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Risk-Based Capital, Asset Allocation, Firm Size and Investment Returns of Insurance Companies in Kenya

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Abstract

This paper's main goal was to establish the joint effect of risk based capital, asset allocation and firm size on investment returns of insurance companies in Kenya. The population of the study comprised of 63 insurance companies licensed in Kenya that transact both life and general insurance. Secondary data was collected from the insurance companies' annual returns submitted to the regulator for a five-year period (2014-2018). Risk-based capital was computed using the standard formulae as per the risk-based supervision model. Asset allocation was computed from investment vehicle and time horizon, firm size was measured using gross written premiums and total assets; and investment returns was calculated using the investment income ratio. Tests to ensure suitability for linear regression were undertaken. Linear regression was used to evaluate the relationship between the variables based on the hypothesis in the study and at a significance level of 5%. The study findings revealed that there is a positive significant relationship on the joint effect of risk based capital, asset allocation and firm size (total assets) on the investment returns of insurance companies in Kenya. It implies that all variables should be considered when looking at the risk based capital and investment returns of insurance companies. It has further revealed that the applicability of extreme value theory is not fully reliant on data obtained from extreme events, but rather insurance companies can use available data on capitalization and investments and still apply the concept to determine their survival in adverse operating environment or scenarios. The study also supports Markowitz portfolio selection theory in the sense that a Company is expected to allocate its assets in a manner that it receives maximum returns from the investment, but at the same time be cautious on the investment vehicles, since the capital charges imposed are pegged on how risky an investment vehicle is deemed. This will eventually influence the amount of risk based capital an insurer is expected to hold and determine its investment returns. It has further revealed that the association amongst risk based capital and investment returns is not purely direct, but it's intervened by asset allocation

Keywords: *Risk-Based Capital, Asset Allocation, Firm Size, Investment Returns, Linear regression analysis*

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Introduction

Risk based capital for an insurance company can be looked at in two different perspectives. The first perspective is that it can be affected from a requirement by the industry regulator, where it determines the total minimum capital an insurance company needs to have in place in order to be operational and to be licensed by the regulator. The second approach is from a financial management point of view, where the insurance company undertakes its own initiative to analyze the amount of business it underwrites, where it invests, the capital it holds and the overall risk exposure in order to determine the additional capital it requires as a buffer to survive any crisis that may arise (Dickinson, 1997). This paper focused on the second perspective, where risk based capital is considered so that management can make prudent investment decisions which will be beneficial to the insurance companies.

Castries (2005) further opines the importance of capital adequacy for insurance companies. He acknowledges the complexity of insurance industry where companies operate in reverse cycle. This means that an insurance company receives payments before delivery of the services they promise. This notion makes capital to be a key factor in the operation of an insurance company. Determining adequacy of the capital is of concern to the company, the policy holders and the regulator. Therefore, availability of adequate capital is a commodity that must be optimally exploited. Risk based capital introduces the optimization of the required capital by factoring in all the risks the company faces, by imposing capital charges on both the asset and liabilities of insurance companies.

Asset allocation is a unique way of diversifying capital for investments in various classes of assets in any accepted jurisdiction, which is a key component in determining investment returns of any investor (Brown et al., 2009). Asset allocation involves selecting a portfolio which focuses on risk reduction and maximize investment returns. The investor ought to make choices between asset classes e.g. bonds and stocks, under the assumption of capital markets where asset classes are not under-priced or overpriced. It is clear to all investors that asset allocation is important. The question that many try to answer is the level of importance (Bendrich & Bergstrom, 2015). An investor's return on any portfolio selected is highly dependent on asset allocation whereas asset timing and security selection doesn't have a significant impact (Brinson et al., 1986).

Firm size can be defined as the amount of assets owned by a company that have productive proficiencies (Hasan et al., 2016). Shalit and Sankar (1977) stipulated that the size of the firm plays a vital role in industrial organization and applied macroeconomics. They further stated that firm size has been confirmed as a robust empirical variable in many studies despite using alternative indicators. In an organization, firm size, a specific internal factor of a firm's characteristics, has a role in determining its behavior with respect to risk management thus influencing its performance.

Investment returns are vital for any company which intends to be profitable. Investment returns should positively co-vary with current stock but negatively co-vary with future stock based on the effect of discount rates on investment returns (Lamont, 2010). The investment income ratio gives a true reflection on how profitable an insurance company is by considering the investment income and the earned premiums/ life fund.

Research Problem

The relationship among risk based capital, asset allocation, firm size and investment returns remains vague due to divergence in findings. Divergent findings can be attributed to by the bivariate nature of the studies, either RBC- Investment link, asset allocation-investment link or firm size- investment relationship. Divergent findings can further be attributed to operationalization of variables within the study or choice of econometric models, selection of variables and control variables, and the choice of econometric models and contextual differences which give rise to conceptual, methodological, and contextual gaps.

Various empirical studies have adopted various metrics to measure RBC as well as investment returns. Hogan, Meredith and Pan (2015) used credit and market risk as proxies for risk based capital while Lastra (2004) utilized additional indicators of RBC (insurance and operational risk) and documented insignificant RBC-returns link. Likewise, a number of empirical studies have been largely bivariate in nature focus on either the link between RBC and investment returns, or RBC and asset allocation, or asset allocation and investment returns. However, the RBC-returns link is not usually direct, but it is explained by several control variables such as asset allocation, firm size, age of the firm among others. This study therefore extends RBC-returns link by incorporating asset allocation and firm size to bridge these conceptual gaps.

This study sought to answer the question: what is the joint effect of risk-based capital, asset allocation and firm size on investment returns of insurance companies in Kenya?

Research Objective

The study's objective was to determine the joint effect of risk-based capital, asset allocation and firm size on investment returns of insurance companies in Kenya.

Literature Review

Theoretical Foundation

The main constructs that are used in this study are based on different theoretical groundings. The theories explain the association between risk based capital and investment returns of insurance firms. Modern portfolio theory is discussed in detail regarding asset allocation and investment returns and the risks associated. Extreme value theory also looks at the risk charges involved in various asset classes and liabilities of insurance companies which forms the concept of stress testing while determining the risk based capital.

Markowitz (1952) modern portfolio theory (MPT) introduces the concept of portfolio selection to maximize returns On the aspect of risk and return, Markowitz theory specifies that the risk of an asset is not its risk in isolation, but a full compilation of the various asset risks to the risk of cumulative or aggregate portfolio. In the context of a portfolio, the risks involved are both systemic/market risk and the unsystemic risk, also known as diversifiable risk. The theory introduced the concept of portfolio selection for investors' optimum returns. Furthermore, the theory indicates that there is a contributory effect of all the risks each asset is being held to the overall risk of the portfolio. There have been various developments and criticism of Markowitz theory on portfolio selection. Treynor (1962) developed the Capital Asset Pricing Model, CAPM based on portfolio selection theory. The risk charge imposed by RBC on investments such as in the securities exchange affect the expected return on investment with asset allocation as a contributing factor, thus making this theory viable for the study.

Tippet (1928) developed the extreme value theory (EVT) which deals with the extreme deviations from the median. This theory has been extensively used in the area of risk management of financial portfolios by statistically modelling extreme events and computing extreme risk measures. EVT can be used to model the influence of any adverse scenario or

situations which have extreme stress on any portfolio an investor holds. The two main models used for extreme values used over time and are the block maxima models and peaks-over-threshold (POT) models. Rocco (2014) highlighted some of the considerable advantages and drawbacks of the extreme value theory and its applicability in finance. Some of the positives in the study findings were that EVT has a strong theoretical underpinning and offers tools for modelling extreme events, which are paramount in finance, since it gives the importance of extreme events in the profitability of an investment portfolio. The drawbacks of EVT as per Rocco (2014) were that there are difficulties applying EVT in multivariate and it's not as straight forward as the univariate and can lead to some computation limitations and that EVT relies on data of extreme events, which happen rarely but at the same time requires large amounts of data for applicability. Despite the drawbacks, it is still considered as an applicable theory in modelling extreme events. The applicability of this theory is that its concept is used when defining the insurance risk capital charge, which is imposed on the premium reserve and claims reserves on short term insurance business, and on mortality, longevity, morbidity, expenses, lapses and catastrophe on long term insurance business. The determination of these sub variables that are used to compute RBC adopts the concept of EVT thus its viability in this study.

Empirical Review

The concept of RBC gives an overview of the entire risks an insurance company is facing on both its assets and liabilities side of the balance sheet. This affects the investment returns either positively or negatively. Previous studies regarding RBC, asset allocation, firm size and investment returns have been reviewed. From the studies, various researchers used different variables to have an understanding on how they influence investment returns.

Wyman (2005) did a study on the risk based regulation to have a clear understanding on various risk based regime and develop one which is superior and applicable to the entire Europe. It was acknowledged that the study was done within a short duration and did not analyse fully all the aspects of the various models, but rather gave a clear overview of most of the solvency assessment frameworks used across the world to fully understand any differences or similarities they present. From the findings, there was clarity on the differences between the existing framework and the proposed risk based framework which factors in more analysis of the risks both in the company's assets and liabilities. They observed that there were some

similarities and consistency in most of the principles contained by the European Commission, IAIS and the IAA. From their findings, they also noted that while the key values contained in the newer regimes had similarities, there was still a variety of approaches chosen in applying those principles. Different regimes had to make a choice between simplicity of the model and a sophisticated model.

Putra (2018) study focused on how the profitability of life insurance companies in Indonesia is affected by growth of income, claims ratio and risk based capital. Profitability, which was the dependant variable, was measured using return on assets (ROA), income was measured using the percentage increase of income for the current year from the previous year, claims ratio was measured as a ratio between the claims incurred and earned premiums, and total assets was measured using the figure given by the insurer on the assets they hold, while the risk based capital was calculated as a ratio between the change in admitted assets and liabilities over the solvability. The data used was panel data for a seven-year duration and multiple regression analysis was done. The findings were that revenue growth and assets don't have a significant effect on profitability, while claims ratio and risk based capital have a negative significant effect to profitability. However, revenue growth, claims ratio, total assets and risk based capital have a joint effect on profitability of the insurance companies. This study will take a similar approach, but the main focus will be on how asset allocation, firm size and risk based capital would jointly affect investment income.

Djayadi et al. (2018) carried out a study on how risk based capital is affected by investment results, premium income, claims and profitability of insurance companies. The study period was a five-year duration between 2013 and 2017, with a study population of ten insurance companies registered by the financial service authority. The study used secondary data published by the insurance companies and panel data regression analysis was conducted. The findings were that, investment results had a positive relation to RBC and not significant, while premium income, claims, profitability and investments do not have a significant effect on RBC. The choice of risk based capital as a dependent variable would have been the major problem on determining the significance on the relationship among these variables. This study looks at the joint effect of RBC asset allocation and firm size on the investment income of insurance companies in Kenya.

Conceptual Framework

The study focused on the joint effect of risk-based capital, asset allocation and firm size on the investment returns of insurance companies in Kenya. The conceptual model was as follows:

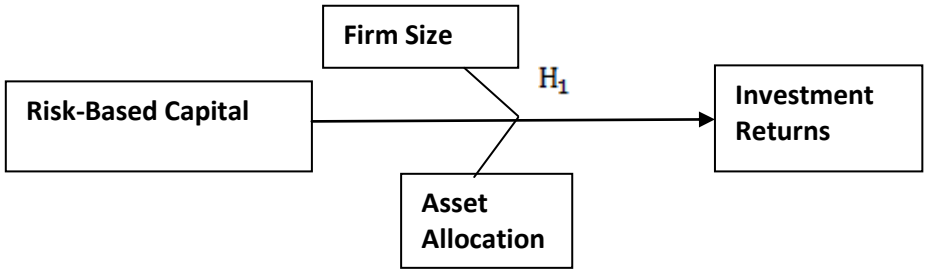

Figure 1: Conceptual model

Research Hypothesis

This study focuses on establishing the joint effect of risk-based capital, asset allocation and firm size on the investment returns of insurance companies in Kenya. The null hypothesis that was tested in the study was as follows:

H_1: The joint effect of risk based capital, asset allocation, and firm size on investment returns of insurance companies in Kenya is not significant.

Data and Methodology

According to Sekaran (1992), descriptive design can either be cross-sectional or longitudinal. Cross-sectional involves attaining a sample from the study population and measuring its characteristics. Cross-sectional studies have no time dimension and relies mainly on the existing variations instead of changes following an intervention. Moreover, groups are chosen on the basis of prevailing variations instead of random allocation. As a result, the researchers utilizing cross-sectional research designs can only use passive approach to make causal inferences based on the empirical findings. Longitudinal (panel data) on the other hand refers to pooling of observations on a cross-section of countries, firms or households over a period of time.

This study adopted longitudinal (panel) design which was used to describe the relationship between variables over time. Secondary data was collected from the insurance companies'

annual returns submitted to IRA for five-year duration (2014-2018). Risk-based capital was determined by the standard formulae as per RBS model as follows:

$$RBC = \sqrt{IRC^2 + MRC^2 + CRC^2} + \text{Operational Risk}$$ ……..…. Equation 1

Firm size was calculated by taking the log normal of the total assets as the first indicator and the gross premium written as the second indicator.

Asset allocation was computed as follows:

Asset Allocation Score = $\boldsymbol{Arithmetic\ mean\ (TH + IV)}$ ……..…..……...…. Equation 2

Where TH= Time horizon score

IV= Investment vehicle score

Time Horizon Score = $\frac{\boldsymbol{Annual\ Investment\ Duration\ per\ class}}{\boldsymbol{Maximum\ annual\ Investment\ Duration}}$ …..……,,..… Equation 3

Investment Vehicle Score = $\frac{\boldsymbol{Investment\ held\ per\ class}}{\boldsymbol{Total\ Assets}}$ ……..…...……..…….. Equation 4

Investment returns in insurance companies was calculated using the investment income ratio as described by Lamont (2010). The ratio was calculated as follows:

General Insurance Companies:

Investment Income Ratio $= \frac{\boldsymbol{Net\ Investment\ Income}}{\boldsymbol{Net\ Earned\ Premium}}$……..……...….....… Equation 5

Life Insurance Companies:

Investment Income Ratio $= \frac{\boldsymbol{Net\ Investment\ Income}}{\boldsymbol{Life\ Fund}}$……..…… Equation 6

To determine the joint effect of risk-based capital, asset allocation and firm size on investment returns, linear regression model on the panel data was used.

The model was as follows:

$$\mathbf{IR = \beta_0 + \beta_1 RBC_{it} + \beta_2 AA_{it} + \beta_3 TA_{it} + \beta_4 GWP_{it} \varepsilon_{it}}$$.....Equation 7

Where:

IR the investment income ratio,

RBC is the risk based capital,

AA is the asset allocation score,

TA is the total asset score,

GWP is the gross written premium score,

β_0 is the regression constant,

$\beta_1 \beta_2 \beta_3$ and β_4 are the regression coefficients,

ε_i: is the random error term.

Adjusted R^2 was used to assess the outcome variable variation as a result of effects of the predictor variable. F- Test was conducted to assess the model fit by testing the significance of the model. Beta coefficient (β) showed the effect variation in the dependent variable as result of a unit change in the predictor variable. T-test was used to evaluate the significance of the beta coefficient of the independent variable at 95% significance level.

Results and Discussions

Descriptive Statistics

The minimum RBC in the insurance sector during the study period was registered as 11.4 million and the maximum at 5.06 billion Kenya Shillings. On average, the industry's risk based capital is at 1.1 billion Kenya shillings. The figures below are represented as log of RBC which was adopted for analysis purposes. The average investment income ratio for the industry was 0.8338. This indicates that most companies net investment income are less than the net earned premiums for general insurance companies or the life fund for life insurance companies.

The results further show that risk based capital, asset allocation and gross written premiums were negatively skewed (-.67, -.65 and -.63 respectively) while total assets and investment returns were positively skewed (.27 and 3.45 respectively). Total assets and gross written premiums had a negative kurtosis (-.6 and -.1) while RBC, AA and investment returns had positive kurtosis (.13,.17 and 17.48). The coefficient of variation is also presented with RBC recording .075, AA .19, total assets .05, gross written premium .06 and investment returns 1.25.

A summary of descriptive analysis of the variables in the study is given in Table 1 below

Table 1: Descriptive Statistics

	N	Least	Most	Mean	Std. Deviation	Kurtosis	Skewness	Coefficient of Variation
RBC	249	6.64	9.87	8.711	.65683	0.13723	-0.67392	0.07538
Asset Allocation	249	.01	.06	.0471	.00930	0.17722	-0.65260	0.19811
Total Assets	249	8.38	10.90	9.578	.57392	-0.60267	0.27836	0.05992
Gross Written Premium	248	7.33	10.31	9.161	.64575	-0.103005	-0.63608	0.06995

	N	Least	Most	Mean	Std. Deviation	Kurtosis	Skewness	Coefficient of Variation
Investment Returns	249	-.23	.99	.379	.06806	17.481462	3.45621	1.25273
Valid N (list wise)	248							

Diagnostic Tests

Normality

The study conducted normality test using Shapiro-Wilk test. Table 2 below illustrates the findings of the test.

Table 2: Test of Normality

	Kolmogorov-Smirnov			Shapiro-Wilk		
	Statistic	df	Sig.	Statistic	df	Sig.
RBC	.080	249	.201	.966	249	.375
Asset Allocation Score	.107	249	.086	.928	249	.063
Total Assets	.058	249	.491	.981	249	.472
GWP	.077	249	.329	.962	249	.323

a. Lilliefors Significance Correction

Table 2 above shows p value > 0.05 where RBC recorded a value of .375, asset allocation score at 0.063, total assets at 0.472 and 0.323 on the gross written premiums thus indicating the data was normally distributed.

Linearity

To test for linearity in this study, Ramsey's RESET test was used so as to confirm that the relationship amongst variables was linear and that the confidence levels generated by the regression analysis were not misleading or biased. Table 3 below highlights the test findings.

Table 3: Linearity

Coefficients [a]						
		Unstandardized Coefficients		Standardized Coefficients		
Model		B	Std. Error	Beta	t	Sig.
1	(Constant)	-1.734	1.594		-1.088	.278
	RBC	-.032	.217	-.017	-.148	.883
	Asset Allocation	9.147	12.459	.068	.734	.464
	Total Assets	-.091	.551	-.041	-.164	.870
	GWP	.268	.556	.138	.483	.630
	ram1	1.105	.614	.611	1.798	.073

ram2	-.089	.258	-.096	-.347	.729

a. Dependent Variable: Investment Returns

The variables have a significance level > 0.05 thus indicating that linearity exists among the variables.

Multicollinearity

This study applied the variance inflation factor (VIF) to define whether multicollinearity exists amongst the variables. Robinson and Schumacker (2009) indicate that if the VIF value is less than 10, then the level of multicollinearity can be tolerated. Table 4 below presents the results for the test conducted.

Table 4: Test of Multicollinearity

Variables	Variance Inflation Factor (VIF)	1/VIF
Risk Based Capital	3.970	0.2518
Asset Allocation	2.101	0.4759
Total Assets	9.118	0.1096
Gross Written Premium	6.659	0.1502

a. Dependent Variable: Investment Returns

From table 4 above, the VIF for risk based capital is 3.970 with a tolerance level of 0.2518, for asset allocation is 2.101 with a tolerance level of 0.4759, for total assets is 9.118 with a tolerance level of 0.1096 and gross written premium is 6.659 with a tolerance level of 0.1502. All these figures are below 10 and a tolerance level of greater than 0.1, thus indicating that the level of multicollinearity can be tolerated.

Serial Independence Test

This study adopted Durbin Watson test to confirm independence among variables. As per this test, the coefficient needs to be between 1.5 and 2.5 in order to confirm that the observations were independent. Table 5 below shows the results for the independence test.

From table 5 below, the coefficient observed as per the Durbin-Watson test for risk based capital was 1.961820, asset allocation score was 2.074575, firm size (total assets) was 1.997517, firm size (GWP) was 2.001893 and investment income ratio was 2. 000623. Since

the coefficients lie between 1.5 and 2.5, it is an indication that the observations made were serially independent.

Table 5: Independence test

Variable	R^2	Adjusted R^2	S.E of the Estimate	Durbin-Watson
RBC	0.474292	0.465494	0.625171	1.961820
Asset allocation score	0.396796	0.389288	0.007570	2.074575
Total Assets	0.506484	0.504470	0.576290	1.997517
Gross Written Premiums	0.497961	0.495912	0.647273	2.001893
Investment income ratio	0.507624	0.505614	1.259701	2.000623

a. Predictors: (Constant), Gross Written Premium, Asset Allocation, RBC, Total Assets
b. Dependent Variable: Investment Returns

Correlation Analysis

The nature and direction of the association among the variables was measured using Pearson Product Moment correlation coefficient (denoted by r) in line with previous studies like Mwangi (2014) and Angima (2017), with the value taking a range of +1 to -1. A perfect positive correlation would be represented by a positive 1, implying that an increase or reduction in one variable will lead to a proportionate increase or reduction in the other variable. A perfect negative correlation is depicted by a value of -1 which implies, an increase in one variable leads to a decrease in another variable. A zero (0) value point towards no association exists between variables. A value greater than zero indicate positive association while a value less than 0 indicates negative association.

The correlation analysis was done at a two tailed significance level of 0.05 and 0.01 as per previous studies. The study adopted the criterion used by Mwangi (2014) to measure the nature and direction of the relationship between variables where 0 and less than 0.4 depicted

weak, 0.4 and less than 0.7 as moderate and above 0.7 as high. The correlation results are presented in table 6.

Table 6: Correlation Analysis

Correlation Matrix

		RBC	Asset Allocation	Total Assets	Gross Written Premium	Investment Returns
RBC	Pearson Correlation	1				
Asset Allocation	Pearson Correlation	-.186**	1			
Total Assets	Pearson Correlation	.806**	.153*	1		
Gross Written Premium	Pearson Correlation	.786**	-.160*	.871**	1	
Investment Returns	Pearson Correlation	.669**	.341**	.897**	.725**	1

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

From the correlation analysis, it is revealed that there are significant relationships within the study variables and in line with the study hypotheses.

Regression Analysis

This study sought to determine the joint effect of risk based capital, asset allocation and firm size on investment returns of Insurance Companies in Kenya. The following hypothesis was developed:

Hypothesis 1: The joint effect of risk-based capital, asset allocation and firm size on investment returns of insurance companies in Kenya is not significant.

The findings from regression analysis that was conducted at 95% confidence level (α of 0.05) are discussed in table 7 below.

The adjusted R^2 as per table 7 below is 0.845, which indicates that 84.5% of the variation in investment returns are attributed to by the joint effect of risk based capital, asset allocation and firm size (total assets and gross written premiums). The results further show that the intercept is -0.223 with a statistically significant p value of 0.000. Risk based capital had a coefficient value of 0.004 with a p value of 0.407 which is statistically insignificant. Asset allocation had a coefficient value of 1.723 with a statistically significant p value of 0.000. Total assets had a coefficient value of 0.094 and a statistically significant p value of 0.000 at 5% level of significance. Gross written premium had a coefficient value of 0.004 with a p value of 0.517 which is statistically insignificant at 5% level of significance.

Table 7: Regression Results for Risk Based Capital, Asset Allocation, and Firm Size on Investment Returns of Insurance Companies in Kenya

Model	**R**	**R^2**	**Adjusted R^2**	**S. E of the Estimate**	
a. Predictors: (Constant), Gross Written Premium, Asset Allocation, RBC, Total Assets	.921a	.848	.845	.02678	
Model	**Sum of Squares**	**df**	**Mean Square**	**F**	**Sig.**
Regression	.972	4	.243	338.658	.000b
Residual	.174	243	.001		
Total	1.146	247			
Model	**Unstandardized Coefficients**		**Standardized Coefficients**	**T**	**Sig.**
	B	Std. Error	Beta		
(Constant)	-.223	.029		-7.703	.000
RBC	.004	.005	.041	.831	.407
Asset Allocation	1.723	.266	.235	6.487	.000
Total Assets	.094	.009	.790	9.993	.000
Gross Written Premium	.004	.007	.042	.649	.517

a. Dependent Variable: Investment Returns
b. Predictors: (Constant), Gross Written Premium, Asset Allocation, RBC, Total Assets

There is a positive significant relationship on the joint effect of risk based capital, asset allocation and firm size (total assets) on the investment returns of insurance companies in Kenya. The null hypothesis indicating that the joint effect of risk based capital, asset allocation, and firm size on investment returns of insurance companies in Kenya is not

significant and is therefore rejected. The regression model explains the variation in investment returns as a result of the joint effect of risk based capital, asset allocation and firm size is shown below:

$$\mathbf{IR_{it} = -0.223 + 1.723AA_{it} + 0.094TA_{it}}$$

Where:

IR is the investment returns,

RBC is the risk based capital,

AA is the asset allocation,

TA is the total asset score,

Summary and Conclusions

The study objective was to establish the joint effect of risk based capital, asset allocation, and firm size on investment returns of insurance companies in Kenya. The study hypothesised that the joint effect of risk based capital, asset allocation, and firm size on investment returns of insurance companies in Kenya is not significant. The findings show a statistically significance on the joint effect of risk based capital, asset allocation and firm size on investment returns of insurance companies in Kenya explaining 84.8% of variation in investment returns. The findings therefor led to the rejection of the null hypothesis (H_1). This implies that all variables should be considered when looking at the risk based capital and investment returns of insurance companies. The findings further indicate that the combined effect risk based capital, asset allocation and firm size; has a positive effect on investment returns of insurance firms.

Due to a progressively complex financial service industry, all financial institutions are keen in managing their risks and holding enough capital in order to survive such crisis in the future. Most regulators in the insurance industry and banking sector across the globe have adopted risk based supervision models, moving away from compliance based capital requirements and concentrating on a risk based capital which is grounded on the size and complexity in operations of the financial institutions. This approach looks at both sides of the

balance sheet (asset and liability) and impose a percentage of capital charge to any investment or business operations as per a defined risk rating. The effect of risk based capital on investment returns as illustrated in this study would help insurance companies' portfolio managers when defining investment policies which will determine on where to invest and the amount of risk based capital the company will be obligatory to hold. The study will also inform portfolio managers of diversifying their investment to maximize their returns without being concerned on the amount of capital to hold. This is supported by the study findings which indicate a positive relationship between risk based capital and investment returns, thus allowing the managers to justify their investments in high risk areas which attract a high capital charge. However, the duration of such investments also needs to be considered, since the study findings indicate that asset allocation has a positive effect on the amount of capital to hold in order to cushion it from unforeseen circumstances and its effect on investment returns. Duration of the investment and investment vehicle were used to determine the asset allocation score, thus deeming investment duration important.

Despite the study having some limitations, efforts were made to make sure that these shortcomings did not significantly affect the results of the study. Other variables that may have influenced the investment returns of insurance companies were not considered in this study. The results of the study are therefore based on the indicators used thus giving the interrelationship between variables that affect investment returns of insurers. The lack of management studies in the Kenyan context, and risk based supervision model meant that comparative analysis in the local context was not possible. However, the results of the study findings were comparable with related studies done internationally. Despite these limitations, the quality of the study wasn't compromised.

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