THE RELATIONSHIP BETWEEN UNDERWRITING PROFIT AND INVESTMENT INCOME FOR THE GENERAL INSURANCE INDUSTRY IN KENYA

BY MWANGI HEZRON KAMAU
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DECLARATION

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

Hezron Kamau Mwangi **D61/62617/2010**

Signed _____ Date _____

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

Signed _____ Date _____

Dr. Josiah Aduda

DEDICATION

This project is dedicated to my three children Vanessa, Vincent and Verlene for their understanding and patience when I was absent from home while studying. To my wife for the steadfast support and challenge that gave me the drive to register and complete graduate studies.

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ABSTRACT

The purpose of this study was to examine the integration of underwriting profit and investment income at aggregate insurance industry level. The objective of study was to evaluate the relationship between underwriting profit and investment income.

The target population was all the licensed non-life insurance companies in Kenya from year 2000 to 2011. Sampling criteria was those non-life insurers licensed for a period of more than three years during the study period. Data used for analysis was mined from the financial statements that insurance companies avail to Insurance Regulatory Authority annually. A descriptive regression model was used for data analysis and presentation using SPSS (version 17).

Based on the study there was a weak positive relationship between the underwriting profit and investment income. The correlation can improve if insurance underwriting is viewed as a risk transfer process and not just a wealth generation endeavour. Prudent risk underwriting will ensure premium revenue growth with both increased underwriting profit and investment income. The insurance industry regulator should encourage portfolio modelling and plan for a mega-risks tendering platform similar to the Lloyds model.

TABLE OF CONTENTS

LIST OF TABLES

ABBREVIATIONS

AKI	-	Association of Kenya Insurers
BPT	-	Behavioural Portfolio Theory
CAPM	-	Capital Asset Pricing Model
CBS	-	Compliance Based Supervision
DFA	-	Dynamic Financial Analysis
FCIC	-	Federal Crop Insurance Corporation
IRA	-	Insurance Regulatory Authority
Kenya Re	-	Kenya Reinsurance Corporation
RMA	-	Risk Management Agency

CHAPTER ONE

INTRODUCTION

1.1 Background of the Study

General insurers are involved in trading uncertain losses of an indefinite amount for a certain definite cost (Beightler & Street, 1967). There is considerable uncertainty in decision making as insurers must earn a profit on underwritten business and investment returns should be favourable. Operating profit is an overriding measure of management performance that often appears as a random result from two unrelated activities.

Insurance companies must generate underwriting profit by underwriting insurable risks. They pool cash inflows from premiums collected and invest the funds to earn investment income. The profit from risk underwriting and investment activities are random variables and the rates of underwriting profit of various lines of insurance may be correlated (Kahane, 1977a).

1.1.1 Underwriting Profit

In private markets, the transfer of risk inevitably involves some form of underwriting. Underwriting is process that enable insurers to classify risks and price them accordingly. Among the cornerstone of successful insurance operation is the ability to underwrite well as poor risks selection results in significant losses and insurer failure (Browne & Kamiya, 2012). Insurers have a leeway to incorporate information that they deem important in risk selection and pricing.

The total accounting profit of an insurance company is the sum of underwriting profit and investment gains less income taxes. Underwriting profit in simplified terms is the net of earned premium less claims incurred and operating expenses. Until 1960s, a 5% underwriting profit provision was accepted as appropriate for most lines of insurance notwithstanding lack of theoretical justification (D'Arcy & Garven, 1990). From the 1970s, the impact of investment income and taxes on the bottom line became apparent with insurers even operating at an underwriting loss.

An insurer should make underwriting profit within the constraints of regulation both real and threatened. It is possible for an insurer to survive with zero underwriting profit and still do better than operating essentially as an investment trust (Hofflander & Drandell, 1969). An insurance company operates in a business environment marked with constraints on its operating policies, constraints arrived at through experience and intuition.

1.1.2 Investment Income

Investment income has been a determinant factor in failure or success of major insurance companies. Insurers generate capital by selling insurance policies. Insurers generate investing funds because on average premiums are received in advance of payment of loss claims and premium funds are invested during this lag (Kraus & Ross, 1982). An array of capital claims exists that relate to each other as well as to the portfolio of assets (Haugen & Kroncke, 1970) .

There is an operational problem of determining an efficient means of measuring investment returns. The compounded rate of cash inflows should be more than that of cash outflows for the insurer to avoid generating capital at a cost.

The amount of investible funds generated by an insurer at times depends on exogenous factors for instance the efficiency of the judicial system in processing of claims. Internally an insurer may reduce investible funds by prompt settlement of claims or collecting premium on instalments rather than in a single payment (Kahane, 1978) .The funds generating coefficient is the amount of investment generated by a shilling of premium in a specific insurance line that Kahane (1978) regards as decision variable of the firm within certain limits. Some insurance lines generate more investible funds than others do.

It is beneficial for shareholders to continue to write insurance even in instances of underwriting losses as long as investment return on assets ratio exceeds the absolute value of a negative ratio underwriting loss on premium (Ferrari, 1968). This is because leverage from the insurance portfolio is still favourable.

1.1.3 Relationship between Underwriting Profit and Investment Income

The selection of insurance lines and investments portfolios is a management dilemma for insurance companies. The initial attempts to combine underwriting profit with investment income involved developing a target total rate of return for insurers in semblance to target total rate of return for utilities (D'Arcy & Garven, 1990). After setting the target total profit, the investment income is forecasted and then required underwriting profit determined.

For multi-product insurer, the underwriting profit differs from one line to another and there are different risks associated with those profits. This dilemma complicates decision making on the types and number of insurance lines that will be availed to a market where regulation restrictions must be adhered to (Kahane, 1977a).

General insurers generate investing funds for two principle reasons; premiums paid in advance and time lag on payment of claims. The funds generating factors differ from among lines of insurance due to variation in claims settlement lag time (Cummins & Nye, 1981). Under property lines, claims are settled relatively fast thus loss reserves are comparatively lower. Inherently settlement delays under Liability lines permits the insurance company to hold and invest premium balances for longer period. For these lines, funds generating factors are higher compared to property lines. There is a tendency of some lines of insurance to generate more investable funds than others claim occurrence and settlement mismatch.

1.1.4 General Insurance Industry in Kenya

The Kenyan insurance industry is regulated under Insurance Act cap.487 that is currently under review to bring a framework that fits advancement and functionality of the industry (IRA, 2010). In consultation with IRA, insurance companies are developing products aimed at increasing the level of insurance penetration in the country. The 47 insurance companies in Kenya are competing to increase their market shares in a market with an average growth rate of 18% in the last five years (IRA, 2010).

The rate of insurance penetration in Kenya at 3% is comparatively low with countries like South Africa which accounted for more than half of total non-life premium in Africa for the year 2010 (AKI, 2010). The industry regulator has been advocating on innovation and embracing technology as a fundamental step towards increased penetration of insurance services and efficiency in operations. The gross direct premium income grew by 19% from Kshs 76.9 billion in 2010 to Kshs 91.8 billion in 2011 with shareholders' funds shrinking by 23% within the same period (IRA, 2011). The growth of gross direct

premium in 2012 was 11.4% to Kshs 108.61 billion from Kshs 97.49 billion in 2011 (IRA, 2013).

The industry total investments for the year 2012 were Kshs 235.6 billion constituting 77.9% of total industry assets with a marked growth of 23.8% for the same period in 2011. The general business investments in 2012 were Kshs 85 billion representing 36.1% of the total investment for the industry (IRA, 2013).

To ensure sustainable growth and stability of the industry, IRA has transitioned from Compliance Based Supervision (CBS) to Risk Based Supervision (RBS). RBS lays more emphasis on understanding the possible risks an insurer will face in executing its business plan. An insurance Anti-Fraud unit was set up in 2011 to mitigate malpractice and fraud in the industry (IRA, 2011).

There are various lines of insurance and this project will focus on the non-life insurance industry in Kenya. There were 47 licensed insurance companies as at December 2011 with 13 lines/classes of general insurance (IRA, 2011). For analysis, annual industry data published by industry regulator (IRA) for the last twelve years will be analysed.

1.2 Problem Statement

The performance of the insurance industry has been examined using several approaches and measures aimed at appraising the unique dynamics in the industry. There are elaborate studies on structure and profitability of the insurance industry. The law of large numbers dictates pooling of insurable risks with profit maximization in mind.

In the last ten years, Kenyan insurers with product lines skewed towards motor underwriting have been struggling to survive with some in receivership and others liquidated. Research on the relationship between underwriting profit and investment income by insurers in Kenya is scarce. The few cited studies highlights on innovation, strategy and state regulation. Notable studies in Kenya include Innovation processes within the insurance industry in Kenya (Kinyumu, 2011) , incidence of financial innovation on insurance company premium growth (Karanja, 2011), challenges in management of general insurance claims (Kiama, 2010), industry strategic responses and effectiveness of state regulation (Okwachi, 2009; Thirima, 2010).

The conclusions of studies done outside Kenya may differ in their assessment of the link between underwriting profit and investment income. Local studies concentrated more on innovation, strategic management and regulation of the industry. There is need of a study empirically testing the relationship between underwriting profit and investment income. This project aims at filing this research gap.

1.3 Objective of the Study

The objective of study is;

1. To evaluate the relationship between underwriting profit and investments income

1.4 Significance of the Study

The study fills the gap in that no studies cited attempted to study the link between underwriting profit and investment income and the ensuing impact on future performance of insurance industry in Kenya.

1.4.1 Insurance Consumers

They will find this study relevant when choosing their insurers as it will illustrate the extent on professionalism in management of insurance companies.

1.4.2 Researchers

The study would be the starting point for other researchers who want to shed more light on link between investment income and underwriting profit.

1.4.3 Industry Service Providers

As competition intensify, players in the industry will benefit from this study, as they will have an empirical understanding of the going concern status of insurers in addition to general market sentiments.

1.4.4 Insurance Companies

They will have statistical benchmarks to gauge their performance based on choice of their product lines and investment income. They will also test the practical relevance of the use correlation coefficients in analysis of underwriting profitability and investments income.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter presents a theoretical review and empirical evidence. Theories on underwriting profit and investment income are highlighted followed by review of empirical evidence on relationship between underwriting profit and investment income.

2.2 Theoretical review

An insurance contract is a derivative contract where the underlying asset is the value of losses experienced by the insured. Insurers in Kenya have to diversify their insurance lines to capture more market share. Stiff competition in the market influences insurers to resort to rates undercutting to win over competition. This under-pricing of risk reduces the underwriting profit making insurers vulnerable to insolvency. The law of large numbers works against an insurer that is unable to earn positive returns on the insurance lines underwritten.

2.2.1 Portfolio Theory

Markowitz initially developed the mean-variance portfolio theory and was one of the three portfolio theories introduced in 1952 (Shefrin & Statman, 2002). It is a powerful tool in allocation of resources among competing alternatives with foundation in Capital Asset Pricing Model (CAPM). Markowitz's customary wealth theory and Roy's safety-first theory were the other two theories presented in 1952. The customary wealth theory was to counter the unrealistic implications of the Freidman- Savage framework.

The technique incorporates preferences of investors, expectation of returns and risk of all assets considered without overshadowing diversification effects that reduces overall portfolio risk (Jorion, 1992). An inherent drawback of mean-variance analysis is the estimation errors associated with the return outputs. By construction, optimal portfolios weigh heavily those assets that show the highest return.

Freidman- Savage hypothesis has not been empirically tested widely probably due varying risk aversion at different levels of wealth (Eisenhauer, 2005) The optimal solutions under Behavioural Portfolio Theory (BPT) resemble combination of bonds and lottery tickets. Optimal portfolios under BPT are different from CAPM optimal solutions. The BPT efficient frontiers do not coincide with mean-variance efficient frontier (Eisenhauer, 2005).

2.2.2 Capacity Theory

Insurance capacity theory draws much from the demand side and mainly concerned with the conditions under which insurance companies operates as they seek to satisfy the needs of consumers (Cummins & Nye, 1980). Insurers are subject to a myriad of constraints including the ruin constrain imposed by regulators in form of regulated premium rates. Insurers may offer any type of cover provided there are sufficient number of independent exposures units to mitigate risks to manageable proportions through diversification (Cummins & Nye, 1980). The gains from diversification will only hold if the risk exposures units are independent.

The capacity of an insurer is determined by among other factors the probability of ruin, the law of large numbers and the reserve funds generated from operations (Doherty, 1980). For an insurer to reach its capacity, an additional new policy would tilt the level of

risk to being unacceptable. Insurer capacity threshold should always tilt ruin probability in favour of the insurer (Doherty, 1980). Risk tolerance levels and the degree of diversification of the existing insurance operations have a bearing on the acceptance of additional insurance lines.

2.2.3 Ruin Theory

The general assumption based on collective risk theory is that insurance company decision making incorporates ruin probabilities. Insurance operation is considered as a stochastic process in discrete time with continuous steps and single absorbing barrier (Cummins & Nye, 1981). Ruin probabilities are manifested in safety-first decision-making and constraint utility maximization. For safety first decision making, the rule is to maximise expected net income and constraint utility maximisation rule is to optimize expected utility of the net worth (Cummins & Nye, 1981).

2.2.4 Game Theory

The process of setting price to charge for non-life insurance policies has evolved over time. There is now more information on customers to be insured and existence of sophisticated statistical models leading to increases price differentials. Driven by the assumption that better estimates of the marginal cost of a policy will enhance the chance of an insurer to attract currently overcharged policies and not undercharge ones in their books, some prediction models focus on costs of providing cover ignoring the strategic optimal price to quote (Warren, Rourke, & Iwanik, 2012). The market is not static and expected competitors behaviour should be analysed.

The notion of strategic interdependence is important and the payoff to an insurer choices will depend on the choices open to its competitors and how they will respond (Warren et

al., 2012). Apparently, it is impossible for sure to know the payoffs for actions taken even with full availability of information about an insurer's customers and costs.

2.2.5 Auction Theory

In setting the price of an insurance policy, insurers bid to underwrite a customer's risk by quoting a premium. The true cost of such an insurance policy is unknown as it is not possible to accurately predict the claims cost (Warren et al., 2012). At the bidding stage, price determination is based on expectations of what will be the actual cost of claims.

The lowest bidder wins and there is a probability of having underestimated the cost of claims and therefore lowest bidder will be cursed by the less profit than expected. Auction theory suggests that the winners should shade their bids to allow for the impact of the winners curse.

2.3 Implication of Theories

In managing the variability of investment income and underwriting profit, the concept of diversification as propagated by portfolio theory is crucial. General insurers operate in a bounded market where their insuring capacity limits the number and magnitude of insurance policies they can underwrite hence influencing investment funds generating ability and underwriting profit. The risk-based supervision methodology adopted by industry regulators has borrowed to some extent the maxims of ruin theory to forestall collapsing of insurance companies.

Games theory brings out the strategic interdependence when setting the price of insurance policies in a competitive insurance industry. The premium charged should be in excess of the cost of claims, underwriting and administrative costs to generate

underwriting profit. The activity of tendering to provide cover that is prevalent in the insurance industry to some extent operates on auction theory where the lowest bidder wins. Under-pricing to win tenders has an adverse effect on underwriting profit and investment funds generating ability.

2.4 Empirical Review

The starting point of a policy account is the moment premium is collected, the starting asset being premium minus acquisition expenses. The asset value changes with time with investment gains increasing the value and loss and expense decreasing it (Zhang, 2012). The terminal asset value must be positive for a policy to be profitable over its lifetime.

Problems in the general insurance industry have attracted considerable attention in recent years with regulation regime shifting to risk-based supervision. Availability of cover crunches such as in liability insurance have occurred and cost pressures forces insurers to compete on basis of risk retention. Some insurers have discontinued offering insurance lines like PSV insurance, carrier liability while vigorously marketing others like medical insurance, crop insurance and micro-insurance.

Insurance premiums are designed to pay covered losses in addition to management and underwriting expenses. Regulator's interest is in keeping premiums at adequate but not excessive levels by focusing on loss ratios and underwriting profit margins (Weiss, 1991).

The possibility that the underwriting profit from different lines of insurance is correlated negates isolated decision making giving rise to risk reduction effects of diversification. The choice of insurance product lines should be determined simultaneously with the investment portfolio due to possible correlation between underwriting and investment

income (Kahane, 1977a). Implicitly there is the assumption under the portfolio approach of the possibility of variation in volume of activities in each insurance line without changing the underwriting profit or risk characteristics.

The research on property-liability insurance has an underlying assumption of stochastic characteristics of the profit margins of the various lines of insurance. The combined ratios are assumed normally distributed and uncorrelated with the yield rates on common stocks (Cummins & Nye, 1980). The assumption is augmented by the distribution properties of the profit margin and the systemic risk inherent in various lines of insurance. Studies of profit distribution based on chi-square goodness of fit tests, estimates of skewness and kurtosis confirmed the assumption of normality (Cummins & Nye, 1980).

There is strong intercorrelation of insurance company profit as indicated by regressions of individual company combined ratios on insurance industry aggregates (Cummins & Nye, 1980). There is tendency of some insurance lines to generate more investible funds comparatively due existence of lags between claim occurrence and settlement (Cummins & Nye, 1981). Cummins and Nye (1981) argued that the overall premium to surplus ratio, the distribution among insurance lines and the proportion of assets in each major investment class is consistent with the risk aversion for a given rate of return of net worth.

There is conflicting proportions concerning the choice between total assets (investable funds) or net worth (capital and surplus) as the appropriate investment base for computing rates of return. The little study of 1968 proposals aimed at overcoming the seasonal variations in assets and debt ratios and concentrated primarily on return on total investable funds (Hammond & Shilling, 1969). The argument took a societal dimension

as being the ultimate winner or losers regardless of how resources in a business venture are financed hence measuring returns on total assets.

Insurance companies operate with a levered capital structure. Debt capital is not the source of leverage but it is the insurance leverage emanating from the deferred nature of insurance liabilities (Ferrari, 1968). Insurance leverage concept can be used to explain the relationship between returns on assets and the return on equity.

General insurers have limitation on the acceptable risk levels for each additional new insurance policy/risk. This capacity has largely been determined by three factors namely: the probability of ruin, the law of large numbers and reserve funds generated from operations (Doherty, 1980). Capacity is reached when the ruin probability is unacceptable by company managers though the level of underwriting risk attached to a new policy and degree of diversification of existing insurance operations also matters (Doherty, 1980).

The loss ratio is extensively relied in evaluating insurance underwriting results. The loss ratio basically measures loss payments relative to premium income though there is no uniformity in definitions and many versions exist (Kahane & Porat, 1984). The accuracy of the loss ratio is determined by estimation errors and measurement problems of incurred losses and premium income. Where the growth of the two series is fairly constant over time, inexact matching is evened out thus significantly reducing the bias of the loss ratio. Though it may cause a mismatch, time value of money is ignored in insurance theory (Kahane & Porat, 1984).

As a measure of the degree of insurance leverage, the ratio between premium and the equity of the firm is used. The points on the efficient frontier are obtained by applying

varying degrees of leverage (Kahane, 1977b). It has been empirically supported that under general business conditions , the assumption that returns on various investment are correlated with each other (Kahane, 1977b).

Portfolio problems arise in nearly all facets of decision making such as companies choosing asset portfolios to invest in. The expected return of an asset included in an optimal portfolio exceed the expected value of any asset not chosen for the optimal portfolio (Mcentire, 1984) . Insurance companies should thus invest their pooled cash inflows in assets with the largest mean values.

The insurance industry is constrained with resources capable of covering major catastrophes. The imbalance in supply and demand bearing in mind the elevated levels of risk and reward potential , has prompted insurers to tap the huge capacity that capital market has to offer (Canter, Cole, & Sandor, 1996). Insurance linked derivatives provide the link in accessing the capital market. This is especially common in the developed financial market where insurance linked derivatives transaction cost are relatively cheaper than reinsurance.

The exposure to single event or multiple major event within a short duration, has triggered the need for insurance companies to look for additional sources of funds to finance or spread the risk (Kist, Meyers, Witcraft, & Sherman, 1999). The mega catastrophes that can impair the capital of the insurance industry can have minimal impact if spread through the capital markets. These mega catastrophe risks are uncorrelated with other financial risks (Kist et al., 1999).

In the multifactor world of financial securities, the mantra is that different risk factors are associated with their own risk premiums and no single investment strategy can span the

entire risk factor space (Agarwal & Naik, 2004). Therefore, different investment strategies need to be deployed to earn the risk premia associated with different risk factors. The various lines of insurance have differing risk exposures thus differing investable funds generating ability. Insurance companies fund their investment using policies premium collected and the time lag between premium collection and settlement of claim limits the investment duration. Shorter time lags may translate to shorter investment maturity period hence probable lower returns and limited investment opportunities.

On the supply side, the insurers may not offer as many insurance lines because of significant long-term insolvency cost even if the underwriting returns are positive and insurers are risk neutral (Lin, 2005). Under the multi-period formulation, the demand and supply curves may differ substantially from those under single period formulation. It is imperative that insurers make optimal choices of the insurance lines that offer short-term returns bearing in mind the demand side preferences. The cover duration of most lines of general insurance is twelve calendar months hence the short-term outlook.

The information asymmetry is more prominent in insurance markets than in securities market. The severity and frequency of insurance losses is influenced by insured behaviour impeding pareto efficiency making the risk transfer mechanism inefficient (Lin & Lu, 2007). To achieve pareto-optimal resource allocation, private information need to be absent as it is costly to monitor. In designing appropriate insurance contract, a menu of multiple price-quantity policies is provided or assembling a multi-period contract in accordance with insured's underwriting experiences (Lin & Lu, 2007). The intention is to induce the insured to reveal their risk type. Segmenting insured by risk types assist in designing insurance contracts that factor in behavioural tendencies.

At times, regulation limits the choice of insurers in determination of pricing of some risks. Price capping can limit underwriting profitability and to some extent the fund generating ability. For instance, in Kenya IRA monitors the premium rates for listed (mega) risks by setting the minimum premium rates that an insurer must charge. In USA crop insurers are price takers as the premium rates and underwriting guidelines are set by the Risk Management Agency (RMA) which is an agency established by Federal Crop Insurance Corporation (FCIC) (Vedenov, Miranda, Dismukes, Glauber, & Vedenov, 2006).

Crop insurers assume large potential risk exposure without recourse to raising premium rates or declining to cover high-risk individuals for them to participate under the federal program. The federal government assumes most of the risks while less risky business can be placed in funds where the insurers pays more for underwriting losses and keeps more of underwriting gains. How well an insurer classifies their risks and manages their portfolio determines the underwriting returns (Vedenov et al., 2006).

The cause of the underwriting cycles is multifaceted and complex elements being the driver with evidenced impact on insurers' profitability. Insurance lines variety influences the overall performance and insurers with more variety improves their odds of outperforming insurers with less variety (Elango, 2009). The expectations are the larger the premium income the better the performance relative to small insurers.

In Kenya, empirical testing of the relationship between underwriting profit and investment income is scanty. There is no study cited that analysed the effectiveness and efficiency of the risk transfer mechanism and the resultant investment performance by insurers. Majority of the studies relating to insurance industry have focused on innovation (Karanja, 2011; Kinyumu, 2011), state regulation (Koima, 2003; Thirima, 2010),

strategic management (Karau, 2008; Kiai, 2007; Lugalia, 2011) and key success factors (Kiplagat, 2011; Wamwati, 2008).

2.5 Conclusion

The relationship between underwriting profit and investments income has been empirically tested and validated in developed financial markets. An investment return component is often factored in during insurance premium ratemaking. The investible funds generating coefficients are positively influenced by underwriting profit. The bulk of the literature relates to studies with data collected outside Kenya which is a developing financial market. No local studies cited that analysed the relationship between underwriting profit and investment income. Insurance deepening in Kenya is low at 3%. It is essential a research using data specifically from insurance industry in Kenya be done to confirm if any linkages exist between underwriting profit and investment income.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

The chapter discusses the research design, population of study, sample size, data collection and data analysis.

3.2 Research Design

Research design deals with a logical problem and not a logistical problem. The study adopted a descriptive research design in gathering quantitative data describing the relationship between underwriting profit and investment income. The status of a phenomenon can be known through descriptive research. The study adopted descriptive research design as it provides a systemic way of looking at occurrences, collecting data, analysing information and presenting the results.

3.3 Population

The target population of this study comprised all the 47 (IRA, 2011) licensed insurance companies in Kenya at the end of year 2011. All the insurance companies can underwrite any line of insurance and it is a management decision on the lines that an insurer wishes to offer. However, risk capacity constrains limit the magnitude and selection of insurance lines portfolios each insurer can underwrite. The Insurance Act that is amended from time to time and supervised by IRA prescribes the insurer's investment criterion.

3.4 Sample Size

The study comprised of insurance companies licensed by Insurance Regulatory Authority and registered under the Insurance Act (Cap 487) to operate non-life business. As at 31/12/2011, there were 47 licensed insurance companies in Kenya (IRA, 2011) and 36 were underwriting non-life business. This study was restricted to non-life business and a sample of 38 licensed non-life insurers (including composite insurers). The insurers must have been licensed for more than three consecutive years during the study period of twelve years hence the sample size of 38 insurers.

3.5 Data Collection

The study utilised secondary data of insurance companies actual past financial performance as filed with Insurance Regulatory Authority to determine underwriting profit and investment income. Data for the past twelve years (2000 – 2011) was used and only from insurers operating for more than three years within the study period.

3.6 Data Analysis and Presentation

Data collected was edited for accuracy and completeness. Then data arranged to enable coding and tabulation. Statistical Package for Social Sciences (SPSS) version 17 was used for analysis and presentation. The choice of SPSS was due to its ability to cover a wide range common statistical data analysis and being systematic.

The regression model used to analyse the data was of the form;

$$y = c + r_a A + r_u P + e$$

Where;

y – Non-life income before tax

c - Constant

r_a - Non-life Investment income as percentage of non-life admitted assets

A – Admitted assets of non-life insurer

r_u – Non-life underwriting profit as percentage of non-life net premium income

P – Non-life net premium income

e – Error term

CHAPTER FOUR
DATA ANALYSIS AND PRESENTATION

4.1 Introduction

The chapter presents an analysis of the secondary data collected in form of tables generated using SPSS. An interpretation of analysed data is presented at the end of the chapter.

4.2 Data Presentation

4.2.1 Parametric Correlation Weighted by Non-Life Net Premium

When weighted by net premium both investment income and underwriting profit have a high correlation with income before tax at 0.727 and 0.738 respectively. However, there is low correlation between underwriting profit and investment income at 0.313 (Table 1). Underwriting profit and investment income explains 81.7% (adjusted R^2) of insurer's income before tax. There is no serial correlation between the variables given the Durbin-Watson static at 2.239 is approaching the value of 2 (Table 2). There is statistically relevant relationship between income before tax and both the investment income (t=24.813, p= .000) and underwriting profit (t = 25.543, p= .000) when weighted by Non-life Net premium (Table 3).

4.2.2 Parametric Correlation Weighted by Admitted Assets

When weighted by admitted assets the correlation between underwriting profit and investment income remains low but decreases by 0.5 basis points to 0.308. The correlation between underwriting profit and income before tax also decreases by 2.5 basis points to 0.713 (Table 4). The decreases though marginal reflect that admitted assets and

net premium have varying influences on both underwriting profit and investment income. The correlation between investment income and income before tax remain static at 0.727.

Underwriting profit and investment income explains 79.2% (R^2) of insurer's income before tax (Table 5). There is no serial correlation between the variables given the Durbin-Watson static at 2.150 is approaching the value of 2. The statistical relationships between the three variables remain significant with values (t= 23.772, p= .000) and (t=22.866, p= .000) (Table 6).

4.2.3 Parametric Correlation Weighted by Capital Employed

The correlation between investment income and income before tax increases to 0.743 when weighted by capital employed. The correlation between underwriting profit and investment income decreases to 0.281 (Table 7). Correlation between underwriting profit and income before tax decreases to 0.666 and 77.9% of income before tax is explained by investment income and underwriting profit (Table 8). There is no serial autocorrelation as Durbin-Watson static at 2.115 is approaching the value of 2.

4.2.4 Parametric Correlation between $r_a A$ and $r_u P$

The non-weighted correlation between underwriting profit and investment income decreases further to 0.215 (Table 12), indicating weighting improves the correlation values. The correlation between $r_a A$ and $r_u P$ was .0216 with the two variable being statistically significant with t values (t=22.095, p=.000) and (t= 20.159, p=.000) respectively (Table 18). The correlation between investment return (r_a) and underwriting return (r_u) was negligible at 0.028 (Table 13).

4.2.5 Nonparametric Correlation

Underwriting profit has low Spearman's correlation coefficient with selected variables the highest (rho = 0.399, p = .000) with Income before tax, followed by (rho= .371, p= .000) with non-life Net premium, then (rho= .192, p= .0000) with admitted assets and lowest at (rho= .034, p= .000) with investment income (Table 9). Investment income has high Spearman's high correlation coefficient with selected variables with highest (rho= 0.711, p= .000) with admitted assets, followed by (rho= .608, p= .000) with income before tax, then (rho= .540, p = .000) with non-life net premium and the lowest one (rho= .034, p= .000) with underwriting profit.

4.2.6 Investment Returns (r_a)

For this study investment return is the ratio of investment income over admitted assets. The overall mean ratio over the period was 0.059, standard deviation at 0.059 and at 95% confidence interval for the mean, the lower bound was 0.053 and upper bound 0.065 (Table 10). The overall coefficient of dispersion was 0.681 implying high polarity of data values. The overall coefficient of variation was 118.8% reflecting high ratio volatility of investment income.

4.2.7 Underwriting Returns (r_u)

The underwriting return was calculated as the ratio of non-life underwriting profit over non-life net premium. The mean underwriting return over the study period was 9.1% with lower bound of 7.7% and upper bound of 10.5% at 95% confidence interval for the mean (Table 11). The weighted mean underwriting return was 8.5% with lower bound of 7.3% and upper bound of 9.6% at 95% confidence interval for the weighted mean. The coefficient of Dispersion value was 1.002 suggesting higher polarity of underwriting

returns across the insurance industry. The coefficient of variation was 122.6% indicating a high variation of insurers underwriting returns across the industry.

4.3 Interpretation of Findings

The parametric correlation between underwriting profit and investment income was low (r=.215, p=.000). When weighted by Net premium, the value improves to (r=.313, p=.000). Weighted by admitted assets, the value was slightly lower (r=.308, p=.000). The value decreased further to (r=.281, p=.000) when weighted by capital employed. It is indicative that there is low correlation between underwriting profit and investment income.

The two study variables explains 81.7% of income before tax thus the main determinants of an insurer's overall profitability. The low correlation of profitability drivers creates a dilemma on performance measurement of risk transfer mechanism that is the core mandate of insurers.

Investment income had comparatively higher parametric correlation with all the selected study variables other than with underwriting profit. The highest correlation was with admitted assets indicating that the magnitude of investment income was almost commensurate to the size of admitted assets. From literature, the lag between claims settlement and premium receipts provided an investment window for an insurer. Thus, investible funds to generate investment income would generally emanate from the premium revenue collected. The high parametric correlation between investment income and admitted assets challenges the funds generation concept.

The insurers' core function is risk transfer through underwriting of insurable risks. Diversification reduces overall underwriting and investment portfolio risks while

capacity constraints and ruin probabilities limit net premium income levels. Optimal and efficient product line portfolios will resort in an elevated confidence of generating underwriting profit. The mean underwriting return (9.1%) was better than mean investment return (5.9%) indicating underwriting portfolios were more efficient than investment portfolios. Future studies should test optimality of these portfolios.

The high parametric correlation (r=.711, p=.000) between investment income and admitted assets implies a substantive portion of investment income was generated through utilisation of these admitted assets. The expectation from literature was a high correlation between investment income and underwriting profit for funds generating coefficients to be high.

Net premium had a slight positive effect on the parametric correlation between underwriting profit and investment income. It may thus suffice that net premium to be more desirable than admitted assets and capital employed to improve the correlation between the two study variables. The expectations are the larger the premium income the better the overall financial performance of an insurer. The competitive business environment affects the growth of premium income and propositions of game and auction theorists may come into play.

Notably the high parametric correlations between income before tax and both underwriting profit and investments income indicate the study variables are key profitability drivers for an insurer. Both underwriting profit and investment income explains 81.7% of income before tax. Underwriting profit correlation coefficient (r=.738, p=.000) is marginally higher than that of investment income (r=.727, p=.000). An insurer must strike a balance between the two study variables to generate income before tax

consistently. Based on this study, investment income takes a larger proportion than underwriting profit in composition of income before tax.

Investment income was critical for an insurer to generate favourable income before tax. Insurers were generating positive income before tax even with negative underwriting profit. Underwriting profit had low nonparametric correlation coefficients with the selected variables especially with investment income. It is indicative that insurers are making underwriting profit so as operating activities break-even but long-term survival was anchored by ability to generate investment income. Ferrari (1968) affirmed that it is beneficial to continue insurance business even when making underwriting losses as long as investment returns exceed underwriting returns.

The parametric and nonparametric correlation values have minimal variations supporting Kahane (1977a) conclusion that profit from risk underwriting and investment activities are random variables. The notable exception was low correlation values for underwriting profit explained by many negative data points. Random variables minimise selection bias thus enhance generalisation of study conclusions. Kenyan insurers would not survive in the long run by just generating underwriting profit.

Investment income must exceeding underwriting profit for insurer to maintain the going concern status. Out of 38 insurers studied, only three at 95% confidence for mean had lower bound mean investment return (r_a) less than 0.000. Two of the three insurers changed ownership structure and one closed down. Twenty insurers, (53% of insurers) at 95% confidence for mean had lower bound mean underwriting return (r_u) less than 0.000. Out of these twenty, two closed down and seven fundamentally changed ownership structure. With 53% of studied insurers having negative lower bound underwriting return

and only 8% having negative lower bound investment return, investment income ensured insurers' remain buoyant.

CHAPTER FIVE

SUMMARY, CONCLUSION AND RECOMMENDATIONS

5.1 Summary

The objective of study was to evaluate the relationship between underwriting profit and investment income. The data collected was for twelve years ranging from year 2000 to 2011 for non-life insurers licenced more than three years within the study period. Data was analysed using SPSS version 17 and results presented using correlation tables and regression model summary.

There was low correlation between underwriting profit and investment income. Underwriting profit had low correlation with all other selected variables notably admitted assets, admitted liabilities, capital employed, non-life net premium unlike investment income that have high correlation.

The regression model did not present evidence of serial autocorrelation given the Durbin-Watson value of 2.206 (Table 14). The model was scientifically relevant with t values (t=22.095, p=.000) for r_aA, (t=20.159, p=.000) for r_uP and independent variables (r_aA, r_uP) explaining 73.4% of dependent variable (Income before tax) (Table 15).

Based on the Little study conclusion, admitted assets was adopted as the base for calculating investment returns. The mean overall insurance industry returns were positive for both underwriting and investment portfolios. Underwriting profit accounted for only 20% of total income before tax with investment income taking the largest share of 80%.

5.2 Conclusion

Insurers must generate a surplus from their risk underwriting portfolio for their risk transfer mandate to be a viable business model. Investment income should ideally supplement risk underwriting surplus. From this study, it may suffice that insurers were concentrating more on investment income at sacrifice of underwriting profit. The low correlation between investment income and underwriting profit is unhealthy for the industry. Adequate pricing of risks underwritten translates to high underwriting profit providing impetus for innovations to sustain a trend of high underwriting profit.

The low correlation of underwriting profit with other selected variables validates an inefficient industry that does not require compliance but risk based supervision. It is important for the insurers to bear in mind that the growth of the insurance industry depends on an efficient and effective risk transfer mechanism. Adequate risk pricing have a direct impact on the levels of underwriting profit.

The high correlation of investment income with other selected variables indicates an industry almost dependent on investment income to maximize shareholders wealth. The seasonal variations in macroeconomic variables like interest rates results in variations of investment income levels affecting insurance industry profitability. Selection of risks to underwrite is a management decision unlike macroeconomic variables that are systemic. The growth of the industry depends on prudent risk selection decisions and innovations to boost insurance penetration in Kenya. Investment leverage boosts equity returns.

Insurers in Kenya should divert their focus to prudent underwriting practices that will ensure premium revenue growth with underwriting profit. The industry regulator should adhere to the adopted risk based supervision to weed out pricing based competition that is stagnating insurance penetration.

5.3 Policy Recommendations

The trend of low correlation between underwriting profit and investment income is disquieting for a country with low insurance penetration rate. The correlation can improve if insurance underwriting is viewed as a risk transfer process and not just a revenue generation endeavor. Kenya insurers seem to be operating largely on the maxim equity holders' wealth maximization overlooking their core mandate of pooling of risks efficiently.

Local insurers are faced with capacity constraints partly due to low capitalization and thus a more focus on overall profitability to boost capitalization. Adoption of Information Technology should be made mandatory to harness the synergy of both underwriting and claims business processes. A computerized linkage between the two processes will create dependency where premium rating will be based on loss ratios.

Portfolio modeling facilitates adequate pricing of insurable risks and provides prudent decision making parameters. The optimality and viability of insurable risks underwriting portfolios should be known at beginning of fiscal year which is not prevalent in Kenya. The IRA should encourage portfolio modeling by making it a requirement before licensing. The selected underwritten risks portfolio should aim to operate within the efficient frontiers.

Professionally qualified individuals who have been vetted for integrity should hold management positions to instill professionalism in the industry. Such individuals should appreciate the theories behind insurance premium rates determination and uphold professional code of conduct and ethics. Professional entrepreneurs and managers having a long term mindset will develop viable risk transfer business models not skewed towards investment income generation. This will ensure self-sustaining risk pools.

Investment income should only boost underwriting profit as insurers generate capital by selling insurance policies. Investment income maximizes equity and debt holders' wealth in instances of low underwriting profit at the expense of increasing insurance penetration through growth of premium income with underwriting profit.

Majority of the mega risks underwritten goes through an auction process. Price determination during bidding is based on expectations of what will be the actual cost of claims and competitors behavior. Self-regulation by industry prayers may not be effective due to premium growth motive. The IRA needs to develop a policy framework on this tendering process to make it more open, risk based and subject to market scrutiny like the trading of bonds in the financial bonds market.

5.4 Limitations of the study

The accuracy of underwriting profit/loss is determined by estimation errors and measurement problems of incurred losses and premium income. The source of data was statutory filings by insurers and assumption was the data presented a fair view of the insurance industry in Kenya. Formats of filing annual statutory returns have changed since operationalization of IRA in 2007 which may affect accuracy of previous years' data. During the study period, some insurers changed ownership or fundamentally restructured though remained licensed as non-life insurers.

The changes in application of various IFRS and the legal framework affected the homogeneity in preparation of data. No restatement of filed data was done to reflect the aforementioned changes. Also Time value of money was ignored to ease analysis of data.

Due to funding constrains, the study period of twelve years is comparatively short and caution to be applied in generalization of the findings. The focal point was an industry analysis and findings should be carefully applied to individual insurers.

There were substantial statutory changes within study period in definition of what constitutes admitted assets notably dropping of premium receivables after adoption of cash and carry legal notice. Premium receivable had a material weight on admitted assets and thus affecting investment returns (r_a) values.

5.5 Suggestions for Further Studies

Further research may shed some light if a longer study period of more than twelve years would materially affect the parametric correlations values. A longer study period will be able to capture the effects of underwriting cycles evidenced by studies done in other countries.

An in depth empirical analysis of the low parametric correlation between underwriting profit and investment income should carried out especially for the Kenya insurance industry. The collapse of insurers who mainly underwrote PSV liability insurance could be because of adverse insurance leverage that should be empirically tested.

The effectiveness of risk-based supervision by industry regulator needs empirically testing in light of underwriting profit low correlation with net premium and admitted assets. Underwriting profit is expected to have high correlation with net premium as an indicator of effectiveness of risk based supervision.

The insurers overall mean investment return of 5.9% is comparatively low to the banking industry. The macroeconomic variables affects both insurance and banking industry in a

similar manner but banking industry investment returns are always usually high despite operating in the same financial market. A study to test the optimality of insurers' investment portfolios in comparison to bankers' investment portfolios will explain this disparity.

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APPENDICES

Table 1 Parametric Correlation Weighted by Non-Life Net Premium

Correlations[a]

		Income before Tax	Investment Income	Non-Life Underwriting Profit
Pearson Correlation	Income before Tax	1.000	.727	.738
	Investment Income	.727	1.000	.313
	Non-Life Underwriting Profit	.738	.313	1.000
Sig. (1-tailed)	Income before Tax	.	.000	.000
	Investment Income	.000	.	.000
	Non-Life Underwriting Profit	.000	.000	.
N	Income before Tax	414	414	414
	Investment Income	414	414	414
	Non-Life Underwriting Profit	414	414	414

a. Weighted Least Squares Regression - Weighted by Non-Life Net Premium

Table 2 Model Summary Weighted by Non-life Net Premium

Model Summary[b,c]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.904[a]	.818	.817	1.028E8	.818	922.803	2	411	.000	2.239

a. Predictors: (Constant), Non-Life Underwriting Profit, Investment Income

b. Dependent Variable: Income before Tax

c. Weighted Least Squares Regression - Weighted by Non-Life Net Premium

Table 3 Coefficients Weighted by Non-life Net Premium

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	-4196.722	8673.017		-.484	.629	-21245.728	12852.285					
	Investment Income	.966	.039	.550	24.813	.000	.890	1.043	.727	.774	.522	.902	1.109
	Non-Life Underwriting Profit	1.176	.046	.566	25.543	.000	1.085	1.266	.738	.783	.538	.902	1.109

a. Dependent Variable: Income before Tax

b. Weighted Least Squares Regression - Weighted by Non-Life Net Premium

Table 4 Parametric Correlation Weighted by Admitted Assets

Correlations[a]

		Income before Tax	Investment Income	Non-Life Underwriting Profit
Pearson Correlation	Income before Tax	1.000	.727	.713
	Investment Income	.727	1.000	.308
	Non-Life Underwriting Profit	.713	.308	1.000
Sig. (1-tailed)	Income before Tax	.	.000	.000
	Investment Income	.000	.	.000
	Non-Life Underwriting Profit	.000	.000	.
N	Income before Tax	413	413	413
	Investment Income	413	413	413
	Non-Life Underwriting Profit	413	413	413

a. Weighted Least Squares Regression - Weighted by Admitted Assets

Table 5 Model Summary Weighted Admitted Assets

Model Summary[b,c]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.890[a]	.793	.792	1.495E8	.793	784.221	2	410	.000	2.150

a. Predictors: (Constant), Non-Life Underwriting Profit, Investment Income

b. Dependent Variable: Income before Tax

c. Weighted Least Squares Regression - Weighted by Admitted Assets

Table 6 Coefficients Weighted by Admitted Assets

Coefficients[a,b]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	24858.033	8754.276		2.840	.005	7649.166	42066.899					
	Investment Income	.910	.038	.561	23.722	.000	.834	.985	.727	.761	.533	.905	1.105
	Non-Life Underwriting Profit	1.160	.051	.540	22.866	.000	1.060	1.260	.713	.749	.514	.905	1.105

a. Dependent Variable: Income before Tax

b. Weighted Least Squares Regression - Weighted by Admitted Assets

Table 7 Parametric Correlation Weighted by Capital Employed

Correlations[a]

		Income before Tax	Investment Income	Non-Life Underwriting Profit
Pearson Correlation	Income before Tax	1.000	.743	.666
	Investment Income	.743	1.000	.281
	Non-Life Underwriting Profit	.666	.281	1.000
Sig. (1-tailed)	Income before Tax	.	.000	.000
	Investment Income	.000	.	.000
	Non-Life Underwriting Profit	.000	.000	.
N	Income before Tax	404	404	404
	Investment Income	404	404	404
	Non-Life Underwriting Profit	404	404	404

a. Weighted Least Squares Regression - Weighted by Capital Employed

Table 8 Model Summary Weighted by Capital Employed

Model Summary[b,c]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.883[a]	.780	.779	7.216E7	.780	710.769	2	401	.000	2.115

a. Predictors: (Constant), Non-Life Underwriting Profit, Investment Income

b. Dependent Variable: Income before Tax

c. Weighted Least Squares Regression - Weighted by Capital Employed

Table 9 Nonparametric Correlations

Correlations

			Income before Tax	Admitted Assets	Admitted Liabilities	Capital Employed	Investment Income	Non-Life Underwriting Profit	Non-Life Net Premium
Spearman's rho	Income before Tax	Correlation Coefficient	1.000	.688**	.628**	.717**	.608**	.399**	.627**
		Sig. (2-tailed)	.	.000	.000	.000	.000	.000	.000
		N	414	414	414	414	414	414	414
	Admitted Assets	Correlation Coefficient	.688**	1.000	.973**	.816**	.711**	.192**	.789**
		Sig. (2-tailed)	.000	.	.000	.000	.000	.000	.000
		N	414	414	414	414	414	414	414
	Admitted Liabilities	Correlation Coefficient	.628**	.973**	1.000	.686**	.674**	.189**	.815**
		Sig. (2-tailed)	.000	.000	.	.000	.000	.000	.000
		N	414	414	414	414	414	414	414
	Capital Employed	Correlation Coefficient	.717**	.816**	.686**	1.000	.633**	.175**	.577**
		Sig. (2-tailed)	.000	.000	.000	.	.000	.000	.000
		N	414	414	414	414	414	414	414
	Investment Income	Correlation Coefficient	.608**	.711**	.674**	.633**	1.000	.034	.540**
		Sig. (2-tailed)	.000	.000	.000	.000	.	.491	.000
		N	414	414	414	414	414	414	414
	Non-Life Underwriting Profit	Correlation Coefficient	.399**	.192**	.189**	.175**	.034	1.000	.371**
		Sig. (2-tailed)	.000	.000	.000	.000	.491	.	.000
		N	414	414	414	414	414	414	414
	Non-Life Net Premium	Correlation Coefficient	.627**	.789**	.815**	.577**	.540**	.371**	1.000
		Sig. (2-tailed)	.000	.000	.000	.000	.000	.000	.
		N	414	414	414	414	414	414	414

**. Correlation is significant at the 0.01 level (2-tailed).

Table 10 Mean Investment Returns

Ratio Statistics for Investment Income / Admitted Assets

Group	Mean	95% Confidence Interval for Mean		Std. Deviation	Range	Price Related Differential	Coefficient of Dispersion	Coefficient of Variation
		Lower Bound	Upper Bound					Median Centered
AMACO	.032	.019	.045	.020	.050	.762	.482	56.0%
APA	.037	.024	.051	.021	.080	.882	.430	66.0%
BLUE SHIELD	.035	.018	.051	.023	.084	1.127	.425	72.5%
BRITISH AMERICA	.084	.022	.146	.098	.251	1.837	1.806	235.8%
CANNON	.058	.026	.089	.049	.159	.794	.970	178.8%
CFC LIFE	.000	.000	.001	.001	.002	1.141	.	.%
CHARTIS (K)	.082	.054	.111	.044	.133	1.075	.514	76.1%
CIC	.058	.045	.071	.021	.056	1.258	.320	41.2%
CONCORD	.044	.031	.056	.018	.056	1.029	.347	43.9%
CORPORATE	.076	.028	.125	.076	.262	.857	1.227	225.7%
DIRECTLINE	.035	.006	.063	.027	.064	.666	.732	92.7%
FIDELITY SHIELD	.109	.079	.140	.048	.146	.961	.420	51.5%
FIRST ASSURANCE	.051	.040	.062	.017	.061	.956	.224	32.5%
GATEWAY	.090	.033	.148	.091	.353	.774	.790	154.9%
GEMINIA	.050	.035	.064	.023	.093	1.045	.343	48.5%
GENERAL ACCIDENT	.074	.061	.087	.020	.070	1.093	.208	27.1%
HERITAGE	.107	.092	.121	.022	.086	1.036	.149	20.5%
ICEA	.079	.065	.092	.021	.085	1.012	.177	26.5%
INTRA AFRICA	.031	.020	.042	.018	.069	1.025	.481	74.4%
INVESCO	.025	.016	.033	.011	.041	.976	.282	52.7%
JUBILEE	.091	.072	.110	.030	.102	1.023	.250	31.6%
KENINDIA	.051	.035	.067	.025	.099	.971	.355	57.9%
KENYA ORIENT	.100	-.046	.247	.230	.825	.810	1.901	585.5%
KENYA ALLIANCE	.038	.018	.059	.033	.094	1.031	.758	96.5%
LION OF KENYA	.056	.029	.083	.042	.106	1.104	.409	61.9%
MADISON	.041	.015	.067	.039	.127	1.173	.758	134.1%
MAYFAIR	.047	.035	.059	.012	.034	.965	.166	25.3%
MERCANTILE	.056	.029	.084	.043	.105	1.102	.467	63.5%
OCCIDENTAL	.064	.056	.071	.012	.038	.976	.141	17.9%
PACIS	.000	.000	.000	.000	.000	.	.	.%
PHOENIX	.076	.060	.092	.025	.075	1.018	.263	31.4%
REAL	.065	.050	.080	.024	.080	.935	.285	36.1%
STANDARD	.007	.003	.012	.006	.017	.994	.599	90.5%
TAUSI	.049	.035	.063	.022	.061	1.100	.402	47.1%
THE MONARCH	.015	.005	.025	.016	.040	1.122	1.656	212.6%
TRIDENT	.059	.048	.069	.016	.050	1.121	.227	29.6%
UAP INSURANCE	.118	.083	.153	.055	.155	1.014	.420	51.4%
UNITED	.012	-.006	.030	.011	.026	.936	.859	156.6%
Overall	.059	.053	.065	.059	.830	.927	.681	118.8%

The confidence intervals are constructed by assuming a Normal distribution for the ratios.

Table 11 Mean Underwriting Returns

Ratio Statistics for Non-Life Underwriting Profit / Non-Life Net Premium

Insurer	Mean	95% Confidence Interval for Mean		Std. Deviation	Range	Average Absolute Deviation	Price Related Differential	Coefficient of Dispersion	Coefficient of Variation
		Lower Bound	Upper Bound						Mean Centered
AMACO	.137	.079	.196	.081	.282	.062	1.410	.485	59.2%
APA	.033	.005	.062	.031	.085	.020	1.537	.937	92.0%
BLUE SHIELD	.166	.082	.251	.101	.334	.070	1.027	.500	60.7%
BRITISH AMERICA	.159	.111	.208	.068	.194	.054	.970	.376	42.9%
CANNON	.163	-.116	.443	.113	.221	.074	1.305	.532	69.0%
CFC LIFE	.092	-.042	.225	.084	.186	.068	1.014	.771	91.4%
CHARTIS (K)	.245	.150	.340	.149	.564	.095	1.084	.430	61.0%
CIC	.055	.026	.084	.038	.103	.031	.760	.559	68.4%
CONCORD	.143	.116	.171	.026	.078	.017	1.041	.112	18.2%
CORPORATE	.025	-.025	.074	.020	.036	.012	1.043	.819	81.4%
DIRECTLINE	.040	.016	.063	.019	.045	.014	.963	.303	48.0%
FIDELITY SHIELD	.014	.000	.028	.009	.019	.008	.983	.559	66.2%
FIRST ASSURANCE	.052	.020	.084	.035	.099	.025	.875	.558	66.7%
GATEWAY	.014	.	.	.	.000	.000	1.000	.000	.%
GEMINIA	.096	.027	.165	.028	.052	.017	.968	.203	28.7%
GENERAL ACCIDENT	.066	.023	.109	.046	.115	.035	1.299	.634	70.4%
HERITAGE	.024	.007	.042	.019	.054	.014	.882	.534	78.0%
ICEA	.420	-.323	1.163	.299	.588	.196	1.597	.406	71.2%
INTRA AFRICA	.045	.022	.067	.032	.109	.021	1.001	.481	71.3%
INVESCO	.072	.008	.136	.083	.223	.056	.843	1.912	114.8%
JUBILEE	.063	.033	.093	.032	.101	.023	.850	.365	51.5%
KENINDIA	.056	.032	.081	.031	.091	.024	.990	.412	55.7%
Kenya ORIENT	.062	.046	.079	.024	.084	.017	.909	.233	39.2%
Kenya ALLIANCE	.093	-.002	.188	.076	.164	.060	.902	.538	82.1%
LION OF Kenya	.096	.002	.189	.059	.143	.039	.872	.394	61.4%
MADISON	.047	.023	.071	.033	.116	.022	1.021	.478	71.4%
MAYFAIR	.715	-3.203	4.633	.436	.617	.308	1.309	.431	61.0%
MERCANTILE	.096	.036	.156	.024	.047	.016	1.000	.151	25.1%
OCCIDENTAL	.042	.018	.066	.033	.089	.027	.986	.732	79.3%
PACIS	.046	-.005	.096	.020	.039	.013	1.151	.241	44.4%
PHOENIX	.028	-.084	.140	.012	.018	.009	1.072	.318	45.0%
REAL	.056	.038	.074	.026	.082	.020	1.192	.337	46.9%
STANDARD	.056	.030	.082	.031	.103	.022	.937	.397	55.3%
TAUSI	.090	-.018	.198	.103	.243	.085	.980	1.458	114.0%
THE MONARCH	.052	-.118	.222	.068	.126	.042	.575	1.972	130.9%
TRIDENT	.029	.000	.059	.024	.056	.018	.986	.991	80.8%
UAP INSURANCE	.070	.038	.103	.046	.140	.036	.977	.600	65.4%
UNITED	.070	-.079	.220	.060	.110	.037	.897	.371	85.6%
Overall	.091	.077	.105	.111	1.023	.062	1.072	1.002	122.6%

The confidence intervals are constructed by assuming a Normal distribution for the ratios.

Table 12 Correlation between Investment Income and Underwriting Profit without Weights

Correlations

		Income before Tax	Investment Income	Non Life Underwriting Profit
Pearson Correlation	Income before Tax	1.000	.686	.649
	Investment Income	.686	1.000	.215
	Non Life Underwriting Profit	.649	.215	1.000
Sig. (1-tailed)	Income before Tax	.	.000	.000
	Investment Income	.000	.	.000
	Non Life Underwriting Profit	.000	.000	.
N	Income before Tax	414	414	414
	Investment Income	414	414	414
	Non Life Underwriting Profit	414	414	414

Table 13 Correlation between Investment Returns and Underwriting Returns without Weights

Correlations

		Income before Tax	Investment Income as percentage of Admitted Assets	Underwriting Profit as percentage of Net Premium
Pearson Correlation	Income before Tax	1.000	.287	.241
	Investment Income as percentage of Admitted Assets	.287	1.000	.028
	Underwriting Profit as percentage of Net Premium	.241	.028	1.000
Sig. (1-tailed)	Income before Tax	.	.000	.000
	Investment Income as percentage of Admitted Assets	.000	.	.284
	Underwriting Profit as percentage of Net Premium	.000	.284	.
N	Income before Tax	413	413	413
	Investment Income as percentage of Admitted Assets	413	413	413
	Underwriting Profit as percentage of Net Premium	413	413	413

Table 14 Correlation between $r_u P$ and $r_a A$

Correlations

		Income before Tax	Investment Income as percentage of Admitted Assets by Admitted Assets	Underwriting Profit as percentage of Net Premium by Net Premium
Pearson Correlation	Income before Tax	1.000	.688	.649
	Investment Income as percentage of Admitted Assets by Admitted Assets	.688	1.000	.216
	Underwriting Profit as percentage of Net Premium by Net Premium	.649	.216	1.000
Sig. (1-tailed)	Income before Tax	.	.000	.000
	Investment Income as percentage of Admitted Assets by Admitted Assets	.000	.	.000
	Underwriting Profit as percentage of Net Premium by Net Premium	.000	.000	.
N	Income before Tax	413	413	413
	Investment Income as percentage of Admitted Assets by Admitted Assets	413	413	413
	Underwriting Profit as percentage of Net Premium by Net Premium	413	413	413

Table 15 Regression model Summary ($r_u P$ and $r_a A$)

Model Summary[b]

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Change Statistics					Durbin-Watson
					R Square Change	F Change	df1	df2	Sig. F Change	
1	.858[a]	.736	.734	100092.907	.736	570.465	2	410	.000	2.206

a. Predictors: (Constant), Underwriting Profit as percentage of Net Premium by Net Premium, Investment Income as percentage of Admitted Assets by Admitted Assets

b. Dependent Variable: Income before Tax

Table 16 Licensed General Insurers in Kenya (Licensed for more than three years during the study period)

1	AMACO
2	APA
3	BLUE SHIELD
4	BRITISH AMERICA
5	CANNON
6	CFC LIFE
7	CHARTIS (K)
8	CIC
9	CONCORD
10	CORPORATE
11	DIRECTLINE
12	FIDELITY SHIELD
13	FIRST ASSURANCE
14	GATEWAY
15	GEMINIA
16	GENERAL ACCIDENT
17	HERITAGE
18	ICEA
19	INTRA AFRICA
20	INVESCO
21	JUBILEE
22	KENINDIA
23	KENYA ORIENT
24	KENYA ALLIANCE
25	LION OF KENYA
26	MADISON
27	MAYFAIR
28	MERCANTILE
29	OCCIDENTAL
30	PACIS
31	PHOENIX
32	REAL
33	STANDARD
34	TAUSI
35	THE MONARCH
36	TRIDENT
37	UAP INSURANCE
38	UNITED

Table 17 Number of Registered Insurance Companies as at 31/12/2011

Type of Business	Number of Insurers
General (Non-Life)	24
Long term (Life)	11
Composite (Both Life and Non-Life)	12
Total	**47**

Table 18 Coefficients for r_aA and r_uP

Coefficients[a]

Model		Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B		Correlations			Collinearity Statistics	
		B	Std. Error	Beta			Lower Bound	Upper Bound	Zero-order	Partial	Part	Tolerance	VIF
1	(Constant)	6493.449	6048.342		1.074	.284	-5396.181	18383.079					
	Investment income as percentage of admitted assets by Admitted assets	.950	.043	.575	22.095	.000	.865	1.034	.688	.737	.561	.953	1.049
	Underwriting profit as percentage of net earned premium by Net earned premium	1.088	.054	.524	20.159	.000	.982	1.195	.649	.706	.512	.953	1.049
2	(Constant)	19045.649	6995.822		2.722	.007	5293.294	32798.004					
	Investment income as percentage of admitted assets by Admitted assets	1.048	.051	.634	20.493	.000	.947	1.148	.688	.712	.514	.656	1.525
	Underwriting profit as percentage of net earned premium by Net earned premium	1.078	.063	.519	17.136	.000	.954	1.202	.649	.647	.429	.684	1.462
	Investment income as percentage of admitted assets	-11821.189	26016.423	-.013	-.454	.650	-62964.153	39321.775	.287	-.022	-.011	.728	1.374
	Underwriting profit as percentage of net earned premium	-348070.960	98656.748	-.106	-3.528	.000	-542009.939	-154131.981	.241	-.172	-.088	.690	1.448

a. Dependent Variable: Income before Tax