investors choose portfolios that are efficient by minimizing risks, given expected return, or through maximizing expected return, given a certain level of risk; the mean-variance model is changed into a market-clearing asset-pricing model by the CAPM theory where investors agree on the distributions of returns and may borrow or lend without limit at a risk-free rate. The market for borrowing and lending is cleared by the risk-free rate.(Fama & French, 2004).

Despite the controversies and criticism of the CAPM both theoretical and on empirical grounds, CAPM is a common risk-return equilibrium model which continues to be used in the finance field. CAPM explains how investors and managers can gauge their investments and differentiate the expected returns from the required returns. If the expected return is not favorable then the investors' intentions in a particular investment should be considered. This theory implies that for effective ERM, firms should institute efficient portfolios that offer maximum returns and minimum risks.

2.2.3 Arbitrage Pricing Theory

APT is commonly used an alternate to the CAPM theory (Ross, 1976). The theory is based on a notion that returns on assets can be envisaged from the relationship between assets and risk. APT, like CAPM shows that the expected returns on assets are linearly related to their covariance's with the market portfolios return Unlike CAPM which requires the markets expected return, APT considers the risk premium and expected return from assets. The APT is a factor model of returns and arbitrage. It assumes that a number of macro-economic factors for example; exchange rates, indices, inflation, fluctuations in interest rates have an impact to the assets return (Ross, 1976). This allows for selection of specific factors that affect the stock price. The theory assumes that; profit maximization is the goal for all market participants, arbitrage does not exist unless otherwise then participants will benefit bringing the market to equilibrium and markets are frictionless.

Due to its simplicity and flexibility, the APT theory can be applied in several practical applications. These include; Evaluation of funds, capital budgeting, cost of capital and asset allocation among others. In this study, two applications may apply. As illustrated in the RBC model, market risk management is taken into account by taking into account risk factors applied on changes in the financial instrument. Capital budgeting is fundamental in the process since the capitalization structure will be in scrutiny through pricing of assets. The insurer can also evaluate funds and align its assets accordingly. ERM again plays a major role as APT theory explains the relationship between risks and returns in asset pricing.

2.3 Determinants of Capital Allocation

Each business requires capital to support its operations throughout so that the business can run on an on-going basis. For an insurance company, which mainly accepts risk to derive returns for its shareholders, the capital requirement is vital to absorb potential risks that materialize over and above the expected level. Therefore, the main objective while allocating capital to insurance companies is to ensure that the underlying risks that such businesses face are supported. These risks mainly include: insurance, market, credit, operational and liquidity risks as earlier defined. These risks are the determinants of the capital to be allocated to an insurance company for it to be able to run its operations. The following summarizes the determinants of risk capital including the appropriate measures for each of them.

2.3.1 Insurance risk

As defined earlier, this risk generally relates to inadequacy of premium and claims reserves held by the insurance company. The premium charged for the risk accepted by an insurer should be able to cover the claims and expense costs adequately. However, the risk emanates from the fact that the claims costs as well as some expenses are contingent on the insured events actually occurring. This introduces uncertainty in the pricing and reserving processes for insurers. The ultimate indicator of this risk is the underwriting profit reported in the financials. If a company is well cushioned against the insurance risk, the underwriting profit is expected to be positive, otherwise, it would be negative. Therefore, a good measure of insurance risk would be the underwriting profit realized by an insurer, which then would be the variable considered in the analysis.

It is expected that the higher the insurance risk (that is, underwriting losses), the higher the capital required to support the insurance company and vice versa. ERM should be able to address the management of this risk through identification of the root causes, quantification of both the inherent risk as well as the residual risk after allowing the mitigating actions. With application of ERM, an insurer is expected to increase its underwriting profits (therefore, reducing insurance risk) and hence, reducing the risk capital (that is, capital allocated).

2.3.4 Market risk exposure

This risk generally defines the reduction in value of financial assets held to back the insurance liabilities. It is usual practice for insurers to invest in financial instruments which are more liquid and marketable and therefore be in a position to meet the insurance liabilities as and when they fall due. The underlying drivers of market risk exposure include:

Amount of equities held – Equities are usually volatile and as a result, expose companies to market risk. The more the equities held the higher the market risk and hence the higher the capital requirement.

Amount of property held – Property is usually illiquid and therefore, significant haircuts could be taken by investors when in distress and therefore, the urgency of liquidating. In addition, the values of property change over-time to reflect the market demand and supply. The higher the exposure in property, the higher the capital is required to be allocated to an insurance business.

Amount of miss-match between assets and liabilities – Assets and liabilities can be mis-matched by currency, term, amount and nature. The more the miss-match is the higher the risk exposure and hence the higher the capital requirements Market risk exposure will therefore be

measured by adding up all the equities, investment property, foreign currency denominated assets and government securities that have a tenor of more than one year.

2.3.5 Credit risk exposure

This is the risk that counterparty defaults on an agreed transaction. The more the business assets are exposed to counterparties that have the potential to default, the more likely the risk of default on the company's assets. A business with more credit exposure is expected to have more capital to cushion itself against the default risk. The following summarizes the assets that are exposed to credit risk:

Premium Receivables –This is the amount booked as revenue by the company, however, it is yet to be collected from the customers. The more a company gives credit to its clients, the more credit risk it is exposed to in case the customers end up not paying up and hence, the more the capital expected to support credit risk.

Reinsurance Receivables and Share of Liabilities –Reinsurance receivables include the actual amounts owed to the insurer by reinsurers. For example, reinsurance commissions and actual claims recoveries. The reinsurance share of liabilities is the share of liabilities to be recovered by the insurer from the reinsurer when a claim occurs in future. This is usually contractually agreed at onset. The higher the amount of reinsurance receivables and reinsurance share of liabilities, the more credit risk an insurer is exposed to in case the reinsurers end up not paying up and hence, the more the capital expected to support credit risk.

Bank deposits –This is the amount of funds kept in banks. If a bank is declared bankrupt it will be unable to give back the deposits placed by the insurer when required. The more bank deposits a company has, the more credit risk it is exposed to in case bank becomes bankrupt.

Corporate debt instruments- This include commercial paper and corporate bonds invested by the insurer to derive an investment return. The risk is that the counterparties raising the debt become unable to redeem the debt when the maturity date falls due. The more corporate debt instruments an insurer has invested in, the more credit risk it is exposed.

2.3.6 Operational risk

This is the risk of loss emanating from failed internal processes, people, and systems or caused by external events. There has not been a fully agreed measure of operational risk across the world; however, revenue has been usually cited as a good indicator of operational risk. This is due to the fact that large organizations with high revenue are likely to have more complex process and therefore, likely to suffer more from operational failures.

2.3.7 Liquidity risk

This risk arises when an insurer does not have adequate liquid assets to meet its liabilities as they fall due. The liquidity of a short-term insurer is well measured by comparing the amount of liquid assets (quoted equities, T-bills, cash and bank deposits) to the amount of liabilities likely to fall due in one year. The difference between the liquid assets and these liabilities is known as **net liquid assets**. The higher the net liquid assets, the lower the liquidity risk and vice versa.

2.4 Empirical Review

Different global studies have been done on ERM but little has been done on risk management and its relation to allocating capital and therefore there is no clear link between ERM and capital allocation. Further, a majority of the local studies focus on single risks in isolation rather than the full scope of the underlying risks. This approach does not sufficiently manage the risks of an

enterprise in an efficient manner due to the silo approach. It is important to note that when all risks are managed together through ERM approach, then, a business is likely to benefit from diversification effects and therefore reduce the required capital. The studies analyzed have not demonstrated how ERM can be applied holistically to manage all risk in an organization and therefore reducing the capital required. This chapter will summarize some of the empirical studies done.

2.4.4 Global studies

Liebenberg and Hoyt (2003) examined the determinants of ERM evidenced from appointment of CROs. The study was conducted on U.S. companies that have appointed a CRO to implement and manage the ERM. The population size included all U.S companies and the samples sizes constituted of 26 companies that have a CRO or senior personnel's in risk management positions and have all the relevant data to enable the study. Variables used in the study include; leverage size of company, earnings, stock price volatility, UK/Canadian regulation and growth. The study revealed that companies that appoint a CRO have a greater financial leverage. Further, financial services tend to appoint CROs compared to other industries.

Kleffner, Lee, and McGannon (2003) examined the effect on corporate governance on the use of enterprise risk management in Canada. The study was conducted on companies that were publicly listed in year 2001. It was administered through a survey with response rate of 35%. The survey revealed that even though not all respondents have adopted ERM, most companies are moving towards adoption. The survey focused on size of firm, structure of risk management function, risk management positions, level of ERM implementation and factors affecting the adoption of ERM programs. In addition, the results identified risk managers, board of directors

and compliance with the guidelines from their stock exchange (Toronto stock exchange) as some factors that influence the adoption of ERM.

Beasley (2006) suggested that top management leadership (board and senior management) play a critical role in ERM deployment. In addition, ERM implementation also depends on industry, size, auditor type, and country of domicile. This was through his study conducted on 122 organizations across different countries to study the impact of ERM on the Audit function. The survey was lengthy to ensure a lot of information is gathered on the level of ERM implementation as well as the overall organization information. This was done using the online format.

Pagach and Warr (2007) examined the factors influencing enterprise risk management adoption. The CRO was used as a proxy in the decision to implement ERM. The study reveals ERM programs are initiated by highly leveraged and volatile earnings firms and firms that have exhibited poorer stock market performances when the value of the CEO's option and stock portfolio is increasing in stock volatility, the firm is more likely to adopt ERM.

Gordon, Loeb, and Tseng (2009) studied 112 US companies in 2005 to examine the impact of ERM on performance using linear regression. ERM was measured using an ERM index created by the author and performance was measured using excess stock market return. The results showed a significant positive relation between ERM and firm performance. The study also revealed that this was contingent upon proper match between a firm's ERM system and five firm specific factors.

Hoyt and Liebenberg (2011) examined the value of ERM on US insurers. The study measured ERM program implementation and its value. The study was in 125 US insurers between 2000 and

2005 using a maximum likelihood model. Tobin's Q is used as a proxy for firm value to measure the effect of ERM. The study revealed that the size of the firm and ownership represents a positive use of ERM programs while the use of reinsurance and leverage are negative.

Tahir and Razali (2011) examined how ERM impacts shareholder value of 528 Malaysian firms in 2007 using linear regression model. ERM was measured using secondary data from Osiris database and shareholder value was measured using Tobin's Q. The study found a positive but insignificant relationship between ERM and shareholder value.

Ping and Muthuveloo (2015) studied how ERM affects performance of firms that are publicly listed in Malaysia. The survey used questionnaires which were sent to a population of 800 companies listed in the Malaysia market. The researcher collected 103 questionnaires that were used in the study; this represented a response rate of 13.38%. The data was analyzed by use of partial least squares and structure equation modeling tool. The study revealed that ERM implementation has a significant influence on the performance of a firm. Further, Board of Directors, firm size and complexity influences ERM.

2.4.5 Local studies

Njiru (2003) examined how cooperatives manage their credit risks. The study was done among cooperatives in Embu District. The study was a survey of coffee co-operatives in the area. The results revealed that the methods of managing credit risk were similar to the ones commonly espoused in finance textbooks.

Further, Kipchirchir (2008) examined foreign exchange risk management among motor vehicle firms in Kenya. This revealed that hedging was the common foreign exchange risk management

method. Weru (2008) did a case study on information systems risk management practices of firms. This revealed the use of various information system risk management strategies.

Gakure, Ngugi, Ndwiga and Waithaka (2012) studied the techniques of credit risk management used by commercial banks and microfinance institutions respectively. Kariuki (2017) also did a survey on savings and credit cooperatives in Kenya to assess the impact of credit risk management practices on financial performance. This illustrated the various credit risk management methods used by commercial banks.

Waweru and Kisaka (2013) investigated the level of ERM implementation and its effect to the value of companies listed on the Nairobi Securities Exchange as measured by Tobin's Q. The main output of this study is that there is a positive relationship between the level of implementing ERM and the growth of the value of shareholders' funds.

Nyagah (2014) measured the extent to which ERM practice affects the financial performance of pension fund management firms in Kenya. The study found that risk assessment, objective setting, and information communication had negative significant effects while internal environment and control activities had positive significant effects on the financial performance of pension fund management firms in Kenya.

Kimotho (2015) examined the relationship between ERM practices and financial performance among commercial state corporations in Kenya. The study revealed a significant number of the state corporations have ERM's framework which have been fully implemented. The results show that the SCs had adopted operational risk management, financial risk management, strategic risk management and governance risk management practices to great extent and therefore the ERM practices affect the Financial Performance of commercial SCs in Kenya.

2.5 Conceptual Framework

Insurance firms are exposed to five major risks namely: credit risk, market risk, insurance risk, liquidity risk and operational risk. Each of these risks has a measure that reflects the amount of that risk as described in section 2.3. These measures/variables are the factors that influence the amount of risk capital to hold in order to adequately cushion the business against the risks faced. In order to ensure effective capital management, ERM is applied to ensure that there is little or controlled exposure to the risks. An example is credit risk management where government securities are deemed to be less risky as compared to corporate bonds, and hence, by converting corporate bonds into government bonds an insurer is expected to reduce the credit risk and consequently, the aggregate risk capital.

In conclusion, insurers are required to hold capital commensurate to their risks, therefore if the risks are too high the insurer should increase the capital allocated to its business (that is, risk capital) Application of ERM is expected to lower the capital allocated to a business and as a result enable the shareholders allocate excess capital to other return generating businesses. This action ultimately is expected to boost the overall return on capital for investors.

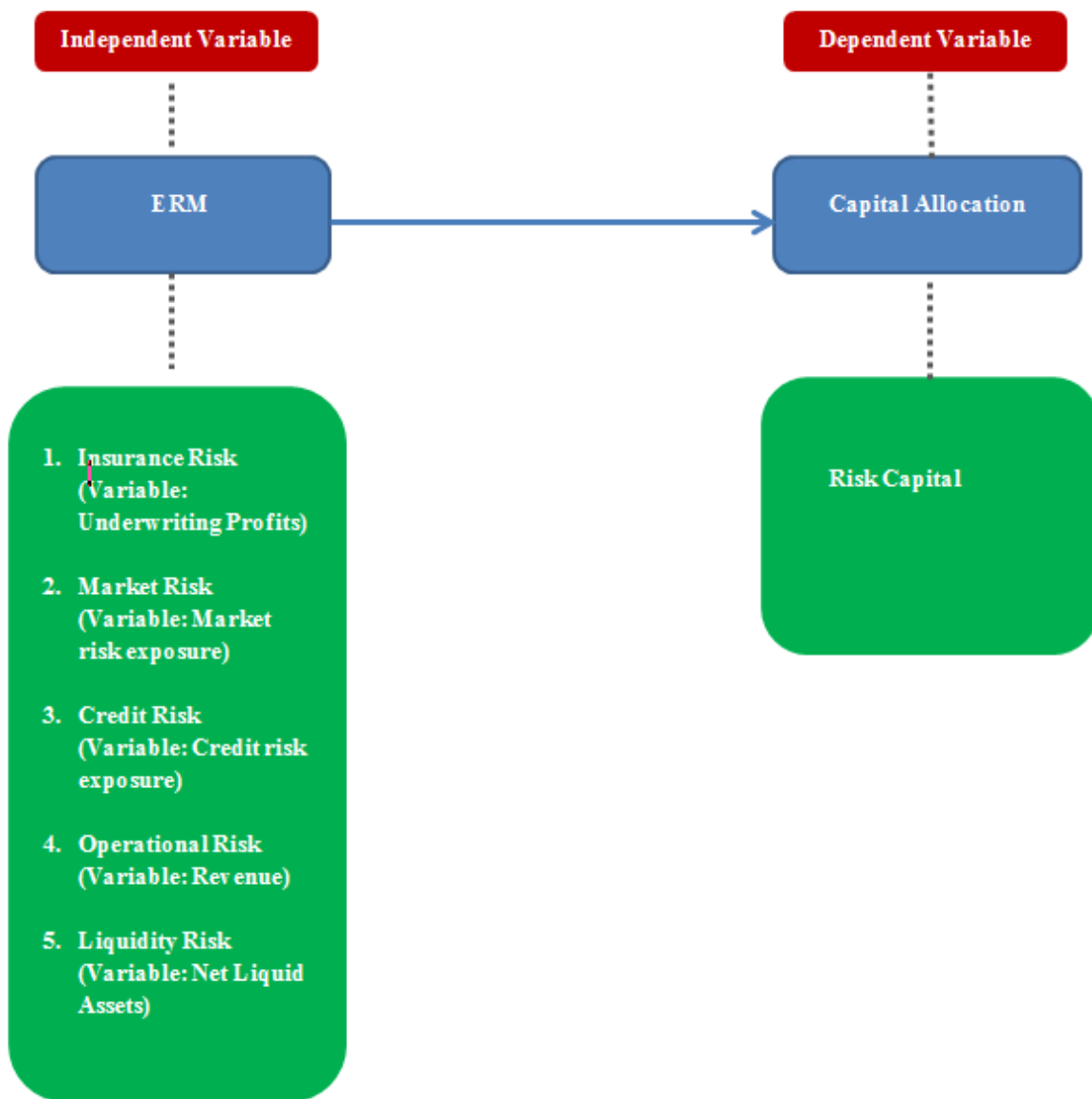


Figure 2.5 : Conceptual Model

Source IRA

2.6 Summary of Literature review

The three theories mentioned in this section explain the adoption of ERM practices in organizations. The theories are built on the relationship between risk and return. The theories are based on the notion that a well-diversified portfolio reduces the risk exposure. Investors can gauge their investments and invest in assets where they expect high returns. The ultimate goal of ERM is maximization of shareholders wealth which can be seen from the mentioned theories.

A number of international studies have focused on determining the effects of ERM on performance of companies that are publicly listed in different jurisdiction while others focus on the level of adoption and drivers. However, not much has been done on the effect of ERM on capital allocation. Further, the different approaches deployed have not gone in depth to demonstrate practically the effects of ERM on capital allocation (Weru, 2008). No research has been conducted to specifically cover the relationship between the two variables for insurance companies in Kenya and therefore there is no information on the effect of risk management on capital allocation for insurance business. In addition, majority of the local studies conducted in Kenya pay attention to specific risks and the impact they have on financial performance of different industries.

The different approaches of allocating capital discussed above have both positive and negative attributes. The user should be able to understand the approaches as well as the various attributes. Nevertheless, the common feature between the approaches is that the user needs to define the risk appetite. This is the acceptable level of probability of a business becoming insolvent.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 Introduction

This chapter sets out the methodology applied in conducting the study. It describes the research design, population, sample, and collection of data and the analysis of data used in the study.

3.2 Research Design

Kothari, Rammna and Skinner (2010) refer to research design as the blueprint for collecting, measuring and analyzing data. The study employed a descriptive research design which involves collection of data in order to answer questions regarding the current status of the subjects in the study. The study was used to discover and measure the cause and effect of relationships between variables. It seeks to illustrate the relationship between ERM and capital allocation which can only be achieved through the descriptive research design. This design will present a clear picture of the relationship of the different variables.

3.3 Population

The population consisted of all insurance companies licensed to operate in Kenya. There were 55 regulated entities in the industry as at 31st December 2016. The source of the population is the Insurance Regulatory Authority where a list of licensed entities was obtained (Appendix 1)

3.4 Sample

In instances where the population is very large, a sampling criterion is used to identify an ideal sample size to enable examination. Due to the large population and complexity in illustration, a

sample from the population was examined which comprised of 34 insurance companies. The sample was representative of the population and provides a homogeneous set of data.

3.5 Data Collection

Secondary data was obtained from published financial statements for insurance companies' and IRA annual publications which include data from the company's revenue account and statement of financial position. The data extracted included; revenue, bank deposit, cash balances, equities, government securities, property, total liabilities, premium receivables and reinsurance exposure. This data was collected and summarized through a data collection form. Data was obtained for the year ending 31st December 2016.

3.6 Data Analysis

This section summarizes the approach used to carry out the analysis which establishes the relationship between ERM and capital allocation. The data analysis involved fitting a regression model to the determinants of capital allocation. The dependent variable as highlighted in the conceptual framework is the capital allocated (i.e. risk capital) and the independent variables are the measures of the five risks identified through the ERM approach. The model was derived and tested for goodness of fit. This demonstrated how ERM was used to reduce the risks and hence, measure the resulting impact to the risk capital.

3.6.1 Analytical model

This section details the structure of the models to be used in analyzing the data obtained.

Capital allocated (i.e. risk capital) = f (ERM)

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \varepsilon$$

Where:

Y is the capital allocated measured by risk capital.

X₁ is the underwriting profit. This variable measures insurance risk as the premium charged should be adequate to cover incurred claims and expenses. If this is not the case, the insurer is exposed to insurance risk as the premium is not adequate to cover the future claims and expense costs.

X₂ is the market risk exposure. This is the total amount of assets that are subject to changes in value due to market movements like economic changes as well as demand and supply. A good example is the amount of equities that an insurer has invested in. This variable is a good indicator of the level of market risk.

X₃ is the credit risk exposure. This is the total amount of assets that are subject to potential default risk. For instance, premium and reinsurance receivables are major sources of credit risk for the insurance companies. This variable is a good indicator of credit risk.

X₄ is the revenue amount. This is a good measure of operational risk as most regulators across the globe as well as insurance company use revenue as a base factor to estimate the operational risk exposure. This is due to the fact that large organizations with high revenue are likely to have more complex processes and therefore, likely to suffer more from operational failures.

X₅ is the net liquid assets. This is a measure of the liquidity risk of a business as it quantifies the excess liquid assets over the underlying liabilities that are likely to fall due in the short term, usually one year.

ε is the error term i.e. deviations of the observed values of the risk capital from the predicted.

3.6.2 Diagnostic Tests

The following diagnostic tests will be used to validate the model:

3.6.2.1 Correlation Test on Variables

A test was conducted for each of the variables in the model to check the correlation between the respective variable and risk capital. This assisted in validating the corresponding sensitivity factor obtained for that variable in the regression model. For example, if a positive sensitivity factor is obtained for insurance risk in the regression model, this will show a positive correlation between underwriting profit and risk capital. This then will be validated by obtaining the correlation between the risk capital dataset and underwriting profit dataset.

3.6.2.2 Goodness of Fit Tests on the Model

An F-test was carried out to test the goodness of fit of the model with respect to the actual data. This was done through Analysis of Variance (ANOVA). The test was carried out at 5% level of significance. In addition, a coefficient of determination was obtained to measure how much the model explains the allocated capital based on ERM.

3.6.2.3 Normality Test on Residuals

This test assessed whether the model obtained is a good fit. It is expected that if the model is a good fit, then the residuals (which are the differences between the actual data and expected results obtained from the model) are expected to fit a NORMAL (0, 1) distribution. To test this, a Q-Q plot was drawn to illustrate whether the residuals follow a NORMAL (0, 1) distribution. In

addition, a Chi-squared test was also carried on the residuals with the null hypothesis set as, “The residuals follow a normal distribution.”

CHAPTER FOUR: DATA ANALYSIS, RESULTS AND DISCUSSION

4.1 Introduction

This chapter presents the analysis of the sampled insurance companies in Kenya with the aim of demonstrating the effect of ERM on capital allocation among the insurance companies in the country. The data analyzed was based on 2016 financial results that are publicly available from IRA's website. The data belongs to 34 insurance companies and covers the risk based capital, underwriting profit, revenue, market risk exposure, credit risk exposure and net liquid assets for each of these companies. This data is detailed in appendix 2 for reference.

4.2 Descriptive Analysis

The table below summarizes the results obtained:

Table 4.1: Descriptive statistics

<i>Statistic</i>	<i>RBC (KShs Millions)</i>	<i>Underwriting Profit (KShs Millions)</i>	<i>Market Risk Exposure (KShs Millions)</i>	<i>Credit Risk Exposure (KShs Millions)</i>	<i>Revenue (KShs Millions)</i>	<i>Net Liquid Assets (KShs Millions)</i>
Mean	2,547	54	14,086	6,277	5,972	(2,426)
Median	1,008	10	3,130	2,465	2,301	(558)
Standard Deviation	7,393	364	41,997	18,190	17,378	8,094
Range	44,376	1,579	246,134	109,637	104,454	45,027
Minimum	204	(628)	373	209	63	(42,461)
Maximum	44,580	951	246,507	109,846	104,517	2,567

In the table above, it can be observed that the average required capital as at December 2016 for the insurance companies assessed was KShs. 2.5 Billion whereas the average revenue was KShs. 5.97 Billion.

On average, the companies recorded a negative liquidity position indicating that their short-term liabilities were not adequately backed by liquid assets. It is also notable that the businesses carry significant market risk in their balance sheets as the average market risk exposure is **KShs. 14 Billion**.

The sizes of companies greatly differ in the market if considered in terms of both required capital and revenue written. This is demonstrated by the significant ranges as computed between those variables. This demonstrates that there are other factors that influence the level of capital required. In the next sections we consider these factors which are related to the level of ERM applied.

4.3 Diagnostic Tests

This section summarizes some of the key diagnostic tests carried out on the model in order to validate it in order to ensure that it is a good fit to the actual underlying data.

4.3.1 Correlation Tests on Variables

The table below summarizes the correlation between the variables to be analyzed, and specifically in relation to each of the five independent variables to RBC.

Table 4.1: Correlation Matrix

<i>Variable</i>	<i>RBC</i>	<i>Underwriting Profit</i>	<i>Market Risk Exposure</i>	<i>Credit Risk Exposure</i>	<i>Revenue</i>	<i>Net Liquid Assets</i>
RBC	1.00	0.39	0.52	0.79	0.67	-0.58
Underwriting profit	0.39	1.00	0.53	0.24	0.00	-0.40
Market risk exposure	0.52	0.53	1.00	0.60	0.03	-0.20

Credit risk exposure	0.79	0.24	0.60	1.00	0.57	-0.45
Revenue	0.67	0.00	0.03	0.57	1.00	-0.17
Net liquid assets	-0.58	-0.40	-0.20	-0.45	-0.17	1.00

The table above shows the following:

There is a positive correlation between underwriting profit and RBC

There is a positive correlation between market risk exposure and RBC

There is a positive correlation between credit risk exposure and RBC

There is a positive correlation between revenue and RBC

There is a negative correlation between net liquid assets and RBC

4.3.2 Goodness of Fit Tests on the Model

This section presents the tests carried out on the fitted model to test whether it adequately fitted the underlying data. The model fitted was a multiple regression model with the RBC being the dependent variable whereas underwriting profits, revenue, market risk exposure, credit exposure and net liquid assets were the independent variables. This model was fitted to understand the influence of the risk management factors on capital allocated to an insurance company (that is, risk based capital).

The table below summarizes the results of tests carried out on the model fitted;

Table 4.2: Summary of Model Tests

<i>Summary</i>	
Multiple R	0.92
R Square	0.85
Adjusted R Square	0.82
F – Value	31.09
Significance F	0.00000001%

In the table above, multiple R is the correlation coefficient which tells us how strong the linear relationship is. The model shows a strong relationship as this measure is 0.92 which is closer to 1. R square (coefficient of determination) and adjusted R square on the other hand are measures that indicate how close the data are fitted to the regression line. The coefficient of determination obtained indicates that the proportion of RBC influenced by underwriting profits, market risk exposure, credit risk exposure, revenue and net liquid assets is 85%.

The F-statistic is used to test whether the model obtained is a good fit to the data and hence, has a predictive capability. The null hypothesis tested is that the model is not a good fit. This test is done at 5% significance level and therefore the critical value of 2.262. Since, the F-statistic (31.09) is greater than the critical value, then, the null hypothesis is rejected. The conclusion therefore, is that the model is a good fit to the data. This also supports that there is effect of ERM (measured by the control variables) on capital allocated (RBC). The p-value measure also supports this conclusion as it is 0.0000000% which is lower than the 5% significance level.

4.3.3 Normality Tests on Residuals

The residuals of the model were also tested in order to further validate the model. Below is a Q-Q plot of the residuals:

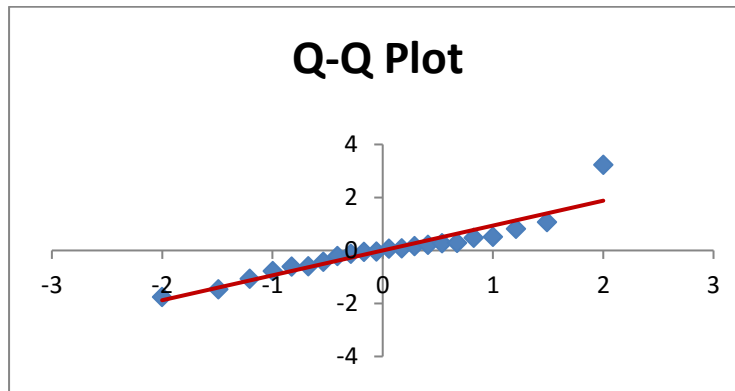


Figure 4.1: Q-Q plot of residuals

The figure above shows that the residuals fit a Normal (0, 1) distribution as they lie close to the straight trend line. This further validates the model results as it is expected that the residuals ought to fit closely to the Normal (0, 1) distribution if the model is a good fit.

In addition, a Chi-squared test was carried out on the residuals where the null hypothesis was that they followed a normal distribution. First the mean and standard deviation of the residuals was computed. Then, the residuals were classified in groups and the number of residuals in a each group recorded. Then, the expected number of residuals was computed based on the lower bound of each group by obtaining the cumulative normal distribution based on the computed mean and standard deviation of the residuals. The Chi-squared statistic was then obtained using the following formula:

$$\frac{((\text{Expected} - \text{Observed})^2)}{\text{Expected}}$$

The table below summarizes the results obtained:

Table 4.4: Chi-Squared Test on Residuals

<i>Variable</i>	<i>Observed</i>	<i>Expected</i>	<i>Chi-Squared Statistic</i>
Below -1.00	3.0	0.8	6.41
-1.00 to -0.75	3.0	4.6	0.57
-0.75 to -0.50	2.0	2.3	0.04
-0.50 to -0.25	3.0	2.8	0.02
-0.25 to 0.00	7.0	3.2	4.69
0.00 to 0.25	4.0	3.4	0.12
0.25 to 0.50	4.0	3.4	0.12
0.50 to 0.75	4.0	3.2	0.23
0.75 to 1.00	2.0	2.8	0.22
Above 1.00	2.0	2.3	0.04
Total	34.0	28.6	12.5

From the table above, the Chi-squared statistic computed is 12.5 and these results to a p-value of 0.09 based on 5% level of significance and 7 degrees of freedom. As the p-value is not less than 0.05, then, we fail to reject the null hypothesis. This test therefore concludes that the residuals obtained from fitting the regression model follow a Normal (0, 1) distribution.

The two normality tests above on residuals further support the conclusion that the regression model obtained is a good fit to the actual data.

4.4 Inferential Analysis: Regression Analysis

The next table below summarizes the coefficients obtained from fitting the regression model;

Table 4.3: Regression Model Coefficients

<i>Coefficients</i>	<i>Coefficients</i>	<i>Standard Error</i>	<i>t – statistic</i>	<i>p-value</i>
Intercept/Constant	165.06	137.39	1.20	0.24
Underwriting profit	0.10	0.33	0.32	0.75
Market risk	0.03	0.01	2.61	0.01

exposure				
Credit risk exposure	0.05	0.07	0.75	0.46
Revenue	0.20	0.04	5.02	0.00
Net liquid assets	- 0.10	0.03	-3.79	0.00

From the table above, the following model can be obtained:

$$Y (\text{RBC}) = 165.06 + 0.10X_1 + 0.03X_2 + 0.05 X_3 + 0.20 X_4 - 0.10 X_5$$

The table also shows that if all the five variables are held constant at zero, the minimum capital an insurer company ought to hold is KShs. 165 Million. A unit of underwriting profit targeted would require an additional capital of KShs. 0.10 Million, a unit of market risk exposure would require an additional capital of KShs. 0.03 Million, a unit of credit risk exposure would require an additional capital of KShs. 0.05 Million, a unit of revenue would require an additional capital of KShs. 0.20 Million and a unit of net liquid assets would reduce capital required by KShs. 0.10 Million.

Revenue, net liquid assets and market risk exposure were all significant variables since the p-value of each of them was below 0.05. However, credit risk exposure and underwriting profits were not significant as the p-values were greater than 0.05. The most significant variable was revenue followed by net liquid assets.

4.5 Interpretation of Results

The adjusted R squared in the study found that 82% of variation on capital allocation of insurance companies could be accounted for by underwriting profits (loss), Market risk exposure, credit risk exposure, revenue and net liquid assets. In addition, the multiple R which is the

correlation coefficient tells us how strong the linear relationship is. The model shows a strong relationship as this measure is 0.92 which is closer to 1.

The study shows that that underwriting profits /loss, market risk exposure, credit risk exposure, revenue and net liquid assets significantly affect the allocation of capital among insurance companies. The following regression analysis determined the impact of ERM on capital allocation among insurance companies in Kenya:

$$Y (\text{RBC}) = 165.06 + 0.10 X_1 + 0.03 X_2 + 0.05 X_3 + 0.20 X_4 - 0.10 X_5$$

The regression equation revealed that underwriting profits /loss, market risk exposure, credit risk exposure and revenue had a positive relationship with capital allocation of insurance companies. The study also shows a negative relationship between net liquid assets and capital allocation of insurance companies.

The study also revealed that revenue, net liquid assets and market risk exposure were all significant variables since the p-value of each of them was below 0.05. This means that more emphasis ought to be placed in managing the related risks through ERM in order to reduce the required capital. These risks are: operational risk, market risk and liquidity risk. The most significant variable was revenue which an indicator of operational risk and therefore, operational risk management would yield the highest results in terms of reducing the capital to be allocated to an insurance business.

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Introduction

This chapter concludes the study as well as giving recommendations. The conclusion and recommendations made will establish whether the objective of the study is met. The objective is to determine whether there is effect of ERM on capital allocation among insurance companies in Kenya.

5.2 Summary

Analysis of data from 34 insurance companies in Kenya was carried out where ultimately a regression model was fitted to understand the relationship between capital allocated (RBC) and five control variables which represent the underlying risks (insurance, market, credit, operational and liquidity). The following relationship was obtained:

$$Y (\text{RBC}) = 165.06 + 0.10 X_1 + 0.03 X_2 + 0.05 X_3 + 0.20 X_4 - 0.10 X_5$$

Where:

Y is the capital allocated measured by risk capital

X₁ is the underwriting profit

X₂ is the market risk exposure

X₃ is the credit risk exposure

X₄ is the revenue amount

X₅ is the net liquid assets

The results obtained indicated that there is a very strong linear relationship between the control variables and RBC. This was measured by Multiple R which was 0.92. In addition, the results also indicated that those five control variables considered explain 82% of the RBC. The model was also validated by testing whether it closely fitted the data and the results were that it was a good fit. This was done using F-test as well as Q-Q plot for the residuals obtained after fitting the model.

In addition, each variable was tested for significance in explaining the capital allocated. Revenue, net liquid assets and market risk exposure were all significant variables since the p-value of each of them was below 0.05. However, credit risk exposure and underwriting profits were not significant as the p-values were greater than 0.05. The most significant variable was revenue followed by net liquid assets.

5.3 Conclusion

From the analysis, it was noted that there is a strong relationship between the capital allocated to an insurance business and the amount of risk exposure. By applying ERM effectively, this risk exposure could be reduced and hence, reduce the capital allocated. For instance, the following approaches could be used to reduce each of the risk exposure by applying ERM:

Insurance risk reduction – applying reinsurance and adequately reserving

Market risk reduction– matching the duration of bonds to liabilities and reducing equity investments

Credit risk reduction – reducing corporate bonds and dealing with highly rated counterparties

Operational risk reduction –having documented processes and tested controls

Liquidity risk reduction – generation of positive cash flows and investing in liquid assets

This demonstrates a strong positive relationship between ERM and amount of capital allocated to an insurance business. In effectively applying ERM, the risk exposure in a business is expected to reduce and hence, the capital allocated.

This study also revealed the relationship between each of the control variables with the capital allocated. Underwriting profits, revenue, market and credit risk exposure had a positive relationship with capital allocated. This means that an increase (decrease) of each of these variables would lead to an increase (decrease) in the capital allocated to an insurer. On the other hand, there was an inverse relationship between net liquid assets and capital allocated. This means that with more net liquid assets, an insurance business will be required to have less capital allocated to support its operations.

5.4 Recommendation for Policy and Practice

The analysis and conclusion point is the need for insurance companies to adopt ERM as part of managing their risks and hence, the required capital they require to hold in order to meet the regulatory requirements as well as support their underlying risks adequately.

The research also recommends that individual risks components that lead to insurance, credit, market, operational and liquidity risks require constant identification, assessment and mitigation

by insurance companies since if they are left unchecked, it may lead to high capital requirements and hence, constrain the business. This for instance could be regulatory challenges if the minimum required capital is not met.

5.5 Limitations of the Study

A limitation of this study was lack of an appropriate proxy measure for operational risk. As much as revenue is a good indicator, more refined measures such as amount of operational losses would have been more accurate. The challenge experienced is that very few insurance companies collate this data and also, for those that do, this information is not publicly shared.

Secondly, only data for 2016 was considered as the Kenyan insurance regulator had began applying the risk based capital model during the same year. However, the data used was still reliable as it covered several companies and hence, provided an adequate sample.

5.6 Areas for Further Research

Further research has been recommended on quantification of operational risk for insurance companies including the effect on required capital. In this study, revenue was used as a proxy measure to operational risk. However, there may be other ideal measures that require in depth research and which then would depict a clearer relationship between the allocated capital and operational risk.

REFERENCES

- Acharya, D. M. (2008). In *Measuring the Benefits of Enterprise Risk Management in Insurance: An integration of Economic Value Added and Balance Score Card Approaches*. Society of Actuaries.
- Barton, T. L., Shenkir, W. G., and Walker, P. L. (2002). *Making Enterprise Risk Management Pay Off: How Leading Companies Implement Risk Management*. Prentice Hall, Pearson Education, Inc.
- Beasley, M. S. (2006). *The Impact of Enterprise Risk Management on the Internal Audit Function*.
- Boddof, N. (2008). *Capital Allocation by Percentile Layer*. Manchester: Willis.
- Chapman, R. (2007). *Simple tools and techniques for enterprise risk management*.
- Committee of Sponsoring Organisations of the Treadway Commission. (2004). *Enterprise risk management - integrated framework*.
- Cummins, J. D. (2000). *Allocation of Capital in the Insurance Industry*. *Risk Management and Insurance Review*, 1540-6296.
- Fama, E., and French, K. (2004). *The Capital Asset Pricing Model: Theory and Evidence*. *Journal of Economics Perspectives*.
- G, V. G. (n.d.). *Capital allocation surveys with commentary*. 8(2), 96-107.
- Gakure, P. R., Ngugi, J. K., Ndwiga, P. M., and Waithaka, S. M. (2012). *Effect of Credit Risk Management Techniques on the Performance of Unsecured Bank Loans Employed by Commercial Banks in Kenya*. *International Journal of Business and Social Research*, 221-236.
- Gordon, L. A., Loeb, M. P., and Tseng, C.-Y. (2009). *Enterprise risk management and firm performance: A contingency perspective*. *Journal of Accounting and Public Policy*, 301-327.
- Grundl, H., and Shmeiser, H. (2007). *Capital Allocation for Insurance Companies-What good IS IT?* *Journal of Risk and Insurance*, 301-317.
- Hoyt, R. E., and Liebenberg, A. P. (2011). *The Value of Enterprise Risk Management*. *The Journal of Risk and Insurance*, 795-822.
- Institute and Faculty of Actuaries. (2016). *Finance - Specialist Application*. London: Actuarial Education Company.

Insurance Regulatory Authority.(2016). Capital Adequacy Guidelines

Jabbour, M. (2011). The Impact of Enterprise Risk Management Strategies on Capital Allocation in Insurance Companies. British Accounting and Finance Association Conference, (p. 34). London.

Jabour, M., and Kader, M. (2015). Changes in Capital allocation practices. ERM and organizational changes.

Kariuki, N. W. (2017). Effect of Credit Risk Management Practices on Financial Performance of Deposit Taking, Savings and Credit Cooperatives in Kenya. *Journal of Business and Management*, 63-69.

Kathrin Brandmeir, D. M. (2016, April 26). Global Insurance Markets - Current Status and outlook up to 2016. Trend Watch, p. 11.

Kimotho, G. W. (2015). Relationship Between Enterprise Risk Management Practices and the Financial Performance Among Commercial State Corporations in Kenya. Nairobi.

Kipchirchir, D. T. (2008). Foreign Exchange Risk Management Practices: A Survey of Motor Vehicle Industry in Kenya. Nairobi.

Kleffner, A. E., Lee, R. B., and McGannon, B. (2003). The Effect of Corporate Governance on the Use of Enterprise Risk Management: Evidence From Canada. *Risk Management and Insurance Review*, 53-73.

Liebenberg, A. P., and Hoyt, R. E. (2003). The Determinants of Enterprise Risk Management: Evidence From the Appointment of Chief Risk Officers. *Risk Management and Insurance Review*, 37-52.

Markowitz, H. (1952). Portfolio Selection. *The Journal of Finance*, 77-91.

Mikes, A. (2009). Risk Management and Calculative Cultures. *Management Accounting Research*, 18-40.

Njiru, G. (2003). Credit Risk Management by coffee cooperatives in Embu District (Unpublished MBA Project, University of Nairobi).

Njiru, G. M. (2003). Credit Risk Management by Coffee Co-operatives in Embu District. Nairobi.

Nocco, B. W., and M.Stulz, R. (2006). Enterprise Risk Management: Theory and Practice. *Journal of Applied Corporate Finance* , 8-20.

Nyagah, B. K. (2014). The Effect of Enterprise Risk Management on Financial Performance of Pension Fund Management Firms in Kenya. Nairobi.

- Pagach, D., and Warr, R. (2007). An Empirical Investigation of the Characteristics of Firms Adopting.
- Perrin, T. (2004). Adding Value Through Risk and Capital Management. Newyork.
- Ping, T. A., and Muthuveloo, R. (2015). The Impact of Enterprise Risk Management on Firm Performance: Evidence from Malaysia. *Asian Social Science*, 149-159.
- Siokis, V. (2001). Risk Measurement and Management of Insurance Companies (Unpublished Doctorial thesis, City University London).
- Tahir, M. I., and Razali, A. R. (2011). The Relationship Between Enterprise Risk Management and Firm Value , Evidence from Malaysian Public Listed Companies.*International Journal of Economice and Management Science*, 32-41.
- TowersPerrin, T. (2004). Adding value through Risk and Capital management. Newyork.
- Vercour, S. (2013). Analysis and comparisons of Capital allocation techniques on Insurance companies.
- Waweru, N., and Kisaska, E. (2013). The Effect Of Entreprise Risk Management Implementation on the value of companies listed on the Nairobi Stock Exchange.*Journal of Applied Finance and Banking*.
- Weru, S. G. (2008). An assessment of Information Systems Risk Management Practices: A Case of Practical Action (International). Nairobi.
- Zeppetella, T. (2002). Allocation of Required Capital by Line of Business. Society of Actuaries.

APPENDICES

Appendix I: Insurance Companies in Kenya

As at 31st December 2016

No	Name of Insurer
1.	AAR Insurance Company Limited
2.	Africa Merchant Assurance Company Limited
3.	AIG Kenya Insurance Company Limited
4.	Allianz Insurance Company of Kenya Limited
5.	APA Insurance Limited
6.	APA Life Assurance Company Limited
7.	Barclays Life Assurance Kenya Limited
8.	Britam General Insurance Company (K) Limited
9.	Britam Life Assurance Company (K) Limited
10.	Cannon Assurance Company Limited
11.	Capex Life Assurance Company Limited
12.	CIC General Insurance Company
13.	CIC Life Assurance Company Limited
14.	Continental Reinsurance Limited (Kenya)
15.	Corporate Insurance Company Limited
16.	Directline Assurance Company Limited
17.	East Africa Reinsurance Company Limited
18.	Fidelity Shield Insurance Company Limited
19.	First Assurance Company Limited
20.	GA Insurance Limited
21.	GA Life Assurance Limited
22.	Geminia Insurance Co. Limited
23.	ICEA LION General Insurance Company Limited
24.	ICEA LION Life Assurance Company Limited
25.	Intra Africa Assurance Company Limited
26.	Invesco Assurance Company Limited
27.	Kenindia Assurance Company Limited
28.	Kenya Orient Insurance Limited
29.	Kenya Orient Life Assurance Limited
30.	Kenya Reinsurance Corporation Limited
31.	Liberty Life Assurance Kenya Limited
32.	Madison Insurance Company Kenya Limited
33.	Mayfair Insurance Company Limited
34.	Metropolitan Cannon Life Assurance Limited
35.	Occidental Insurance Company Limited
36.	Old Mutual Assurance Company Limited
37.	Pacis Insurance Company Limited
38.	Phoenix of East Africa Assurance Co. Limited
39.	Pioneer General Insurance Company Limited

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| 40 | Pioneer Assurance Company Limited |
| 41 | Prudential Life Assurance Company Limited |
| 42 | Resolution Insurance Company Limited |
| 43 | Saham Assurance Company Kenya Limited |
| 44 | Sanlam General Insurance Company Limited |
| 45 | Sanlam Life Assurance Company Limited |
| 46 | Takaful Insurance of Africa Limited |
| 47 | Tausi Assurance Company Limited |
| 48 | The Heritage Insurance Company Limited |
| 49 | The Jubilee Insurance Company of Kenya Limited |
| 50 | The Kenyan Alliance Insurance Company Limited |
| 51 | The Monarch Insurance Company Limited |
| 52 | Trident Insurance Company Limited |
| 53 | UAP Insurance Company Limited |
| 54 | UAP Life Assurance Company Limited |
| 55 | Xplico Insurance Company Limited |

Source IRA (2016)

Appendix II: Financial data collection form for the study sample

No	Company Name	RBC	Underwriting Profit/(Loss)	Market Risk Exposure	Credit Risk Exposure	Revenue	Net Liquid Assets
		KShs' Millions	KShs' Millions	KShs' Millions	KShs' Millions	KShs' Millions	KShs' Millions
1	AAR INSURANCE KENYA	1,055	94	1,223	3,868	6,489	(166)
2	AIG INSURANCE COMPANY	607	158	3,130	1,340	3,670	1,219
3	AFRICAN MERCHANT ASSURANCE	1,261	(230)	1,035	2,298	3,162	(849)
4	APA INSURANCE COMPANY	2,421	(127)	9,288	6,643	8,996	2,281
5	BRITAM GENERAL INSURANCE	1,158	(48)	4,338	3,917	6,997	(24)
6	CIC GENERAL INSURANCE COMPANY	1,761	(623)	4,022	6,737	8,407	(2,983)
7	DIRECTLINE ASSURANCE COMPANY	1,005	(17)	3,157	1,828	3,225	(1,349)
8	FIDELITY SHIELD INSURANCE	885	10	1,447	1,176	1,717	(684)
9	GA INSURANCE COMPANY	1,810	289	4,000	5,028	4,782	(425)
10	HERITAGE INSURANCE COMPANY	1,180	404	2,775	3,929	5,340	1,407
11	ICEA LION GENERAL INSURANCE	1,742	142	7,509	3,344	6,305	866
12	INTRA-AFRICA ASSURANCE	680	8	580	1,011	1,014	(219)
13	INVESCO ASSURANCE COMPANY	1,008	4	1,357	954	2,301	(2,031)
14	KENYA ORIENT INSURANCE	794	133	1,465	1,219	2,526	(1,680)
15	MAYFAIR INSURANCE COMPANY	889	237	1,579	2,832	2,302	370
16	OCCIDENTAL INSURANCE COMPANY	616	16	1,744	1,426	2,033	73
17	PACIS INSURANCE COMPANY	432	(46)	889	1,017	1,042	(558)
18	PHOENIX OF EAST AFRICA	204	(415)	677	733	439	443
19	RESOLUTION INSURANCE COMPANY	1,069	(628)	373	3,503	3,926	(2,340)
20	SANLAM GENERAL INSURANCE	456	(38)	846	866	1,002	(943)
21	TAUSI ASSURANCE COMPANY	320	118	1,200	667	963	773
22	UAP INSURANCE COMPANY	4,760	(262)	8,489	6,479	10,982	(960)
23	CIC LIFE ASSURANCE COMPANY	1,073	240	5,066	1,825	755	(1,228)
24	LIBERTY LIFE ASSURANCE COMPANY	940	(198)	15,599	7,201	403	(2,452)
25	OLD MUTUAL LIFE ASSURANCE	989	(563)	7,877	5,042	699	(49)
26	UAP LIFE ASSURANCE COMPANY	729	(98)	8,459	2,049	400	(733)
27	BRITAM LIFE	4,837	914	19,947	9,083	6,642	(23,423)
28	ICEA LION LIFE ASSURANCE	1,954	545	52,026	5,243	1,982	2,567
29	SANLAM LIFE INSURANCE	2,062	234	17,787	6,039	1,467	(2,054)
30	PIONEER ASSURANCE COMPANY	651	72	1,794	2,465	661	(423)
31	APA LIFE ASSURANCE COMPANY	291	(80)	3,074	828	63	(21)
32	CANNON ASSURANCE COMPANY	405	(232)	1,346	209	98	200
33	JUBILEE INSURANCE COMPANY	3,210	704	43,848	8,391	2,803	(4,062)
34	MADISON INSURANCE COMPANY	1,323	234	8,562	655	924	(3,004)
	Total:	44,580	951	246,507	109,846	104,517	(42,461)

Source IRA (2016)