DETERMINANTS OF SOLVENCY MARGINS OF INSURANCE COMPANIES IN KENYA

BY

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DECLARATION

This research project is my original work and has not been presented for a degree in 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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ABSTRACT

The objective of this study was to establish the determinants of solvency margins of insurance companies in Kenya.

The research design was a census survey of all insurance companies in Kenya. The target population was defined as all insurance companies, which operated in the insurance industry from January 2001 to December 2010. Multiple regression analysis was carried out in order to see their impact on the solvency margin of insurance companies.

The multivariate regression for the insurers has generated statistically significant results consistent with majority of the hypotheses formulated on firm-specific factors. The study revealed that four of the seven studied variables were of the predicted sign. Liquidity ratio, operating margin, combined ratio (expense and claims ratio) and premium growth were of the predicted sign while growth in surplus, Investment performance and firm size were contrary to the predicted results.

The results of the study have some important policy implications for regulating and monitoring insurers' solvency. Since liquidity ratio is one of the most direct measures of insurer's financial health, regulators may consider using it as a first line indicator of possible financial difficulties. It is also important to have different regulations for life and general insurance companies as each operates under different constraints and requires more specific management and regulatory structures.

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ABBREVIATIONS

AKI – Association of Kenya Insurers

ASM – Available Solvency Margin

COI – Commissioner of Insurance

IRA – Insurance Regulatory Authority

KNAC – Kenya National Assurance Company Limited

MDA – Multiple discriminant analysis

MIPs – Medical Insurance Providers

IP - Investment Performance

LQ - Liquidity Ratio

OM - Operating Margin

CR - Combined Ratio,

SG - Surplus Growth

PG - Premium Growth

CHAPTER ONE
INTRODUCTION

1.1 Background to the Study

The solvency margin as set out in the Kenyan Insurance Act (CAP 487) is used as an indicator of the financial soundness of the insurance companies operating in Kenya. For the years 1987 to 2005, six insurance companies were declared insolvent in an industry of forty three as at 31st December 2005. These companies did not meet the solvency margin requirements. These were; Access, Kenya National, Stallion, Lakestar, Liberty and United Insurance Companies. The largest of these failures was Kenya National Assurance Company Limited (KNAC) in 1995. KNAC was a market leader in both life and general insurance business with total assets of Kes 3.5 billion representing 20% of the total industry assets in 1992 (COI Annual Reports, 1992 – 2005).

1.1.1 Solvency Margin

Solvency margin is defined as a minimum excess on an insurer's assets over its liabilities set by regulators. It can be regarded as similar to capital adequacy requirements for banks. It is essentially a minimum level of the solvency ratio, but regulators usually use a slightly more complex calculation (http://www.moneyterms.co.uk).

In Kenya, Insurance companies are required by law to maintain a minimum solvency margin. The solvency margin as set out in the Kenyan Insurance Act (CAP 487) is used as an indicator of the financial soundness of the insurance companies operating in Kenya. Section 41 and 42 of the Act define what are admissible assets and liabilities for purposes

of determining the solvency margins. In the long-term business, the admitted assets must exceed the admitted liabilities by 5%. In short-term business, the margin must be greater than Kes 10 million or 15% of the preceding year net premiums whichever is greater.

1.1.2 Determinants of Solvency Margins

The sensitivity of Solvency Margin has been found to be affected by several factors. McDonald (1992) summarized the factors affecting insurer insolvency, which provide useful guidelines on an insurer's financial health, but without classifying them into different types of insurers. They include the following;

1.1.2.1 Operating Margin

Operating margin is defined as the ratio of net operating income to premiums earned (Lee and Urrutia, 1996). Intuitively, being profitable means that insurers are earning more revenues than being disbursed as expenses. Operating margin is found to be negatively correlated to the rate of insolvency.

1.1.2.2 Firm Size

The financial health of any organization is influenced by, among other factors, the size or total assets of the firm. Variables used to measure firm size include total premium, total admitted assets, and capital and surplus (BarNiv and Hershbarger, 1990; Cummins, Harrington, and Klein, 1995).

1.1.2.3 Investment Performance

Investment performance discloses the effectiveness and efficiency of investment decisions. As such, investment performance becomes critical to the financial stability of

any insurer. Empirical results have found that investment performance is negatively correlated to insolvency rate (Kim et al. (1995) and Kramer (1996).

1.1.2.4 Liquidity Ratio

Liquidity is the capability of an insurer to pay liabilities, which include operating expenses and payment for losses/benefits under insurance policies, when due. The frequency, severity and timing of insurance claims or benefits are uncertain, so insurers need to plan their liquidity carefully. Liquidity is usually a less pressing problem for insurance companies at least as compared to banks, since the liquidity of their liabilities is relatively predictable and for non-life insurers the liabilities, besides claims are for shorter period of time. Lee and Urrutia (1996) found that the current liquidity ratio is a significant indicator of solvency.

1.1.2.5 Premium Growth

Premium growth measures the rate of market penetration. Prompt growth of premium is one of the causal factors of insurers' insolvency. The ratio used to measure this variable is premium written to surplus (Lee and Urrutia (1996), Ambrose and Seward (1988), Pinches and Trieschmann (1974), NAIC)

1.1.2.6 Underwriting Result

For underwriting income, we use combined ratio to measure its performance. The combined ratio is a ratio of incurred losses to earned premiums plus incurred expenses to written premiums (Rejda, 2001). It is used as a measure of insurers' underwriting performance, the ratio is defined as loss ratio plus expense ratio and it presents the

outlook of insurers' efficiency in underwriting operations. According to Browne and Hoyt (1995), the combined ratio is positively correlated to insolvency rate.

1.1.2.7 Growth Rate of Surplus

This is closely related to operating margin. This has been found to be negatively correlated to the rate of insolvency. The ratio used to measure this variable is change in surplus during the period to surplus at the beginning of the period (Lee and Urrutia (1996), Hampton (1993), NAIC.

1.1.3 Overview of the Insurance Industry in Kenya

Insurance business is defined as a business of undertaking liability by way of insurance (including Reinsurance) in respect of any loss of life and personal injury and any loss of life and personal injury and any loss or damage, including liability to pay damage or compensation, contingent upon the happening of a specified event (Insurance Act Cap. 487).

As per AKI insurance industry annual report 2010, there were 46 licensed insurance companies. 22 companies wrote non-life insurance business only, 9 wrote life insurance business only while 14 were composite (both life and non-life). There were 163 licensed insurance brokers, 23 medical insurance providers (MIPs) and 4223 insurance agents. Other licensed players included 120 investigators, 80 motor assessors, 21 loss adjusters, 2 claims settling agents, 10 risk managers and 26 insurance surveyors. The penetration of insurance in Kenya is estimated at 3%. The penetration ratio can be improved further by increasing the number of intermediaries particularly agents.

The insurance industry is governed by the Insurance Act Cap 487 and is regulated by the Insurance Regulatory Authority (IRA). The role of the Authority is among others to formulate and enforce standards in the conduct of the business of insurance with which a member of the insurance industry must comply. They basically set the agenda in the industry to ensure that the businesses are run professionally. The creation of IRA to replace the office of the Commissioner of Insurance under the Ministry of Finance has not only instilled a sense of confidence in the regulatory framework in the industry but has also injected new approaches to ethics, management and growth of the insurance investments in Kenya.

Another player in the industry is the Association of Kenya Insurers (AKI). Membership of the Association is open to any insurance company registered and licensed under the Insurance Act Cap 487 to transact business in Kenya. AKI was established as a trade association to advocate for its members interests. It also looks into the members interests by protecting, promoting and advancing the common interests of members against other bodies and the Government. AKI also lobbies for its members to ensure that their businesses run smoothly with as little interference as possible. Gathering and collection of information and market-wide statistics from members for the purpose of determining market trends that are economically viable is also carried out by AKI.

There are several legislative changes made in recent years that have had an impact on the Kenyan insurance industry. There were notable legislative changes affecting the insurance sector in the year 2010 as outlined below in the Finance Act, 2010;

Under Regulation 20, four copies of accounts, balance sheets, certificates returns or statements shall be forwarded to the Commissioner accompanied by an authentication certificate signed by both the principal officer and the auditor who prepared the accounts. It also allowed for the submission of such returns through the use of Information Technology.

Under Regulation 49 the fees payable by the members of the Insurance industry for registration or renewal of registration under the Act and the Regulations shall be paid to the Insurance Regulatory Authority. The definition of medical insurance business was introduced under the Third Schedule to read as follows: "Medical Insurance Business means the insurance business of paying for medical expenses, including the business of covering disability or long term nursing or custodial care needs." Legal Notice No 105 of 2004 relating to the Insurance (Policyholders Compensation Fund) Regulations 2004 was revoked effective 10th June, 2010. The same was replaced with new regulations which are broader and more comprehensive, now referred to as Insurance (Policyholders Compensation Fund) Regulations 2010. Section 42(1) (d) was deleted.

The item referred to unpaid premium due to the insurer for more than three months, and that previously secured under automatic non forfeiture against the surrender value of a life insurance policy as an inadmissible asset. Note: There was also a corresponding amendment under the regulations where outstanding premiums were deleted from the statement of admitted assets under the Part B of the Second Schedule, item 3(vii).

The prescribed penalty of Kenya Shillings two hundred thousand charged by IRA for persons carrying on insurance or reinsurance business without registration, persons

charging a rate of premium other than that filed with the Commissioner, as well as persons found to be engaging in business malpractices shall be paid to the Policyholders Compensation Fund in such manner as may from time to time be prescribed by the Authority. It was previously payable by the crossed bankers draft in favour of the Permanent Secretary Treasury.

The unsecured loan or advance that an insurer may grant to an employee on compassionate grounds was increased from Kenya Shillings Twenty Thousand (Kshs.20,000/=) to Kenya Shillings One Hundred Thousand(Kshs.100,000/=). Following the signing of the East African Community Common Market protocol, insurance agents will be in a position to sell insurance and insurance related products anywhere across the various member partner states within the region.

Section 156 (7) which prescribed a penalty of 5% on outstanding premium payable by brokers for failure to remit premium under section 156(2) was deleted. Section 156(2) had been deleted in 2007 following the introduction of "cash and carry" for all classes of business.

1.2 Statement of the Problem

The insurance industry is one volatile industry in the financial services sector. It has unique characteristics that make it vulnerable to changes in the operating environment.

According to the Insurance Regulatory Authority, solvency management is a crucial element in supervision of insurance companies. It is therefore important for any insurance

institution to not only measure solvency on an ongoing basis but also examine ways of mitigating during distress.

Under section 41 of Insurance Act CAP 487, Insurance companies are required to maintain minimum solvency margin. Currently, an Insurer carrying on in Kenya long term insurance business but not general insurance business shall keep at all times total admitted assets of not less than his total admitted liabilities and ten million shillings or five per centum of the total admitted liabilities, whichever is higher while an Insurer carrying on in Kenya general insurance business but not long term insurance business shall keep at all times admitted assets of not less than the aggregate value of his admitted liabilities and ten million shillings, or fifteen per cent of his net premium income during his last preceding financial year, whichever is the greater.

For the purposes of determining the solvency of an insurer, every registered insurer shall, for the period ending on the 31st December in each year, make a return on the prescribed form (FORM 41-1), showing his total assets, total admitted assets, total liabilities and such other details as may be prescribed, which shall be signed by the principal officer of the insurer and an auditor and submitted to the Commissioner on or before the 30th April the following year. Further, quarterly returns are submitted to IRA, before 45 days lapses after quarter end to monitor the solvency margins.

Previous studies of insolvency and solvency margins of insurance companies focused mainly on insurers (both life and general) operating in the United States and developed economies.

Ng'ang'a (2006) carried out related research on failure prediction of insurance companies in Kenya. He developed a model similar to Altman Z score model and used to forecast financial distress up to a number of years before financial distress. The study revealed that it is possible to classify failing and non-failing companies with 100% of failed and 90% of non-failed. There is no known study which has been undertaken in Kenya to examine determinants of solvency margins. Thus, an explicit analysis of solvency determinants of insurance companies in Kenya was necessary. As a result, this study sets to find out the determinants of solvency margins of insurance companies in Kenya.

1.3 Objective of the Study

The objective of this study was to establish the determinants of solvency margins of insurance companies in Kenya.

1.4 Importance of the Study

This research is important to insurance Regulatory Authority (IRA) as it will be used to enhance existing legal and regulatory policies and procedures of supervising insurance companies in Kenya.

Also, this research will enable insurance companies to develop ways of mitigating and protecting their solvency margins.

Further, the research will add to the body of knowledge in finance discipline by relating practical aspects of solvency with finance theory.

Finally, the research will enable policyholders to assess whether the insurance companies are in compliant with the relevant regulation and therefore make informed decision on which company(s) to invest.

CHAPTER TWO
LITERATURE REVIEW

2.1 Introduction

This section reviews previous studies on the Insurer's insolvency and solvency margins particularly factors affecting the same.

2.2 Factors Affecting Insurer's Insolvency/Solvency Margins

McDonald (1992) summarized the factors affecting insurer insolvency, which provide useful guidelines on insurer's financial health, but without classifying them into different types of insurers. The following section will review firm-specific factors that affect property-liability (general) and Life insurers separately, and market factors that affect both types of insurers. This is because life insurers differ greatly in terms of operations, investment activities, vulnerabilities, and duration of liabilities from general insurers (Brockett et al., 1994) life insurers are said to function as "financial intermediaries" while general insurers as "risk takers".

2.2.1 Firm – Specific Factors on General Insurer's Insolvency

Many previous studies focused on general insurers used financial characteristics as insolvency predictors (Ambrose and Seward, 1988; BarNiv, 1990; Barniv and McDonald, 1992; BarNiv and Smith, 1987; Barrese, 1990; Harrington and Nelson, 1986; Hershbarger and Miller, 1986; Willenborg, 1992; Pinches and Trieschmann, 1974; Trieschmann and Pinches, 1973). The factors that are significant for assessing general

insurer's insolvency include firm size, investment performance, underwriting result, liquidity, operating margin, premium growth, and growth rate of surplus.

2.2.1.1 Firm size

The financial health of any organization is influenced by, among other factors, the size or total assets of the firm. As regulators are less likely to liquidate large insurers, it is expected that small insurers are more vulnerable to insolvency (BarNiv and Hershbarger, 1990; Cummins, Harrington, and Klein, 1995). Variables used to measure firm size include total premium, total admitted assets, and capital and surplus.

2.2.1.2 Investment Performance

Investment performance discloses the effectiveness and efficiency of investment decisions. As such, investment performance becomes critical to the financial solidity of and insurer. Kim et al. (1995) and Kramer (1996) find that investment performance is negatively correlated to insolvency rate.

2.2.1.3 Underwriting Result

There are two components of an insurer's total operating income; investment income and underwriting income. We have discussed the effect of investment performance. As for underwriting income, we use combined ratio to measure its performance. According to Browne and Hoyt (1995), the combined ratio is positively correlated to insolvency rate.

2.2.1.4 Liquidity Ratio

Liquidity is the capability of an insurer to pay liabilities, which include operating expenses and payment for losses /benefits under insurance policies, when due. For an insurer, cash flow (mainly premiums and investment income) and liquidation of assets are the two sources of liquidity (Hampton, 1993).

Liquidity is usually a less pressing problem for insurance companies at least as compared to banks, since the liquidity of their liabilities is relatively predictable and for non-life insurers the liabilities, besides claims are for shorter period of time. However, the ratio is prescribed to be maintained more than 100 percent, Hampton, (1993). Moreover the liquidity problem may call upon capital restructuring and infusion of more capital to heighten the liability graph.

Lee and Urrutia (1996) found that the current ratio is a significant indicator of solvency. The stability of the liquidity ratio is a necessary measure of corporate solvency (Dambolena and Khoury, 1980).

2.2.1.5 Operating margin

Intuitively, being profitable means that insurers are earning more revenues than being disbursed as expenses. Kramer (1996) found a positive relationship between operating margin and financial solidity, that is, operating margin is negatively correlated to the rate of insolvency.

2.2.1.6 Premium Growth

Premium growth measures the rate of market penetration. Empirical results show that rapid growth of premium volume is one of the causal factors in insurer's insolvency (Kim et al. 1995). Being too obsessed with growth can lead to self-destruction as other important objectives might be neglected. This is especially true during an economic downturn, such as the Asian Financial Crisis.

2.2.1.7 Growth Rate of Surplus

Closely related to operating margin is the growth of surplus. An insurer who is profitable should be reporting increases in surplus over the years. However, the increases in surplus should not be dramatic as such increases could indicate the increase in in the risk level of operation. Being operating with growth at higher risk level could produce negative impact on the insurer's financial health (Lee and Urrutia, 1996).

2.2.2 Firm – Specific Factors on Life Insurer's Insolvency

Unlike general insurer's insolvency, Kim et al. (1995) found that the correlation coefficients of identified variables in life insurer's insolvency are not high. Nevertheless, they are important in predicting insurer's insolvency and thus are discussed below.

2.2.2.1 Firm Size, Investment performance, and operating margin

Consistent with the findings for general insurers, firm size (Kim et al., 1995) and age (Grace, Harrington, and Klein, 1998) are negatively correlated with life insurer's rate of insolvency. Ambrose and Carroll (1994) got a better classification when ratio of net

investment income to total income was included in their analyses. BarNiv and Hershbarger (1990) found that operating margin is the best single variable associated with life insurer's solvency.

2.2.2.2 Change in Asset Mix

Life insurers' assets can be partitioned into various categories like bonds, common and preferred stocks, mortgage loans, and loans. Life insurers offer a variety of life insurance policies, annuities, and other investment sensitive contracts with different risk-return features (Klein, 1995). Hence, any changes in the asset mix will definitely have implications on the insurer's financial solidity to varying degrees. Empirical findings have confirmed that there is a positive relationship between this variable and life insurers' insolvency (Ambrose and Carroll, 1994; BarNiv and Harshbarger, 1990; Carson and Hoyt, 1995).

2.2.2.3 Change in Product Mix

Change in product mix is the ratio representing the average change in the percentage of total premium from each product line during the year. BarNiv and Harshbarger (1990) found that change in product mix affects smaller life insurers adversely.

2.2.2.4 Insurance Leverage

Insurance leverage is defined as reserve to surplus. The risk of an insurer may increase when it increases its insurance leverage and/ or financial leverage (Carson and Hoyt, 1995). Literature on capital structure confirms that a firm's value will increase up to an optimum point as leverage increases, and then decline if leverage is further increased

beyond the optimum level. Thus, leveraging beyond this optimum level could result in high risk of insolvency and low value of the firm.

2.2.3 Market/ Economic Factors on General Insurer's Insolvency

A good understanding of economic conditions under which an insurance company operates is valuable for three reasons (Browne and Hoyt, 1995). First, the potential and probability of insolvencies can be greatly reduced, to the extent that the regulator can influence these market conditions. Second, any effective and efficient regulatory action taken with respect to an insurer's financial distress is a function of the prevailing economic conditions. Third, depending on the economic environment in which insurers operate, the optimal need of resources devoted to solvency surveillance will change. As such, more resources will be needed during difficult economic periods, such as the Asian Financial Crisis.

Browne and Hoyt (1995) tested six hypothesis in relation to general insurers' insolvency, which include the number of insurers (competition), underwriting cycle and combined ratio, first quarter of year (which has to do with the timing of regulatory action taken), unanticipated inflation, interest rate level, and interest rate change. The hypothesized relationships for all these variables are positive, except the interest rate level. It was found that only the first three hypotheses were significant in their study. Their conclusions are to some content supported by the studies done by Munch and Smallwood (1980), Chen, Wong, and Lee (1991), and Staking and Babbel (1991).

2.2.4 Market/ Economic Factors Related to Life Insurer's Insolvency

In a study examining the relationship between insurance market conditions and life insurers' insolvency, Best Company (1992) found that the number of insolvencies is correlated with the accident and health underwriting cycle (lagged by 1-3 years). The increased number of insolvencies is correlated with increases in interest rates and life insurers' focus on investment-related products. The study, however, did not examine the economic factors in a multivariate framework to determine their relative significance.

Browne, Carson and Hoyt (1995) attempted to identify factors that are exogenous to individual life insurers, and that increase their susceptibility to insolvency. This is because conditions that are exogenous to the firm may increase the likelihood of its financial distress. They find that life insurers' insolvencies are positively related to increases in long-term interest rates and personal income, and negatively related to real estate returns. These findings support the argument that economic and market factors are important in the prediction of life insurers' financial health.

2.3 Failure Prediction Models

The signs of impending financial distress or failure usually manifest themselves prior to failure. Consequently and with appropriate mechanisms of predicting failure creditors, investors, management and other stakeholders may be able to make corrective action before failure finally occurs. Horne (1991) notes the need to develop mechanisms that detect the impending failure early enough.

Various business failure prediction models have been developed:

2.3.1 Univariate analysis models

Horne (1991) noted that Beaver (1966) was the first to use statistical techniques to predict corporate failure. He applied a univariate discriminant analysis model on a number of financial ratios of a paired sample of failing and non-failing companies in order to predict company failure. Beaver applied a dichotomous classification test in order to identify those ratios that were best in classifying the companies as failing or non-failing; failure defined as the inability to meet financial obligations of any type. He observed that the mean ratio for the failed firms differed significantly from that for the non-failed firms. Not only was it lower, but it deteriorated markedly as failure approached (Beaver 1966).

2.3.2 Risk Index models

Tamari (1966) noted the weaknesses in Beaver's (1966) model as reliance on one variable alone and the inconsistency in ratio application and came up with the risk index. This model involves the use of a simple "point system" which includes different ratios, generally accepted as measures of financial health. Each firm is attributed a certain number of points, between 0 and 100, according to the values of ratios for the firm. Higher total points indicate a better financial situation. The risk index takes account of the fact that some ratios are more important than others. Points are allocated in a way that most important ratios have higher weights. Tamari documented the ratios and their respective weights as under:

Ratio	**Points**
Equity capital/ Total Liabilities	25

Profits earned	25
Current ratio	20
Value of production/Inventory	10
Sales/Receivables	10
Value of production/Working Capital	10
	100

Adopted from Meir Tamari: Financial ratios as means of forecasting bankruptcy; management international review, Vol. 4, 1966 pp19

Moses and Liao (1987) presented a risk index that first requires a univariate analysis, which allows determining an optimal cut-off point for each of the financial ratios. Next, for each ratio, a dichotomous variable is created and these variables are assigned a score of one if a firm's ratio value exceeds the optimal cut-off point and a score of zero if the value is lower. The major criticism of the risk index models is subjectivity. The weights are determined subjectively.

2.3.3 Multiple Discriminant Analysis

Multiple discriminant analysis (MDA) is a statistical technique used to classify an observation into one or several priori groupings dependent on observed individual characteristics. It is used primarily to classify and or make predictions in problems where the dependent variable appears in qualitative form, for example male or female, bankrupt or non-bankrupt. The steps involved are: establishing explicit group classification, in

which case the number of groups could be two or more, and collection of data for the objects in the groups. In its simplest form, the discriminant function is of the form;

$Z = V_1X_1 + V_2X_2 + \ldots\ldots\ldots V_nX_n$

Transforms the individual variable values to a single discriminate score, or Z value, which is then used to classify the object value:

$V_1, V_2 \ldots\ldots V_n$ = discriminate coefficients,

$X_1, X_2 \ldots\ldots X_n$ = Independent variables

Source: Edward I. Altman, Predicting Financial Distress of Companies: Revisiting the Z-Score and Zeta Models, July 2000

The MDA computes the discriminate coefficients; V_i while the independent variables X_i are actual values.

Altman (1968) employed MDA to predict bankruptcy, using various financial ratios. Altman worked with sample of corporations that filed for bankruptcy. He collected a paired sample of bankrupt and non-bankrupt firms on a stratified random basis. Starting with 22 financial ratios, he selected the five that did the best combined job of predicting bankruptcy. The ratios were used to discriminate between bankrupt and non-bankrupt using data from 1 to 5 years prior to bankruptcy. The predictive accuracy of the discriminate declined with the increase in years prior to bankruptcy; however the model was able to forecast failure quite well up to 2 years before bankruptcy.

The Z-score model derived by Altman has the discriminate function as below:

$Z = 0.012x_1 + 0.014x_2 + 0.033x_3 + 0.006x_4 + 0.999x_5$

Where;

X_1 = Working capital/total assets

X_2 = Retained earnings/total assets

X_3 = earnings before interest and taxes/ total assets

X_4 = market value of equity/book value of total liabilities

X_5 = sales/total assets

Z = overall index

Source: Altman (1968)

Altman (1968) found out that companies with Z – score below 1.81 including negative amounts always went bankrupt, whereas Z - scores above 2.99 represented healthy firms. Firms with a z-score in between were sometimes misclassified, and this he noted represented an area of gray.

The model above described was for publicly quoted companies. Altman ariaing from the frequent inquiries from those interested in using Z – score model on the application of the model in private sector revisited the model and derived one for private firms and later for non – manufacturers. The model derived for private firms is of the form:

$Z = 0.717x_1 + 0.847x_2 + 3.107x_3 + 0.420x_4 + 0.998x_5$

$Z < 1.23$ indicates a bankruptcy prediction

1.23 to 2.90 indicates a gray area

$Z > 2.90$ indicates no bankruptcy

The main change was in variable X_4 whereby instead of using the market value of equity he used the book value of equity. All the coefficients had significant changes except X_5. Regarding X_4 the only variable that changed, had its coefficient reducing from 0.6 to 0.420.

The non- manufacturing model is of the form:

$$Z = 6.56x_1 + 3.26x_2 + 6.72x_3 + 1.05x_4$$

Where;

X_1 = Net working capital to total assets

X_2 = Accumulated Earnings to total assets

X_3 = Earnings before interest and taxes to total assets

X_4 = Book value of equity to total liabilities

$Z < 1.1$ indicates a bankruptcy prediction

1.1 to 2.6 indicates a gray area

$Z > 2.6$ indicates no bankruptcy

Source: Eidleman, Gregory J, CPA Journal, New York, Feb1995)

Altman et al (1977) later made improvements on the initial Z – score model due changes in the bankruptcy environment and need for other improvements. These enhancements resulted in increase in the number of variables from five to seven. These ratios are; return on asset ratio, stability of earnings, interest coverage ratio, retained earnings to total assets ratio, current ratio, common equity to total capital ratio, and size of total assets.

2.3.4 Conditional Probability Models

Balcaen et al (2004) in his review of the classical statistical methodologies and their related problems documents the methodologies of conditional probabilities models. The conditional probability models; Logit and Probit Analysis are used to estimate the probability of company failure conditional on a range of firm characteristics by non – linear maximum likelihood estimation. The models are based on a certain assumption concerning the probability distribution. The Logit models assume a logistic distribution while the probit models assume a cumulative normal distribution. Ohlson (1980) pioneered in the use of Logit Analysis (LA) and Zmijewski (1984) the Probit Analysis (PA).

2.4 Causes and Effect of Insurers' Failure

Specific causes of business failure in the insurance industry have been noted to be rapid growth, fraud and greed, corporate governance, lax in supervision on the part of regulators. This was observed in the case of the collapse of HIH of Australia whose failure was attributed to rapid expansion, unsupervised delegation, expensive and complex reinsurance, under-pricing, reserving problems, false reports, incompetence, fraud, greed and self-dealing (Erisk Regulatory Workshop, 2002).

Commissioner of insurance reports, cite some causes of the Kenya's insurance companies business failure as: cash flow constraints, mismatch of assets and liability, imprudent investments decisions, excessive operating expenses, financial mismanagement amidst others. Access Insurance Company Limited was declared insolvent in 1993. Prior to its

closure, the company had experienced negative reserves ranging from Kes 32.4 million to Kes 19.7 million for three consecutive years 1990-1992. The reason cited for its fall was, severe cash flow constraint. Kenya National Assurance Limited (KNAC) closed down in 1995. Bell (1996) in his report attributed the failure to huge deficits in its ordinary and superannuation businesses. The profit business (General Insurance business) had borrowed over Kes 300 million from the Long-term business further aggravating the deficit in the Long-term business. The causes of failure documented by Bell (1996) were; imprudent investment decisions, excessive management expenses and declaration of interest to the deposit administration schemes over and above the actual returns. Stallion Insurance Company Limited (SIC) closed down in the year 2000. Deloitte and Touché (2000), in their report attributed failure to; cash flow constraints, bad claims experience, weak debt collection and credit control systems, poor business mix and financial mismanagement (COI reports 1993-2004).

The consequence of insurer's failure is very devastating to both the industry and the insuring public. The Insurance Act Cap 487 requires that other operating insurers surviving in the market bear the liabilities of the failed insurers. In the case of co-insurance, the leading insurer shoulders the burden of claims. Failure is costly also because insurers' image is tainted. Failure leads to loss of confidence in the industry.

Carson (1994) noted that there is a difference between the cost of failure for insurer and that of a non-insurer. That if a non-insurer becomes insolvent, its former customers stand to lose little or no more than the value of the product or service purchased. However, when an insurer fails, some policyholders will not only suffer the loss of premiums

already paid but may also have losses for which they will not be indemnified – "....precisely the contingency for which they had sought coverage".

2.5 Empirical Evidence

Lee and Urrutia, 1996) studied samples consisting of property-liability insurers that became insolvent during the period from January 1980 through June 1999. Complete data were available for 82 insolvent insurers, of which 72 were stock companies and 10 were mutual firms. Data for 82 matching solvent insurers were also collected for the same time period. In order to qualify as a solvent firm, an insurer must have operated normally and not been declared or reported insolvent during the entire January 1980 through June 1991 time period. Matching solvent insurers were selected based on state domicile and magnitude of total admitted assets. They compared the performance of the logit and hazard models in predicting insolvency and identifying variables that have a significant impact on the solvency of property-liability insurers. The logit model detects four variables that have statistically significant impacts on the probability of insolvency of a property-liability insurer: ratio of net premiums written to surplus, return to policyholders' surplus, proportion of premiums written in long-tailed lines, and market value of invested bonds as a proportion of total admitted assets. On the other hand, the hazard model detects eight statistically significant variables: the four identified by the logit model plus operating margin, current liquidity ratio, rate of growth of surplus, and rate of growth of premiums written. The tests of forecasting accuracy indicate that the logit model has a somewhat lower misclassification rate than the hazard model, but the logit model also has somewhat higher misclassification costs for high costs of Type I errors, C1. Thus, the logit and hazard models seem to have comparable forecasting

accuracy. Since both models provide important information about the insolvency of property-liability insurers, the combined use of the logit and hazard models allows for a more thorough analysis of the incidence of insolvency in the insurance industry

Cummins (1988) and Brewer et al. (1997) discuss default insurance and the attendant moral hazard problem, in that the limited liability that owners of insured financial institutions enjoy encourages risk-taking behavior that would not be profit maximizing for the firm in the absence of default insurance, e.g., investing in higher risk investments. To minimize the potential for insolvency, government regulators require that financial institutions maintain a certain prescribed level of capital. This capital acts as a buffer against loss and to some extent, together with the incentive for safety provided by firm franchise value, discourages owners from taking excessive risks that may increase the probability of insolvency.

Empirical models employing MDA and logistic regression have been used widely in insurer solvency research. The literature on insurer financial distress is reviewed by BarNiv and McDonald (1992) and Willenborg (1992). Cummins, Harrington, and Klein (1995) found that the ability of the NAIC risk-based capital ratio to predict insolvency for property-liability insurers is low when used in isolation, but improves significantly when variables for firm size and organizational form are included. Carson and Hoyt (1995) found that surplus and leverage measures are strong indicators of insurer financial strength, and also found a slightly higher risk of failure among stock insurers than mutual insurers. While Browne and Hoyt (1995) illustrated the importance of exogenous economic factors for the property-liability insurance industry, little evidence has been presented for the life-health insurance industry. The studies discussed above generally

attempted to identify insurers in financial distress by developing empirical models that focus on the operating characteristics of particular insurers as opposed to the economic environment in which the firms operate.

In a study examining the relationship between insurance market conditions and insolvencies, Best Company (1992) found that the number of insolvencies is correlated with the accident and health underwriting cycle (lagged one to three years). The increased number of insolvencies is also correlated with increases in interest rates and with the life-health insurance industry's focus on investment-related products. The Best study did not examine the various economic factors in a multivariate framework, thus precluding the ability to identify the relative significance of the individual factors.

Prior studies of insurance company financial operations, including those by Cummins (1991), Browne and Hoyt (1995), Kazenski, Scoles, and Feldhaus (1995), and Grace and Hotchkiss (1995), suggest that economic factors are significantly related to insurer financial performance. These factors are associated with disintermediation (interest rates, economic, and employment conditions), returns on insurer investments (bonds, stocks, and real estate), and competition. Life-health insurer insolvency is hypothesized to be related to several factors exogenous to individual insurers. These are explained below;

Changes in interest rates have a direct impact on the value of insurers. As interest rates decline, the value of bonds in an insurer's portfolio increases, and vice versa. Staking and Babbel (1995) note that one way insurers incur risk with their financial portfolio is by holding assets with a longer duration than their liabilities. This mismatch creates an interest rate risk since the magnitude of the change in the value of assets will be greater

than that of liabilities when interest rates move. When interest rates decrease, insurers with this duration mismatch experience an increase in surplus. On the other hand, an increase in interest rates leads to a larger decline in the value of assets than liabilities, and thus a decrease in surplus. Colquitt and Hoyt (1997) document a positive asset/liability maturity mismatch for the majority of life health insurers in their sample. The asset/liability mismatch results in increased leverage and a greater probability of insolvency for the insurer (Carson and Hoyt, 1995). As a result, changes in short-term interest rates are expected to be positively related to the insolvency rate.

Differences in asset and liability durations should be interpreted as only a possible indication of exposure to interest rate risk since insurers can cover current obligations as they become due by using cash, including premium income and other assets. If insurers have sufficient funds from current operations (investment earnings, investment turnover, and premiums collected) to offset current obligations, then the effect of an interest rate change on the insolvency rate may be relatively insignificant.

The level of long-term interest rates may be related to the rate of insolvencies. Since interest earnings are a significant source of revenue for insurers, companies are more likely to remain solvent when interest earnings are high. High interest earnings are generally indicative of favorable investment experience for insurers. Thus, the level of interest rates is a proxy for investment earnings for insurers. Higher investment earnings will facilitate insurers meeting their obligations to policyholders. In this case, interest rates are hypothesized to be negatively related to the insolvency rate. To the extent that interest earnings are credited back to insured's through lower premiums or higher policy returns, the effect of interest earnings on solvency will be reduced. Alternatively, high

market interest rates likely result in greater disintermediation for life-health insurers in the form of policy loans (Carson and Hoyt, 1992) and guaranteed investment contract withdrawals (Carson and Scott, 1996). In addition, the interest rate hypothesis suggests that higher interest rates are likely to be related to policy surrenders (Cummins, 1973; Outreville, 1990). That is, when the value of insurers' assets is decreased due to higher interest rates, disintermediation also may increase, thus leading to a liquidity crisis for life-health insurers. In this case, interest rates would be positively related to the insolvency rate.

Estrella and Hardouvelis (1991) provide empirical evidence that the slope of the yield curve may contain useful information about the future prospects of the economy. The expectations hypothesis suggests that long-term interest rates decline before an anticipated recession in order to equalize holding-period returns. In as much as the performance of life-health insurers may be related to the state of the economy, important predictors of the economy may be related to insurer solvency. If insurer insolvency is more likely during recessionary periods (when the yield curve is flatter or inverted), then the slope of the yield curve is expected to be negatively related to the probability of insolvency.

Life-health insurance sales are positively related to personal income, and policy surrenders are negatively related to personal income. Thus, when personal income is relatively high, cash flows to insurers are likely to increase and disintermediation is likely to be relatively low. Thus, personal income is expected to be negatively related to the probability of life-health insurer insolvency. Conversely, increased sales result in greater

leverage and a drain on surplus, and an alternative hypothesis is that personal income is positively related to insolvency.

Recessionary periods are likely to affect life-health insurer cash flow in that life insurance purchases are more discretionary than auto and homeowners insurance purchases. In addition, the emergency fund hypothesis suggests that policy surrenders are likely to increase during periods of economic duress. Hoyt (1994) provides evidence that disintermediation in the form of policy surrender activity was directly related to unemployment. Widespread increases in surrender activity also may be accompanied by a decrease in new sales, thereby exacerbating the decrease in insurer liquidity. Thus, high unemployment is likely to be associated with a higher incidence of life-health insurer insolvency.

Life-health insurers generally hold a portion of their investment portfolios in real estate. As witnessed by events in the early part of the 1990s, real estate can have a debilitating effect on the financial soundness of an insurer as real estate values decline. Conversely, a strong real estate market can produce high returns for insurers. Thus, as total investment returns on real estate increase, the probability of life-health insurer insolvency is expected to decrease, and vice versa.

Life-health insurer investment portfolios typically contain a relatively small proportion of stocks. Thus, as stock returns increase, the return on insurer's portfolios increases and the probability of insolvency may decrease. An alternative hypothesis is based on the fact that holders of life insurance policies have the option to take policy loans or surrender their policies. As returns from alternative investments become more attractive,

disintermediation in the form of policy surrenders (Outreville, 1990) or policy loans (Carson and Hoyt, 1992) increases. The negative correlation between rates on alternative investments and insurer cash flows represents a liquidity risk for life-health insurers. Thus, as a result of disintermediation, stock returns are expected to be positively related to life-health insurer insolvency. The introduction of variable policy loan rates and the popularity of variable life insurance in the mid-1980s could serve to mitigate such disintermediation.

Unanticipated inflation may increase the insolvency rate. Real returns on fixed-rate bonds are lower than expected when unanticipated inflation is high, and profit margins are lower than expected. This will place a financial strain on insurers which will increase the likelihood of insolvencies. Thus, unanticipated inflation is expected to be positively associated with the risk of insolvency.

The insolvency rate during a quarter is hypothesized to be positively related to the number of insurers for several reasons. The number of companies may serve as a proxy for the degree of competition in the insurance market (Munch and Smallwood, 1980), and increased competition could contribute to an increase in the rate of insolvency: competitive bidding may result in a "winner's curse" that is positively related to the number of bidders (Harrington and Danzon, 1994).

2.6 Conclusion

From the above reviews, it was observed that for life insurers, insolvencies are positively related to increases in the average yield curve or long term interest rates, personal income per capita, unemployment, the stock market, and the number of insurers and negatively related to real estate returns.

Further, the signs of impending financial distress or failure usually manifest themselves prior to failure. Thus, various business failure prediction models have been developed and they include: Univariate analysis models, Risk Index models, Multiple Discriminant Analysis, and Conditional Probability Models

It was also noted that some causes of the Kenya's insurance companies business failure are: cash flow constraints, mismatch of assets and liability, imprudent investments decisions, excessive operating expenses, financial mismanagement amidst others.

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter defines the research design and the target population to be studied. It describes the procedure for sampling, collecting data as well as the model specification.

3.2 Research Design

The research design was a census survey of all insurance companies in Kenya, which was meant to establish the determinants of solvency margins. Churchill (1991) agrees that this is an appropriate form of study whenever the population of study is small.

3.3 Population

The target populations for this research comprised all insurance companies licensed in Kenya. The population was therefore defined as all insurance companies, which operated in the insurance industry from January 2001 to December 2010. As per AKI insurance industry annual report 2010, there were 46 licensed insurance companies. 22 companies wrote non-life insurance business only, 9 wrote life insurance business only while 14 were composite (both life and non-life).

The period of study was between January2001 and December2010. The choice of period of ten years was taken to be reasonable because average ratios shift over time, (Altman, 1968).

3.4 Sample Selection and Data Collection

All the insurance companies during the period under review were subjects of the study. For the purpose of this study, an insurer had to meet the following criteria to be considered relevant;

i. The insurer must have been in operation for the entire period under review.
ii. Its annual accounts must have been accessible as the study will be based on solvency margins that are accounting based.

The objective of using this criterion was to ensure that any outlier that may arise from new or existing insurers is eliminated.

Secondary data was collected from annual insurance forms/ returns submitted by insurance companies to IRA. Further, AKI annual insurance industry reports were also used. The data was collected for the period 10 years i.e. (2001 – 2010). The use of annual returns and reports was considered appropriate as they are reliable and available at the IRA and AKI offices.

3.5 Model Specification

Quantitative data was used to work out a number of financial ratios relevant to insurance business.

Seven variables were tested with the help of multiple regression analysis in order to see their impact on the solvency margin of insurance companies. Available Solvency Margin (ASM) was used as dependent variable and it was measured as the difference between total admitted assets and admitted liabilities. Thus the model took the general form:

Available Solvency Margin (Y_{it}) = a0 + a_1SIZ + a_2 IP + a_3 LQ + a_4 OM + a_5 CR+ a_6 SG + a_7 PG + ∈

Where:

A_0 = intercept coefficient.

A_1, A_2..... A_7 = coefficient for each variable 1 – 7, respectively.

i = 1, 2 ....., N = Number of Insurers

t = 1, 2.....t = time periods, in our case in years.

∈ = The Error term that is assumed to have zero mean and constant variance

To ensure the robustness, three estimates of the above model were calculated:

a) Run a cross sectional regression for each of the firms for 10 years. Here, available solvency margin (dependent variable) was measured and compared with hypothesized results. Dependent variable was measured as the difference between total admitted assets and admitted liabilities.
b) Estimate the cross sectional model using the average values of each of the firms characteristics.
c) Estimate the solvency margin model for each of the insurance companies to highlight the differences in solvency for each of the firms. This will be done by constructing a "best-fit" model for each of the company. Here all variables with insignificant t-statistic will be dropped to ensure that the best fit model's equation has a significant F-score and each of the relevant variables has a significant t-statistic.

The independent variables are the seven firm-characteristics as shown in table 1 below with the expected effect; significance tests were carried out to ensure that observed relationships are significant not spurious.

Table 1: Hypotheses of the effects of various factors on the financial stability of Asian Insurers

Insurance Company's Specific Factors Hypothesis	**Abbreviations**	**Expected Effect**
Firm Size	**SIZ**	+
Investment Performance	**IP**	+
Liquidity Ratio	**LQ**	+
Operating Margin	**OM**	+
Combined Ratio	**CR**	-
Surplus Growth	**SG**	-
Premium Growth	**PG**	-

Source: Determinants of Financial Performance of Asian Insurers, the Journal of Risk and Insurance 2004, Vol.71, No.3, 469-499

Further, the ratios that have been found to be significant in previous studies in predicting insurers' insolvency/solvency margins are summarized below; this study has adopted the same ratios in computing the independent variables.

Table 2: Lists of Financial Ratios Employed for Predicting Insurers Insolvency and Sources of References

Ratios	Mathematical expressions	Sources
Liquidity Ratio	Stated Liabilities / Liquid assets (Accounting value)	Brockett et al. (1994), Ambrose and Seward (1988), NAIC
Loss Ratio	(Losses Incurred ± Adjusting Expenses) / Premiums Earned	Hampton (1993)
Expense ratio	(Acquisition Expenses ± Administrative Expenses) / Premiums Earned	Hampton (1993)
Combined ratio	Loss ratio + Expense Ratio	Ambrose and Seward (1988), Pinches and Trieschmann (1974)
Investment ratio	Investment Income / Premiums Earned	Hampton (1993)
Change in Surplus ratio	(Ending Surplus – Starting Surplus) / Starting Surplus	Lee and Urrutia (1996), Hampton (1993), NAIC
Premium Growth	(Current year premium – prior year premium) / Prior year	Lee and Urrutia (1996), Ambrose and Seward (1988), Hampton (1993), NAIC
Firm Size	Total admitted assets	

***Source:** Determinants of Financial Performance of Asian Insurers, the Journal of Risk and Insurance 2004, Vol.71, No.3, 469-499*

CHAPTER FOUR

DATA ANALYSIS, RESULTS AND DISCUSSIONS

4.1 Introduction

This chapter presents the results of the study which was designed to establish the determinants of solvency margins of insurance companies in Kenya. Out of the 46 registered insurance companies, 34 met the criteria for selection i.e. existence throughout the period under review and accessibility of data (see appendix 1).

4.2 Regression Analysis

A multivariate regression model was applied to establish the determinants of solvency margins of insurance companies in Kenya. The data for this study was obtained from IRA and AKI for the period between December 2001 and December 2011. Regression tests carried out are illustrated in the appendices. The regression equation used in this model was:

Available Solvency Margin (Y_{it}) = a0 + a_1SIZ + a_2 IP + a_3 LQ + a_4 OM + a_5 CR+ a_6 SG + a_7 PG + $\in$

Where:

A_0 = intercept coefficient.

A_1, A_2..... A_7 = coefficient for each variable 1 – 7, respectively.

i = 1, 2 ....., N = Number of Insurers

t = 1, 2.....t = time periods, in our case in years.

$\in$ = The Error term that is assumed to have zero mean and constant variance

The results for the total industry are summarized below;

Table 3: Model Summary and coefficients

SUMMARY OUTPUT

Regression Statistics	
Multiple R	0.98
R Square	0.97
Adjusted R Square	0.57
Standard Error	1,654,288.65
Observations	10

ANOVA

	df	*SS*	*MS*	*F*	*Significance F*
Regression	7	2.44843E+14	3.498E+13	14.91	0.06
Residual	3	8.21001E+12	2.737E+12		
Total	10	2.53053E+14			

	Coefficients	*Standard Error*	*t Stat*	*P-value*	*Lower 95%*	*Upper 95%*	*Lower 95.0%*	*Upper 95.0%*
Intercept	708,252.28	8,431,330.76	0.08	0.94	(26,124,005.14)	27,540,509.70	(26,124,005.14)	27,540,509.70
Firm Size	-	-	65,535.00	#NUM!	-	-	-	-
Liquidity Ratio	0.78	0.45	1.72	#NUM!	(0.66)	2.21	(0.66)	2.21
Investment Performance	(0.16)	0.64	(0.25)	0.82	(2.20)	1.88	(2.20)	1.88
Operating Margin	0.50	0.90	0.56	0.62	(2.36)	3.36	(2.36)	3.36
Combined Ratio	(0.36)	1.70	(0.21)	0.85	(5.77)	5.05	(5.77)	5.05
Surplus Growth	0.15	1.87	0.08	0.94	(5.82)	6.12	(5.82)	6.12
Premium Growth	(1 65)	1.96	(0.84)	0.46	(7.88)	4.58	(7.88)	4.58

Source: Research Data

The coefficient of determination (R square) measures the proportion of variability in a data set that is accounted for by a statistical model. From table 3 above, the value of R^2 is 0.97. This implies that 97% of determinants of solvency margins of insurance companies

in Kenya can be explained by the seven variables, namely, Firm Size, Investment Performance, Liquidity Ratio, Operating Margin, Combined Ratio, Surplus Growth and Premium Growth. An analysis of individual entities indicate that four companies had R2 of less than 70% while the rest thirty four companies had R2 above 80% meaning that in most companies, the determinants of solvency margins is explained by the variables listed above at 95% confidence level.

4.3 Data Results and Discussions

Table 3 above summarizes the coefficients for the total industry while appendix 3 reports the coefficients estimates of the predictors to solvency margins for all the firms studied.

The following regression equation was established for the total industry:

ASM = 708.252 + 0.78 (LQ) – 0.16 (IP) + 0.50 (OM) – 0.36 (CR) + 0.15 (SG) – 1.65 (PG)

From the above analysis, Liquidity ratio and operating margin was found to be positively related to solvency i.e. of the predicted sign. A closer look at individual entities reveals that 67% and 64% of the firms found liquidity ratio and operating margin being of the predicted sign. Instinctively, being profitable means that insurers are earning more revenues than being disbursed as expenses. Further, for an insurer, cash flow (mainly premiums and investment income) and liquidation of assets are the two sources of liquidity. This supports the findings of Kramer (1996) and Lee and Urrutia (1996).

The study also revealed that the coefficients of combined ratio (expense and claims ratio) and premium growth were of the predicted sign i.e. negatively related to solvency. 64% of all the firms studied found these variables to be of the predicted sign. Empirical results

show that rapid growth of premium volume is one of the causal factors in insurer's insolvency. Being too obsessed with growth can lead to self-destruction as other important objectives might be neglected. Combined ratio is used as a measure of insurers' underwriting performance; it presents the outlook of insurers' efficiency in underwriting operations .The results are consistent to the findings of (Kim et al. 1995) and Browne and Hoyt (1995).

Contrary to the predicted positive relationship, investment performance was found to be negatively related to solvency i.e. positively related to insolvency rate. Only 39% of the studied firms found this variable to be of the predicted sign. Investment performance discloses the effectiveness and efficiency of investment decisions and as such, investment performance becomes critical to the financial stability of any insurer. The results were not consistent to the findings of Kim et al. (1995) and Kramer (1996).

Further, growth in surplus was found to be positively related to solvency contrary to predicted negative relationship. Contrary to the total industry findings, 58% of individual entities revealed negative relationship; this means that the big firms influenced the findings of this variable. The results, therefore, were not consistent to the findings of (Lee and Urrutia, 1996).

CHAPTER FIVE

SUMMARY, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter contains a summary of the research findings and the conclusions. It also contains recommendations for future research. Limitations of the study are also highlighted in this chapter.

5.2 Summary of Findings and Interpretations

From the above analysis, operating margin was found to be positively related to solvency i.e. of the predicted sign. This finding is consistent with the results of BarNiv and Hershbarger (1990). They found that operating margin is the best single variable associated with life insurer's solvency. .

The results on investment performance indicated that it was negatively related to solvency i.e. positively related to insolvency rate. The results were not consistent to the findings of Kim et al. (1995) and Kramer (1996). This can be attributed to inconsistencies in accounting for investment income whereby some companies account revaluation gains or losses through equities while others account through income statements.

The study further revealed that firm size was insignificantly related to solvency. The analysis showed no relationship at all. This was inconsistent to the findings of BarNiv and Hershbarger, (1990) and Cummins, Harrington, and Klein, (1995) which argued that regulators are less likely to liquidate large insurers and it is expected that small insurers

are more vulnerable to insolvency. This finding confirms why some insurers in Kenya failed despite being large.

Further, coefficients of combined ratio (expense and claims ratio) and premium growth were of the predicted sign i.e. negatively related to solvency. Empirical results show that rapid growth of premium volume is one of the causal factors in insurer's insolvency. Being too obsessed with growth can lead to self-destruction as other important objectives might be neglected. Combined ratio is used as a measure of insurers' underwriting performance; it presents the outlook of insurers' efficiency in underwriting operations .The results are consistent to the findings of (Kim et al. 1995) and Browne and Hoyt (1995).

In addition, growth in surplus was found to be positively related to solvency contrary to predicted negative relationship. Conflicting to the total industry findings, 58% of individual entities revealed negative relationship; this means that the big firms influenced the findings of this variable. The results, therefore, were not consistent to the findings of (Lee and Urrutia, 1996).

Finally, liquidity ratio was found to be positively related to solvency. The results, therefore, were consistent to the findings of (Lee and Urrutia, 1996). Therefore, liquidity ratio is significant factor affecting insurers' financial health and solvency.

5.3 Conclusions and Recommendations

The study examined the firm-specific determinants of solvency margins of insurance companies in Kenya. The multivariate regression for the insurers has generated statistically significant results consistent with majority of the hypotheses formulated on firm-specific factors. The study revealed that four of the seven studied variables were of the predicted sign. Liquidity ratio, operating margin, combined ratio (expense and claims ratio) and premium growth were of the predicted sign while growth in surplus, Investment performance and firm size were contrary to the predicted results.

The results of the study have some important policy implications for regulating and monitoring insurers' solvency. Since liquidity ratio is one of the most direct measures of insurer's financial health, regulators may consider using it as a first line indicator of possible financial difficulties. For example, IRA may decide to constantly monitor the liquidity ratios, without letting the insurers know the limits being set (so as to avoid window dressing by insurers). Further, IRA should like to monitor the underwriting results as indicated by the combined ratio. This is important, as operation performance (underwriting results) is another indicator of insurer's profitability.

It is also important to have different regulations for life and general insurance companies as each operates under different constraints and requires more specific management and regulatory structures. Thus, insurance regulation is an evolving process and there is need to be flexible, as there will be continuing changes in the environment and insurance market. Therefore, recent changes of risk-based regulation approach as opposed to compliance of insurance companies in Kenya is welcome.

5.4 Limitations

The main limitation of the research was lack of consistency in data provided by the Insurance Regulatory Authority annual reports. Comparison of data from one period to another showed some inconsistencies e.g. closing balance in previous period showed different opening balance in the subsequent period. This was noted in 4 companies. However, 30 out of 34 companies was a good representative hence insignificant negative effect if any on the accuracy of results.

Another limitation were the changes in the insurance sector in the past ten years which saw several companies liquidated, put under statutory management, merged and demerged. This affected several companies and therefore the data collected showed inconsistencies across the period. For example, CfC Life Assurance ltd (formerly ALICO) operated together with Chartis (formerly AIG) to 2004 before the demerger.

Most insurance companies operated as composite despite being categorized as Long term or General. The unavailability of data for pure Life and General Companies affected the analysis of solvency due to the varying nature of the insurance companies in terms of operations, investment activities, vulnerabilities, and duration of liabilities.

Lastly, the study focused on financial statements data at the firm level and did not take into consideration the qualitative information from each insurance company. Qualitative assessment can be an important addition to the process of better assessing an insurer's financial conditions. Window dressing of the financial statements could be a potential problem in this study.

5.5 Suggestions for Further Research

This research considered solvency margins for insurance companies (both general and Life insurers). Future research should be carried out on different types i.e. pure general and Life insurers. This is because life insurers differ greatly in terms of operations, investment activities, vulnerabilities, and duration of liabilities from general insurers. Life insurers are said to function as "financial intermediaries" while general insurers as "risk takers".

Also, further research should be carried on market/ economic factors. This is because a good understanding of economic conditions under which an insurance company operates is valuable.

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APPENDIX 1: LIST OF INSURANCE COMPANIES

	NAME	TYPE
1	Africa Merchant Assurance Ltd (AMACO)	General
2	Apollo Life Insurance Ltd	Long-term
3	British American Insurance Company Ltd	Composite
4	Cannon Assurance Company Ltd	Composite
5	CfC Life Assurance Ltd (formerly ALICO)	Long-term
6	Concord Insurance Company Ltd	General
7	Co-operative Insurance Company Ltd (CIC)	Composite
8	Corporate Insurance Company Ltd	Composite
9	Fidelity Shield Insurance Company Ltd	General
10	First Assurance Company Ltd	Composite
11	General Accident Insurance Company Ltd (GA)	General
12	Gateway Insurance Company Ltd	General
13	Geminia Insurance Company Ltd	Composite
14	Heritage Insurance Company Ltd	Composite
15	Insurance Company of East Africa Ltd (ICEA)	Composite
16	Intra Africa Assurance Company Ltd	General
17	Jubilee Insurance Company Ltd	Composite
18	Kenindia Assurance Company Ltd	Composite
19	Kenya Alliance Insurance Company Ltd	Composite
20	Kenya Orient Insurance Company Ltd	General
21	Lion of Kenya Insurance Company Ltd	General
22	Madison Insurance Company Ltd	Composite
23	Mercantile Insurance Company Ltd	Composite
24	Monarch Insurance Company Ltd	Composite
25	Occidental Insurance Company Ltd	General
26	Old Mutual Life Assurance Company Ltd	Long-term
27	Pan Africa Life Assurance Company Ltd	Long-term
28	Phoenix of E.A Assurance Company Ltd	General
29	Pioneer Life Assurance Company Ltd	Long-term
30	REAL Insurance Company Ltd (Formerly Royal)	General
31	Tausi Assurance Company Ltd	General
32	Trident Insurance Company Ltd	General
33	UAP Insurance Company Ltd	General
34	UAP Life Assurance Company Ltd	Long-term

APPENDIX 2: SUMMARY OF OUTPUT

INSURER	Multiple R	R Square	Adjusted R Square	Standard Error
AMACO	0.99	0.98	0.60	38,399.15
APOLLO LIFE	0.97	0.94	0.49	128,151.30
BRITAK	1.00	1.00	0.66	49,415.06
CANNON ASSURANCE	1.00	0.99	0.64	45,860.16
CfC LIFE	0.80	0.64	(0.42)	456,436.74
CIC	1.00	1.00	0.66	36,763.08
CONCORD	0.81	0.66	(0.34)	38,382.07
CORPORATE	1.00	0.99	0.65	18,180.52
FIDELITY SHIELD	0.99	0.98	0.60	28,895.24
FIRST ASSURANCE	1.00	1.00	0.66	17,231.60
GATEWAY	0.99	0.99	0.63	15,889.69
GEMINIA	0.99	0.98	0.60	45,327.89
GENERAL ACCIDENT	1.00	0.99	0.65	22,710.87
HERITAGE	0.91	0.83	0.15	207,268.19
ICEA	0.98	0.95	0.53	244,453.23
INTRA AFRICA	0.98	0.96	0.55	14,783.74
JUBILEE	0.99	0.99	0.63	143,186.32
KENINDIA	0.98	0.96	0.56	128,033.51
KENYA ALLIANCE	1.00	1.00	0.65	17,916.51
KENYA ORIENT	0.97	0.93	0.46	11,120.69
LION OF KENYA	1.00	1.00	0.66	25,443.98
MADISON	0.91	0.82	0.14	54,939.76
MERCANTILE	1.00	0.99	0.64	12,131.06
MONARCH	0.93	0.86	0.25	40,764.64
OCCIDENTAL	1.00	0.99	0.64	13,790.94
OLD MUTUAL	0.90	0.82	0.11	357,953.05
PAN AFRICA	0.82	0.67	(0.33)	218,498.73
PHOENIX	0.93	0.86	0.26	121,271.53
PIONEER	1.00	1.00	0.66	4,087.12
REAL	0.83	0.68	(0.29)	41,526.05
TAUSI	0.99	0.99	0.63	17,661.70
TRIDENT	1.00	1.00	0.66	7,874.89
UAP INSURANCE	0.98	0.97	0.57	182,758.88
TOTAL INDUSTRY	0.98	0.97	0.57	1,654,288.65

APPENDIX 3: COEFFICIENTS

INSURER		LQ	IP	OM	CR	SG	PG
	Intercept	Variable 2	Variable 3	Variable 4	Variable 5	Variable 6	Variable 7
AMACO	(100,572.56)	0.90	(1.81)	1.63	0.04	(2.47)	(0.01)
APOLLO LIFE	(332,015.98)	0.98	(1.56)	(0.33)	0.83	2.37	(2.42)
BRITAK	(1,022,668.22)	1.43	(4.15)	(1.26)	(0.33)	1.17	(1.46)
CANNON ASSURANCE	(145,855.09)	0.52	1.60	0.57	(1.88)	(0.06)	0.54
CfC LIFE	886,138.63	(0.08)	0.25	1.50	(0.48)	(2.04)	0.52
CIC	(81,578.22)	0.98	(1.38)	(4.69)	(0.72)	2.05	(0.07)
CONCORD	60,096.13	(0.50)	(3.62)	2.80	0.46	(2.42)	0.75
CORPORATE	19,954.16	0.49	(0.35)	0.15	(0.83)	1.44	0.24
FIDELITY SHIELD	(119,109.13)	0.36	0.31	0.08	(0.23)	(0.11)	0.29
FIRST ASSURANCE	51,264.09	(0.16)	(0.11)	0.81	0.48	0.48	0.04
GATEWAY	(53,966.54)	0.25	(0.49)	(1.58)	(1.54)	2.65	1.37
GEMINIA	(127,806.04)	0.18	0.41	0.86	(0.62)	(0.44)	1.33
GENERAL ACCIDENT	82,271.47	0.28	(0.76)	1.07	(0.41)	(0.36)	0.57
HERITAGE	(833,636.05)	0.78	(1.15)	(0.91)	2.04	0.55	(2.81)
ICEA	(612,828.95)	(0.53)	(1.43)	(6.58)	3.43	(2.73)	1.27
INTRA AFRICA	(481,679.40)	0.75	(0.20)	1.11	1.19	(0.26)	(1.08)
JUBILEE	704,206.74	(0.16)	1.75	(0.15)	(0.26)	0.84	(0.04)
KENINDIA	348,123.78	0.01	0.06	0.41	(0.30)	(0.07)	0.69
KENYA ALLIANCE	(1,345,459.82)	0.72	(0.38)	0.55	(0.56)	(0.09)	0.73
KENYA ORIENT	(4,916.79)	0.53	(0.83)	(3.39)	(0.06)	2.49	(0.09)
LION OF KENYA	288,715.49	0.07	0.37	0.23	(2.31)	0.25	2.66
MADISON	257,940.76	(0.02)	0.55	(1.02)	(0.03)	0.72	(0.08)
MERCANTILE	(37,342.48)	(0.08)	0.97	0.48	(0.82)	(0.28)	2.34
MONARCH	2,495.78	0.64	(0.95)	(2.28)	0.25	(0.20)	(1.36)
OCCIDENTAL	(108,357.43)	0.34	(0.53)	2.92	2.12	(0.39)	(2.19)
OLD MUTUAL	(1,176,508.82)	0.37	1.00	0.34	(0.35)	1.47	(0.61)
PAN AFRICA	(77,231.11)	0.23	(0.30)	(0.19)	0.80	0.16	(0.78)
PHOENIX	746,791.28	(0.20)	3.57	2.38	(0.37)	(0.89)	(1.76)
PIONEER	31,817.27	(0.04)	(0.29)	3.06	0.14	(0.17)	0.04
REAL	(19,526.31)	0.66	(3.06)	(1.60)	(2.80)	(0.21)	3.08
TAUSI	183,209.52	(0.19)	2.95	1.07	(1.42)	(1.62)	1.13
TRIDENT	5,283.46	(0.06)	(1.72)	0.59	1.91	2.66	(1.87)
UAP INSURANCE	83,675.81	0.57	0.38	0.73	(1.79)	(0.31)	0.96
TOTAL INDUSTRY	708,252.28	0.78	(0.16)	0.50	(0.36)	0.15	(1.65)