

**FIRM CHARACTERISTICS AND REVENUE EFFICIENCY OF
SELECTED INSURANCE COMPANIES IN KENYA**

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D58/CTY/PT/27522/2014

**A RESEARCH THESIS SUBMITTED TO THE SCHOOL OF BUSINESS IN
PARTIAL FULFILMENT OF THE REQUIREMENTS FOR THE AWARD OF
MASTER OF SCIENCE DEGREE (FINANCE) OF
KENYATTA UNIVERSITY**

OCTOBER, 2020

DECLARATION AND APPROVAL

Declaration by Candidate

This thesis is my original work and has not been presented for a degree in any other University.

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DEDICATION

To my husband Denis, daughter Clarice and son Barack for being my greatest support.

You are my daily inspiration.

ACKNOWLEDGEMENT

I thank God Almighty for His faithfulness, my parents for their love, prayers and believing in me. I wish to acknowledge my brothers and sisters especially Faith for her emotional support throughout the time of the study. I also acknowledge my supervisors, Dr. Lucy Wamugo and Dr. Eddie Simiyu for their priceless input into this study. Their experience and knowledge in this field of study has gone a long way in assisting me complete my study.

To my colleagues at work and especially my immediate supervisor for the many times you gave me permission to consult with my supervisors and for my endless journeys to the library. To my family, words cannot express my gratitude for your selflessness and encouragement throughout this whole period of study.

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OPERATIONAL DEFINITION OF TERMS

Asset Quality	Asset Quality refers to the determination of the credit risk linked to an asset; it was proxied by the ratio of debtors to Gross Premium plus Reinsurance Recoveries.
Capital Adequacy	A measure of the available capital in relation to the minimum required capital by the regulatory authority in this case the Insurance Regulatory Authority. Capital adequacy in this study was proxied by the Capital Adequacy Ratio.
Claims	The speed, accuracy and effectiveness of processing a customer's claim. It is a measure of an insurance firm survival. Claims Experience in this study was proxied by the ratio of Net Technical Reserves/Average of Net Claims Paid in the last 3years.
Competition	Competition is the rivalry between firms in the same industry with the aim of increasing sales volume, increasing profit and growth in market share by varying the market mix elements of Product, price, promotion and distribution. Competition in this study was proxied by the Herfindahl Hirshman Index
Cost Efficiency	The use of minimum inputs to produce a given level of output.
Financial	Financial Efficiency is a measure of the magnitude with which an entity uses the available resources to generate revenue and the effectiveness of purchasing inputs, producing, pricing, financing and marketing the output; that is utilization of minimum quantity of inputs (i.e labour, technology and capital) to attain the maximum possible output.
Firm Characteristics	A firm characteristic is that unique attribute or feature that differentiates a company from other companies and it influences the company's internal and external decisions, in this study, the firm

characteristics included; firm size, capital adequacy, asset quality, claims experience and risk.

Firm size	Total assets owned by an insurance firm at a particular time. Firm Size was proxied by natural logarithm of total assets.
Herfindahl Hirshman Index	Herfindahl Hirshman Index is a measure of the market concentration. This study employed the index to determine the competition amongst the insurance companies in Kenya.
Insurance	Insurance is the risk transfer between two parties (the Insurer and the Insured).
Market Concentration	A measure of the distribution of market share amongst companies in the same industry in this case the insurance industry.
Net Technical Reserves	Net Technical Reserves represents amounts set aside by insurers from their profits whose main purpose is to settle commitments to policyholders (cover claims).
Revenue	Total earnings received by a company from its daily operations before the statutory deductions.
Revenue Efficiency	Revenue efficiency is the use of the available resources by a company to realize an increase in profits, Revenue Efficiency is proxied by an output distance function in this case Total Revenue/Total Assets.
Risk	Refers to total losses incurred in form of claims adjusted for expenses and divided by the total earned premiums. It is a means for insurers to gauge the profitability of their businesses or an insurance policy.
Risk Based Supervision	A holistic analysis of an insurer's risk position and capital Held at all times by linking the capital held by the insurers to the Amount of risk they underwrite, their asset and investments composition.

ABBREVIATIONS AND ACRONYMS

ADF	Augmented Dickey Fuller
ARMA	Autoregressive Moving Average
BI	Boone Indicator
BIAK	Bima Insurance Association of Kenya
BJ	Bera Jarque
CAR	Capital Adequacy Ratio
CCR	Charnes, Cooper and Rhodes
COMESA	Common Market for East and Southern Africa
DEA	Data Envelopment Analysis
DFA	Distribution Free Approach
DMU	Decision Making Unit
FDH	Free Disposal Hull
FDI	Foreign Direct Investment
GDP	Gross Direct Premium
GMM	Generalized Methods of Moments
HHI	Herfindahl-Hirschman Index
IMF	International Monetary Fund
IRA	Insurance Regulatory Authority
KARA	Kenya Automobile Repairers Association
LI	Lerner Index
LLC	Levin-Li-Chu
NAKI	National Association of Kenya Investigators
RBC	Risk Based Capital

ROA	Return on Assets
SAS	Statistical Analysis System
SFA	Stochastic Frontier Analysis
TFA	Thick Frontier Approach

ABSTRACT

Revenue efficiency is recognized as a major ingredient in sustainable growth in insurance business. The growing complexity in the insurance business characterized by the constant change in the operating environment has increased the significance of the effect of revenue efficiency in resource utilization in the sector. The continuous decline in revenue efficiency in the Kenyan insurance has affected profitability and sustainability of insurance companies. The main objective of this study was to determine the effect of firm characteristics on revenue efficiency of selected insurance companies in Kenya. The specific objectives of the study included: to determine the effect of firm size on revenue efficiency, to establish the effect of capital adequacy on revenue efficiency, to determine the effect of claims experience on revenue efficiency of insurance companies, to establish the effect of asset quality on revenue efficiency, to assess the effect of risk on revenue efficiency, to determine the moderating effect of competition on the relationship between firm characteristics and revenue efficiency. The research was based on the information asymmetry theory, the agency theory, passive learning theory and the structural conduct theory. The study used a causal research design and was underpinned on positivism research philosophy. The target population was the 27 insurance companies that have consistently been in operation during the study period, 2008-2017 and registered by the Insurance Regulatory Authority. A census of all the 27 insurance companies was taken. The study relied on secondary data from audited financial statements as submitted to the Insurance Regulatory Authority. The panel secondary data was quantitative in nature and was analyzed using descriptive statistics and inferential statistics. Descriptive statistics included mean, mode, median and standard deviations. Inferential statistics included correlation analysis and multivariate analysis using the two stage Data Envelopment Analysis by obtaining efficiency scores in the first stage thereafter Dynamic panel regression model in stage two. Data was analyzed by STATA (14). The research findings showed that capital adequacy had a positive statistically significant effect on revenue efficiency of insurance companies in Kenya, firm size and asset quality had a statistically significant negative effect on revenue efficiency; claims experience and risk did not have a significant effect on revenue efficiency. The moderating effect of competition on the relationship between: capital adequacy and revenue efficiency; claims experience and revenue efficiency was negative and statistically significant; the moderating effect of competition on the relationship between: Asset Quality and Revenue Efficiency, Firm Size and Revenue Efficiency, risk and Revenue Efficiency was not significant. The study recommends that insurance companies should put in place robust measures to ensure remittance of policy premiums especially from insurance agents, to reduce exposure to large sizes of debtors consequently poor asset quality. The study also recommends that insurance companies should be encouraged to form strategic business units through spin-offs, which will encourage specialization for the different units reducing the too-big-to-fail phenomenon.

CHAPTER ONE: INTRODUCTION

1.1. Background of the Study

All companies strive to minimize inputs and to maximize their outputs and that companies that fail to achieve these objectives do not survive, (Cummins & Weiss, 2013). To ensure survival, companies must strive to be effective, (Eling & Luhen, 2007). The main objective of every profit orientated organization is profit maximization through maintenance of great standards of efficiency in cost and revenue this has made the study of cost and revenue efficiency imperative in finance, (Philips *et al.*, 2010).

The continuous decline in revenue efficiency in the Kenyan insurance sector has affected profitability and sustainability of insurance companies. Insurers are unable to gain business volume which is significant for collective pooling of insurance risk under the law of large numbers yet the insurance sector operations are anchored on it, (Cytonn Report, 2016, Wasseja, 2015). For this reason, the industry has lately been experiencing a declining rate of growth in revenue as compared to the global revenue trends. The General insurance business in Kenya grew by 11.4% which is an equivalent of 3.4% while the global growth stood at 3.6%, and the Life business in Kenya grew by 9.7% representing 1.7% while the global growth was at 4%, during the year 2017, (IRA, Annual Report, 2017).

The insurance industry in Kenya is facing turbulence which seems to be affecting its revenue efficiency and productivity with an insurance penetration of 2.68% with 52 insurance companies serving 46 million people as at December, 2017, while the average global penetration was at 6.1%; South Africa with 175 insurance companies for 55 million people, insurance penetration was at 14.50%; Namibia with 30 insurance companies for 2.5 million people and an insurance penetration of 7.4% ; and Mauritius with 20 insurance

companies for 1.3 million people and an insurance penetration of 6.40% , (Cytonn report, 2017, IRA Annual Report, 2017, Sigma, 2018)

Most studies have focused on profit, market share and economic value addition (bottom line) to determine financial performance and there are minimal studies on revenue efficiency (topline). The studies used simple financial ratios, such as expense to premium, ROA and ROE, (Cummins & Weiss, 1998). However, financial ratios do not provide the nexus between financial resources utilized and the output realized by the firm as they are one dimensional and ignore any interaction between key variables, (Kocisova, 2014). For these reasons, the measurement of firm efficiency using DEA has captured attention from business and strategic management scholars, (Cummins & Weiss, 1998; Kocisova, 2014).

Studies on how firm characteristics relate to efficiency and particularly revenue efficiency have elicited mixed reactions. A study carried out in Zimbabwe, Abel and Roux (2016) contended that capital adequacy, income ratio, inflation, macroeconomic growth, and credit risk are important determinants of cost and revenue efficiency and to improve competition financial sector reforms should be adopted to enhance efficiency. On the other hand, Wasseja and Mwenda, (2015) in a study carried out in Kenya suggested that the technical efficiency of the Kenyan life insurance deteriorated over the years.

1.1.1. Revenue Efficiency

Revenue efficiency is the use of available resources by a company to realize an increase in profits and it is measured by an output distance function, (Kocisova, 2017; Jarraya & Bouri, 2012). An insurance firm has several outputs or sources of revenue that is investment income, commissions from reinsurance, other direct incomes and premium income.

Premium income is the major output from an insurance company's daily operations, accounting for 74% of the total output, (IRA, Annual Report, 2015). Most studies on the insurance industry have used premium income as a measure of output where Premiums collected is a clear reflection of the insurance firm's ability to market its products, choose its customers and acknowledge risks, (Bikker & Leuvensteijn, 2008).

Trends in the Kenyan insurance sector revenue throughout the study period are as shown in figure 1.1 below:

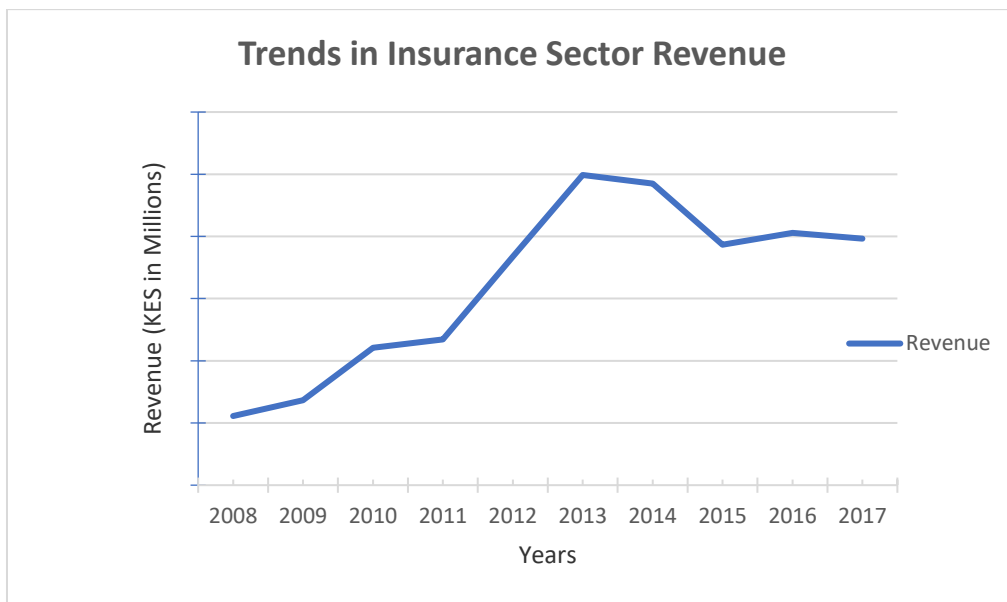


Figure: 1.1: Trends in Insurance Sector Revenue

Source: IRA Annual Reports, (2008-2017)

From Figure 1.1, although there is an increase in the industry revenue, it is marginal and starts declining from the year 2013 through to 2017. The industry's Revenue is seen to decline by 2.7% from 2013 to 2014 and further with even a bigger margin of 20.25% from 2014 to 2015. Although there is a slight increase in 2016, the industry's revenue declines by a further 2.32% in the year 2017.

Trends in the Kenyan insurance sector revenue efficiency throughout the study period are as shown in figure 1.2 below:

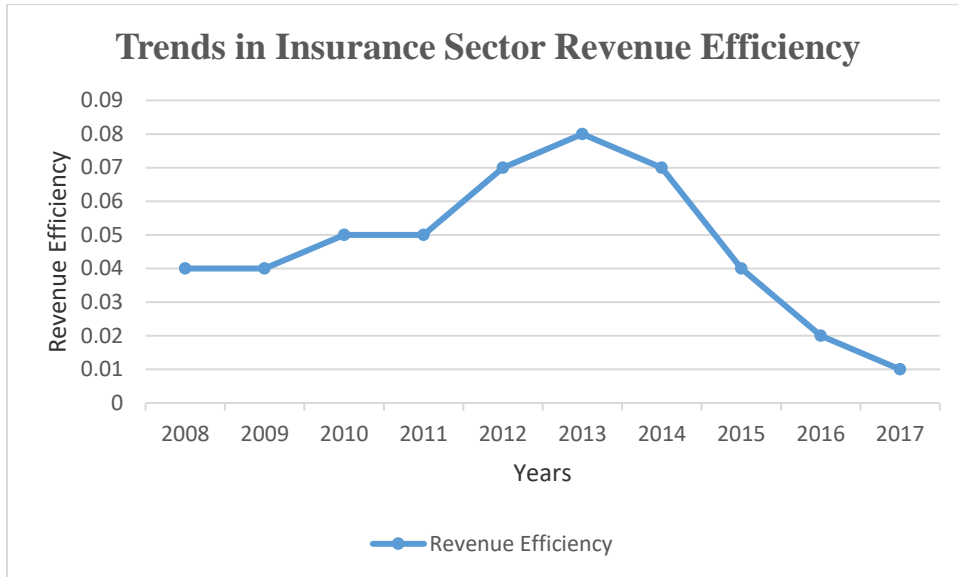


Figure 1.2: Trends in the Insurance Sector Revenue Efficiency

Source: IRA Annual Reports, (2008-2017)

From Figure 1.2, the industry's revenue efficiency as measured by the ratio of total revenue to total assets reflects a downward trend from the year 2013 through to 2017. The industry experiences a decline of 1.0% in revenue efficiency from the year 2013 to 2014, a decline of 3.0% from 2014 to 2015, and a further decline of 2.0% from 2015 to 2016; and a 1.0% decline from 2016 to 2017. The study in this regard sought to explain this downward movement in revenue efficiency.

The two major approaches of measuring the efficiency of a firm are; the Accounting Approach by use of traditional convectional ratios and the Frontier Efficiency methods, (Usman *et al.*, 2014). The frontier efficiency methods are further classified into two; the parametric (econometric) Approach which includes Stochastic Frontier Approach (SFA);

Thick Frontier Approach (TFA) and Distribution Free Approach (DFA) and the Nonparametric (mathematical programming) Approach which includes, Data Envelopment Analysis (DEA) and Free Disposal Hull (FDH), (Hjalmarsson *et al.*, 1996; Jarraya & Bouri, 2012; Usman *et al.*, 2014). In the recent past, the number of studies using frontier efficiency methods in determining revenue efficiency in the insurance industry has been going up at a very high rate, (Eling & Luhen, 2006; Jarraya & Bouri, 2012).

DEA was introduced by Charnes, Cooper and Rhodes, (1978). Being a mathematical programming approach, it does not specify the efficient frontier and error terms unlike the econometric approach, (Eling & Luhen, 2007). Using linear programming techniques, DEA determines efficiency of decision-making units under study using the input and output variables without prior knowledge of how the variables relate to each other, (Charnes *et al.*, 1978). DEA produces a single measure of efficiency for a group of DMUs under study by optimally weighting the inputs and outputs irrespective of their number by establishing a best practice among a set of DMUs, then it takes a comparison of all the DMUs under study in relation to the best practice and shows the degree of inefficiencies and possible improvements for the inefficient DMUs (Abel & Roux, 2016; Yang, 2006). An important aspect of DEA is that it incorporates environmental factors in the model as either inputs or outputs depending on whether they are additional resources or resource users to the DMU under study, (Jarraya & Bouri, 2012). This informed the inclusion of Claims Experience as one of the variables in the study given it is an additional resource to the insurance sector.

Efficiency is achieving organizational goals with minimal resource utilization, (Khan *et al.*, 2012; Kazemi, 2007). Financial Efficiency is a measure of the magnitude with which an entity uses the available resources to generate revenue and the effectiveness of purchasing inputs, producing, pricing, financing and marketing the output; the use of minimum quantity of input (i.e labour, technology and capital) to attain the maximum possible output (Dario & Simar, 2008). The different dimensions of financial efficiency are technical, allocative, cost and revenue efficiency (Popovic & Martia, 2005). A cost-efficient frontier utilizes the lowest costs compared to other firms in the industry to produce a given level of output while a revenue efficient frontier generates a high level of profits from its operations compared to other firms in the industry with a given level of inputs, (Nissim, 2010; Bader *et al*, 2008, Cummins, 1999).

1.1.2. Firm Characteristics in the Kenyan Insurance Industry

A firm characteristic is that unique attribute or feature that differentiates a company from other companies and it influences the company's internal and external decisions, (Shehu, 2009). In this study, the firm characteristics included; firm size, capital adequacy, asset quality, claims experience and risk.

1.1.3. Firm Size in the Kenyan Insurance Companies

Firm size can be determined in terms of either volume of sales, or total employees, or market share, or value addition, or total assets, (Kaguri, 2013; Zadeh & Eskandari, 2012). The most appropriate measure of firm size is the use of real assets in logarithm since the effect of a growing size of a firm on efficiency and profitability is not necessarily linear but non-linear, (Yuqi Li, 2007). The effect of size on firms that become extremely large could be negative as a result of bureaucracy and routine thus most studies measure firm

size using the real assets in logarithm in order to eliminate the extreme values in the data and also capture the possible non-linear relationship, (Athanasoglou *et al.*, 2005; Adams & Buckle, 2003).

The Kenyan insurance market has in the recent past experienced increased mergers and acquisitions from both foreign and local investors due to its attractiveness and secondly due to the legal provision that no one individual should own more than 25% of the share capital of an insurance company, (AKI, Annual Report, 2015). Mergers and acquisitions result into large sizes of insurers. Biener *et al.*, (2015); Eling & Luhnen, (2010b); Luhnen, (2009); Cummins & Rubio-Misas, (2006), suggested a positive relationship between size and revenue efficiency. This was occasioned by firstly, the scale advantages large insurers enjoy as the mean cost per unit of output decreases as the volume of actual output increases; secondly larger firms are perceived to enjoy economies of scale due to the spreading of fixed production costs over a larger volume of output in addition to the learning effects gained by managers as they operate at a larger scale; and also income volatility is seen to reduce in a large scale of operation in the insurance industry as compared to a smaller scale of operation as result of larger risk pooling. However, Almajali *et al.*, (2012); Zanghieri, (2008); Fenn *et al.*, (2008); Yuqi Li, (2007), proposed that size had a negative effect on efficiency that is larger firms suffer from diseconomies of scale resulting from bureaucracy and the complexity of their operations and are not as efficient as compared to their small and middle-sized counterparts.

1.1.4. Capital Adequacy in the Kenyan Insurance Companies

Capital adequacy is a measure of the available capital in relation to the minimum required capital by the regulatory authority in this case the IRA. Capital adequacy is seen to promote

the efficiency and stability of a financial system and it is perceived to be an important indicator of an insurer's capability to withstand losses from the customers' claims, (Smajla, 2012). An efficient firm increases capitalization by retaining more earnings as capital, (Carvallo & Kasman, 2005). The insurance industry in Kenya has in the recent past experienced a dramatic change in the capital structure such as the introduction of the Risk Based Capital (RBC) regime by the IRA. The changes include an increase in the minimum capital requirement each insurer is expected to hold; composite insurers KES 1.0 billion, general insurers KES 600 million, long-term insurers KES 400 million, reinsurers KES 1.5 billion, (IRA Annual Report, 2015). The introduction of the RBC regime is meant to support the implementation of the risk-based supervision framework that was introduced in the year 2008. A majority of the past studies looked at the banking industry where they suggested that capital adequacy enhanced bank profitability and revenue efficiency but very little has been done concerning the insurance industry, (Wasseja & Mwenda, 2015; Almazari, 2013; Pessarossi & Weill 2013; Ajlouni *et al.*, 2011). Capital adequacy is measured by the Capital Adequacy Ratio (CAR).

1.1.5. Claims Experience in the Kenyan Insurance Companies

Claims have a contradictory effect for the insurance industry in that neither the insured nor the insurers want claims to fall due, but when they happen, they are of utmost importance to both the insured and the insurers, (Ernst & Young, 2018). Claims are a major determinant of how the insured and the insurers relate with each other where the success of an insurance firm is mostly defined by the customer's claims experience, (Singh, 2007). Claim's experience being a measure of insurance survival, it has a direct benefit to the insurer in terms of customer retention, (Costonis, 2014). According to (Kiana, 2010), while

the insured customers are interested in speedy resolution of claims, the insurers are more focused on a claims management process that strikes a balance between customer expectations and maintaining cost efficiency.

SAS, (2012), mooted that 10% of insurance claims are always fraudulent therefore proper claims management was seen to be a fraud control tool. Section 203 of the Insurance Act Cap 487 Laws of Kenya requires an insurer to settle claims within 90 days after a liability is established. The IRA registered a rise in complaints from 1082 in 2016 to 2,126 complaints in 2017 this was as a result of declined claims, delayed claims' settlement, erroneous deductions and unsatisfactory claims offer, (IRA, Annual Report, 2017). The IRA imposes a levy of 5% on the outstanding amounts if the insurer fails to comply. Additionally, service providers have formed associations such as the National Association of Kenya Investigators (NAKI), Kenya Automobile Repairers Association (KARA) and Assessors and Engineers Association whose main purpose is to ensure insurers comply with the requirements of the IRA such as the payment period, (IRA, 2012).

1.1.6. Asset Quality in the Insurance Companies in Kenya

Asset Quality refers to the determination of the credit risk linked to an asset and it is important in determining the financial health of an insurance firm, (Darzi, 2011). The Kenyan insurance companies have for a long time been experiencing large amounts of debtors occasioned by delayed remittance of premiums collected to the insurance firms by insurance agents and brokers who collect the premiums on behalf of the companies, (IRA, 2018). This translates to poor asset quality.

According to the IMF Report, (2004), Asset Quality can be determined using these ratios: Equity/Total Assets; (Real Estate + Unquoted Equities + Debtors)/Total Assets; Non-Performing Loans or Assets/Total gross Loans or Total Assets; Debtors/ (Gross Premium + Reinsurance Recoveries). Most studies have concentrated on the banking industry and there's minimal or no literature on asset quality on revenue efficiency of insurance companies yet the industry has been experiencing a zig zag trend of up and down in asset quality in the recent past, (IRA annual Report, 2017). This study just like Kumar & Ghimire, (2013), used Debtors/ (Gross Premium + Reinsurance Recoveries) to determine the asset quality of insurance companies in Kenya.

1.1.7. Risk in the Kenyan Insurance Company

Risk refers to the Loss ratio insurance companies are exposed to in their day today running of the business while insurance refers to risk transfer between the insurer and the insured where the insured pays the insurer a premium and the insurer in return agrees to compensate the insured just in case the insured risk occurs, (Kaya, 2015; Ingram, 2006). The Kenyan insurance industry has in the recent past experienced a surge in the number of fraud cases occasioned by fake and or exaggerated insurance claims, (KPMG, 2015). In the year 2015, there were 93 cases worth KES 324 Million, which rose from 88 cases worth KES 102 Million that occurred in the year 2014, (Cytonn Report, 2015). According to AKI, (2018), insurance fraud in the year 2018 stood at KES 367 Million. The medical and motor insurance classes were found to represent three quarters of the reported fraud cases with 6 cases of KES. 14.5 million involving employees while 21 cases of KES. 17.8 million involving agents, (IRA,2015). The fraud cases might be high because of unreported cases

and medical insurance covers, where hospitals double or even triple the cost of medication for patients with insurance covers, (Bima Intermediaries Association of Kenya, 2017).

Excessive risk-taking is perceived to impact negatively on the revenue efficiency of insurance firms as a result, insurers that underwrite risky businesses are forced to put up measures that will reduce their susceptibility to underwriting losses and ensure maximization of returns on invested assets, (Mehari & Aemiro, (2013). Most studies such as (Kaya, (2015); Gebremariyam, (2014); Mehari & Aemiro, (2013); Malik, (2011)); that have identified loss ratio as an insurance specific characteristic have agreed that insurance companies with low underwriting risk are more revenue efficient and profitable as compared to insurance companies with high underwriting risk. This study observed firm characteristics in terms of Firm Size, Capital Adequacy, Asset Quality, Claims Experience and Risk.

1.1.8. Competition in the Insurance Industry in Kenya

Competition is the rivalry between firms in the same industry with the aim of increasing sales volume, increasing profit and growth in market share by varying the elements of the market mix: promotion, product, distribution, and price, (Bikker & Gorter, 2008). Although competition is seen as an incentive to improved efficiency, if the insured customers are not keen on the financial health of their insurers, competition between insurers may bring premiums down leading to closure of the firms, (OECD, 1998). Pearce & Robinson, (1997), argue that a clear understanding of a firm's external environment and competition is crucial in determining the firm's capability and effectiveness.

Insurance business is unique in that instead of an immediate good or service to consumers in exchange of their payment, the insurer promises a future benefit based on if and when specific conditions occur, Hafeman, (2009). The insurance industry in Kenya is oligopolistic in nature with a few established companies controlling the market share, (Gitau, 2013; Cytonn Report, 2016). In the year 2017, Jubilee Insurance controlled 16.3%, of the market share, Britam Holdings controlled 14.1%, of the market share, Liberty Kenya Insurance controlled 6.4%, of the market share, Sanlam controlled 6.2% of the market share, CIC controlled 4.9% of the market share while the others controlled 52.1% of the market share, (IRA, Annual Reports, 2017). It is prudent to note that out of the 52 insurance companies in Kenya as at December 2017, five companies control 47.9% nearly 50% of the market share while the remaining 47 control 52.1%, this is a clear indication that competition amongst the companies is imperfect.

Leon, (2013), argued that it is difficult to observe competition directly because it is a complex concept this has led to the development of a variety of measures of determining it while (Liu *et al.*, 2013), contended that there was also no agreement on the best method of determining competition since the different indicators do not give the same inferences about competition. Leon (2013), further suggested that the choice of a particular measure depends on the study objectives, availability of data and the assumed understanding of what competition is.

Competition can be measured using two major approaches; the Structure-Conduct Performance (SCP) paradigm and the efficiency hypothesis: the SCP determines if in a very concentrated market collusion among bigger firms results in superior market performance while the efficiency hypothesis investigates whether it is the efficiency of

bigger firms that improves their overall performance, (Bikker & Haaf, 2002). The most common measures of competition are the Boone Indicator (BI), Profit Margin, Lerner Index (LI) of market power and the Herfindahl Hirschman Index (HHI), (Schiersch & Schmidt-Ehmcke, 2010). The Boone indicator is an indirect method of measuring competition that assumes competition rewards efficiency and punishes inefficiency, Profit Margin is a direct measure of competition where supernormal profits would mean limited competition, LI is the convectional way while the HHI is an indicator of the market concentration, (Bikker & Haaf, 2002).

Murat *et al.*, (2002); Kovacs, (2011), asserted that the HHI is a common measure of the extent of concentration in the general insurance sector where market concentration is seen as a determinant of competition. This study used the HHI as a measure of market concentration in the Kenyan insurance industry.

1.1.9 . Insurance Industry in Kenya

Insurance industry is part of the financial service providers including but not limited to commercial Banks, Savings and Credit Societies, Building Societies among others contributing about 11% of GDP, with the insurance industry contributing 3% of the GDP, (Cytonn Report, 2017). The various entities in the insurance industry are; Insurance Companies, Reinsurance Companies, Intermediaries and other Service Providers. Insurance companies are the major players being the risk carriers and represent the largest segment of the insurance industry in Kenya in terms of revenue collection in this regard a lot of emphasis on their supervision has grown a great deal, (Kogi, 2009). The Insurance Regulatory Authority plays the supervisory and regulatory role while the Association of Kenya Insurers is tasked with promoting professionalism amongst its members,

development of best practice guidelines and creation of public awareness through education among others, (IRA, Annual Report,2015)

Currently there are 52 insurance companies in Kenya which are further subdivided into three major segments depending on the nature of business they carry out; 15 of which are long- term insurer business, 26 are General insurer business while 11 are composite insurer business, (IRA, Annual Report, 2017). A long- term insurer business pays out a certain amount of money to the insured or their beneficiaries upon the death of the individual who is insured. Its required capital base is KES 400 million. The General insurer business is short term in nature and protects and covers all risks not covered by the long-term insurer. Its required capital base is KES 600 million. The composite insurer business, involves both long term and general insurers and its required capital base is KES 1.0 billion.

There has been increased corporate restructuring activities in the Kenyan insurance industry in the recent past involving mergers and acquisitions, (IRA, Annual Report, 2017). In 2015, UAP Holdings Limited was acquired by Old Mutual South Africa, Gateway Insurance Company Limited was acquired Pan Africa Insurance Holdings, South Africa, (IRA, Annual Report, 2015). The demerger of Cannon Assurance Limited where the long-term business of Cannon Assurance was transferred to Metropolitan Cannon Life Assurance limited in December, 2017 and the demerger of Madison Insurance Company Limited where the general business of Madison Insurance Company Limited was transferred to Madison General Insurance Company in June, 2017, (IRA, Annual Reports, 2017)

1.2. Statement of the Problem

The growing complexity in the insurance business and the constant change in the operating environment have enhanced the importance of the effect of revenue efficiency in resource utilization in the sector, (Roy & Das, 2012). The insurance sector has been experiencing a decline in revenue efficiency in both the advanced and developing economies, with the Kenyan industry experiencing a decline of 1.0% in revenue efficiency from the year 2013 to 2014, a decline of 3.0% from 2014 to 2015, and a further decline of 2.0% from 2015 to 2016; and a 1.0% revenue efficiency decline from 2016 to 2017 (IRA, Annual Report, 2014 & 2017). The declining revenue efficiency remain a major problem in promoting sustained growth in the Kenyan insurance industry, (Wasseja & Mwenda, 2015). In this regard insurers are unable to gain business volume which is significant for collective pooling of insurance risk under the law of large numbers yet the insurance sector operations are anchored on it, (Greene, 2004).

According to (Kocisova, 2014), studies have focused on profit, market share and Economic Value Addition on financial performance using simple ratio-based analysis. However, ratios are one dimensional and ignore any interaction between key variables that is the effect of input factors (capital) is not connected to the output (revenue), (Cummins & Weiss, 2008). While DEA is superior as it utilizes programming and statistical techniques which minimize the effects of differences in input and output prices and other external factors that affect a firm, (Roy & Das, 2012;). Much of the previous research in this regard; Eling & Schaper, (2015); Mahdavi *et al.*, (2011); Eling and Luhen, (2007); Cummins & Rubio-Misas, (2006), focused on the developed and advanced economies in Europe, North America, Australia and Asia. Very little has been done in the developing countries

especially Kenya which is a frontier economy, yet the industry is facing turbulence that affects its efficiency and productivity, (Cytonn Report, 2015).

Most studies have focused on profit, market share and economic value addition (bottom line) to determine financial performance and there are minimal studies on revenue efficiency (topline). Previous studies carried out in Kenya (Wasseja & Mwenda, 2015; Kaguri, 2013; Mwangeti, 2012), solely concentrated on the life insurance sector; failed to consider dynamism in revenue efficiency; did not explain the causes of revenue inefficiency; the variables considered in the previous studies are different from those this study used; and failed to incorporate the moderating variable of competition yet the insurance industry in Kenya is oligopolistic in nature with a few firms controlling the market, (Gitau, 2013).

It is against this background that this study sought to determine the effect of firm characteristics on revenue efficiency of selected insurance companies in Kenya.

1.3. Objectives of the study

1.3.1. General objective

The general objective of the study was to determine the effect of Firm characteristics on revenue efficiency of selected insurance companies in Kenya.

1.3.2. Specific objective

Specifically, the study sought to:

- i.** To ascertain the effect of firm size on revenue efficiency of selected insurance companies in Kenya.

- ii. To establish the effect of capital adequacy on revenue efficiency of selected insurance companies in Kenya.
- iii. To deduce the effect of Claims Experience on revenue efficiency of selected insurance companies in Kenya.
- iv. To determine the effect of asset quality on revenue efficiency of selected insurance companies in Kenya
- v. To establish the effect of risk on revenue efficiency of selected insurance companies in Kenya.
- vi. To determine the moderating effect of competition on the relationship between firm characteristics and revenue efficiency of selected insurance companies in Kenya.

1.4. Research Hypotheses

The null hypotheses below were generated basing on the literature review:

- H₀₁:** Firm size had no significant effect on revenue efficiency of selected insurance companies in Kenya.
- H₀₂:** Capital Adequacy had no significant effect on revenue efficiency of selected insurance companies in Kenya.
- H₀₃:** Claims Experience had no significant effect on revenue efficiency of selected insurance companies in Kenya.
- H₀₄:** Asset Quality had no significant effect on revenue efficiency of selected insurance companies in Kenya.
- H₀₅:** Risk had no significant effect on revenue efficiency of selected insurance companies in Kenya.
- H₀₆:** Competition had no significant moderating effect on the relationship between firm characteristics and revenue efficiency of selected insurance companies in Kenya.

1.5. Significance of the study

The study aimed at providing stakeholders in the insurance industry with knowledge on the effect of firm characteristics on revenue efficiency of the industry. The IRA being the regulators and policymakers has the responsibility of monitoring and evaluating the efficiency of insurance companies. This study provides the IRA and the management of insurance companies with objectively researched information regarding the responsiveness of the firms' revenue efficiency to changes in firm characteristics. As a result, policies put in place are objectively informed.

Information that is important to investors is the information that is material in enabling them to make accurate decisions regarding where, when and how to invest their funds. This research informed investors on how to use firm characteristics to gauge the revenue efficiency of insurance companies in Kenya and make appropriate investment decisions.

The study acts as an addition of information to the finance field and a basis for future reference by academicians and scholars. It provides researchers with the opportunity of knowing how firm characteristics relate with the revenue efficiency of the insurance companies in Kenya since much of the available research in this regard has concentrated on the developed economies but not Kenya.

1.6. Scope of the study

The study focused on firm characteristics and revenue efficiency of insurance companies in Kenya with the aim of establishing the model of explaining the relationship between them. The study considered 27 insurance companies that have been consistently in operation between 2008 and 2017 covering a study period of ten years. The period under

study was chosen basing on the fact that the IRA was established in the year 2006 and Risk Based Supervision Framework whose main aim is to enhance industry capacity and stability was implemented in the year 2008.

1.7. Limitation of the study

The use of historical secondary data which the researcher had little or no control over what data had been collected, and how. However, the limitation was mitigated by the use of audited financial statements submitted to IRA by the insurance companies in conformance to the provisions of the Insurance Act. By concentrating only on the insurance industry, the study was not sufficiently heterogeneous.

1.8. Organization of the study

The thesis is structured as: Chapter one provides the background, the problem statement, the objectives of the study, the significance of the study, defines the scope, identifies the limitations and states the assumptions of the study. Chapter Two focuses on the theoretical and empirical literature review, identification of the research gaps and finally the conceptual framework. Chapter Three presents the research design, the target population, and the sample, operationalization of variables, the data collection, and data analysis. Chapter Four provides findings and interpretations of the findings while chapter five provides the study conclusions and the researcher's recommendations.

CHAPTER TWO: LITERATURE REVIEW

2.1. Introduction

The chapter examines the concepts and theories on determinants of revenue efficiency with major focus on firm size, capital adequacy, claims experience, asset quality, risk and competition. By considering literatures from diverse past authors, the chapter forms the theoretical and the conceptual framework on the topic under study. A summary of the reviewed literature and the gaps emanating from the past literature is then presented

2.2. Theoretical Review

This section discusses current/relevant theory that supports the research problem at hand.

The study reviewed the Information Asymmetry theory, Agency Theory, Passive Learning theory and the Structure Conduct Performance theory to come up with the conceptual framework

2.2.1. Information Asymmetry theory

The Information Asymmetry Theory also referred to as the theory of imperfect information was propounded by Akerlof (1970) through the paper on the market of lemons in the USA. According to this theory, the seller has more detailed information about one specific good probably the one he is selling, while the buyer uses general knowledge to measure the value of a class of goods basing on some market statistics to arrive at the average of the whole market. The seller is therefore in a position to sell commodities of less than the average market quality to the buyer without the buyer's knowledge, (Tumay, 2009). The Information Asymmetry Theory is pertinent to the study as the theory expounds on the rationale behind risk transfer between two parties. The theory applies when there exist asymmetries in one direction, that is information differences in the favor of one party in an

economic transaction making it difficult for the other party to make accurate and correct decisions or inferences, (Auronen, 2003). In the insurance industry, two issues arise; the moral hazard and the adverse selection. Moral hazard is whereby the ex-post risk of the insured is higher as compared to the ex-ante risk therefore individuals tend to exert less effort protecting the insured goods while adverse selection is where high-risk individuals purchase more coverage (Keane and Stavrunova, 2014). The insurer is constantly at a risk of incurring losses when the insured holds onto crucial information concerning the asset being insured.

2.2.2. Agency Theory

The classical owner-manager agency problem was propounded by Jensen and Meckling, (1976) they described how the owner and the manager relates through the metaphor of a contract. The agency relationship results when one party known as the principal delegate's work or decision-making authority to another party known as the agent. In the insurance industry, insurers receive premiums from the insured and invest the money in financial assets (Cummins & Weiss, 2009), insurance companies in this case are the agents while the insured are the principals. The agency problem arises when the interests of the insured and the insurer diverge, (Hill and Jones, 2001).

The agency theory is based on risk, outcome uncertainty, incentives and it has been used by scholars in accounting, economics, finance, marketing, organizational behavior, and sociology (Arwa, 2010). The main concern for this relationship is to solve two main problems; firstly, the agency problem resulting from a divergence in the goals of the principal and the goals of the agent and secondly a divergence in risk preferences between the two (Eisenhart, 1989). Insurance is the transfer of risk between two parties (the insurer

and the insured), where the insured pays premiums to the insurer who in return agrees to compensate the insured when the insured risk occurs, (Ingram, 2006). The insurer in this case is the agent whom the principal (insured) entrusts with their premiums to invest wisely and for the money to be available to and when the need arises. For this reason, this theory assists in explaining the customer's (insured's) claim experience.

2.2.3. Passive Learning Theory.

The passive learning theory was propounded by Jovanovic (1982). The theory assumes that firms learn-by-doing that is as firms' age, they are perceived to be more efficient. According to Audretsch and Thurik, (2003), the theory presents a model where new firms face unexpected costs that are unique to every firm. The main feature of this theory is that recently formed firms are not aware of their cost function (relative efficiency) at the start but with time learns from their actual post-entry performance. The theory further explains that new firms face a greater degree of uncertainty as compared to older firms in the industry. As insurance firms age, cost and revenue efficient firms realize growth in the volume of premium and survive while the inefficient ones decline and fall due to bad claims experience. This model guided the researcher to include firm size, capital adequacy and risk as variables under study.

2.2.4. Structure-Conduct-Performance "SCP" theory

The SCP theory as propounded by Chamberlin and Robinson, (1933) states that firms with a higher concentration ratio tend to exhibit high degrees in cost and revenue efficiency consequently more profitable. The theory assumes that concentration and profit have a positive relationship, whereby a lowly concentrated market has low competition, as result increased market inefficiency through monopolistic pricing is seen to flourish and excess

(monopoly) profits are realized, (Tetsushi *et al.*, 2012). The theory determines if in an overly concentrated market collusion amid larger firms results in high-level market performance, (Bikker & Haaf, 2002). According to (Cytonn Report, 2016), the Kenyan Insurance market is oligopolistic in nature with a few firms controlling the market share leading to tendencies of collusion amongst the firms which in return negatively affects the consumer (e.g. by setting high prices in order to realize more profit). Murat *et al.*, (2002), suggested that firms with larger market shares have more power as compared to their counterparts with smaller market power and they use this advantage to determine the overall performance of the sector in terms of setting prices.

The SCP theory can be illustrated by two hypotheses; the structure performance hypothesis and the standard hypothesis, the structure performance hypothesis assumes an indirect relationship between market concentration and competition since market concentration allows firms to collude while the standard hypothesis assumes a direct relationship between the two, (Edwards *et al.*, 2005). The theory helps in expounding on the relationship between competition and market share where this study is seeking to evaluate its moderating effect on the relationship between firm characteristics and revenue efficiency of insurance firms in Kenya.

2.3. Empirical Review

In this section, the various empirical studies of importance to this study are reviewed basing on the objectives of the study. This involves the determination and establishment of the relevance of the previous studies on the current study and the identification of the gaps left.

2.3.1. Firm Size and Revenue Efficiency

Abubakar & Haruna, (2018), using a robust regression analysis in their study on the effect of firm characteristics on financial Performance of listed insurance companies in Nigeria, the study revealed that firm size was a determinant of performance. However, the study looked at firm performance while this study looked at revenue efficiency of insurance companies in Kenya.

Wasseja & Mwenda, (2015), analyzed the Efficiency of Life Insurance Companies in Kenya using the DEA-Model. The variables considered were size, age, quoted and line of specialization. Firm size was measured by the natural log of the total assets and results from the regression analysis of the external factors found out that size positively affected efficiency. Large insurers were more efficient than the smaller ones since they enjoyed economies of scale in transactions and profitability. The study concluded that the efficiency of life Insurance companies had been declining over the study period. However, the study did not consider time lags in its methodology.

A study by Kaya, (2015) identified size, age, loss ratio, current ratio, and premium growth rate as firm-specific factors and sought to determine their effect on the profitability of non-life Insurance companies in Turkey. Using the ordinary Least squares regression model, the one-way fixed effects model, and the one-way random effects model for analysis, the study concluded that size had a positive effect on profitability of non-life insurance companies. Kaya, (2015), opined that income volatility is seen to reduce in a large scale of operation in the insurance sector as compared to a smaller scale of operation as result of larger risk pooling therefore insurers should prioritize their growth strategies such as acquisitions and mergers. However, the study looked at profitability while this study

looked at revenue efficiency. Additionally, the study was carried out in Turkey which is a developed economy yet Kenya is a frontier economy therefore there are disparities and contextual gaps.

Sambasivam and Ayele, (2013), sought to determine the performance of insurance companies in Ethiopia for nine years. Using Return on Assets, the study examined the internal factors that affected profitability of insurance firms. The study concluded that growth, leverage, volume of capital, size and liquidity were positively related and the most important determinants of company profitability. The study observed that size and ROA were found to have a positive relationship alluding to the fact that larger firms enjoy economies of scale in transactions and increased profitability. However, except for size, the variables considered by Sambasivam & Ayele, (2013), are different from those this study looked at.

Mahdavi *et al.*, (2011), using DEA, studied the cost efficiency, revenue efficiency and profit efficiency of automobile and parts industry of companies listed in Tehran stock exchange. The study concluded that larger firms were more revenue and profit efficient as compared to their smaller sized counterparts. Mahdavi *et al.*, (2011), posited that, larger firms enjoy scale of economies due to the spreading of fixed production costs over a larger volume of output in addition to the learning effects gained by managers as they operate at a larger scale. However, Mahdavi *et al.*, (2011), did not consider the moderating effect of competition.

2.3.2. Capital Adequacy and Revenue Efficiency

Bochaberi, (2018), determined the effect of Bancassurance on financial performance of commercial banks in Kenya; the key variables under study were bancassurance, firm size, capital adequacy and liquidity. Using a multiple linear regression model, the study concluded that capital adequacy had a positive significant effect on financial performance of commercial banks in Kenya. However, the study concentrated on the financial performance of commercial banks in Kenya while this study looked at revenue efficiency of insurance companies in Kenya.

Pessarossi and Weill (2013), used the Stochastic Frontier Analysis to determine cost efficiency in the Chinese banking sector. The study looked at how capital adequacy requirement relates to efficiency for Chinese banks and concluded that capital adequacy requirements and cost efficiency had a positive relationship. The study showed that capital requirements improved bank efficiency although the degree of this effect was depended on ownership type. The study opined that low capital ratios are perceived to increase the shareholders' urge to take on excessive risk as a result of reduced moral hazard between shareholders and fund providers while a higher capital ratio tends to reduce shareholders' risk shifting tendencies as it acts as a risk control incentive. However, Pessarossi & Weill (2013), used SFA while this study used the two stage DEA.

A study by (Almazari, 2013), determined the relationship between Capital adequacy and profitability. The study obtained secondary data from nine Saudi banks. Using traditional financial ratios and linear regression technique, the study argued that capital adequacy improved bank profitability and minimized the expected financial distress and bankruptcy costs. Almazari, 2013 suggested that capital adequacy enables bankers and regulators to

absorb shocks thus minimizing the chances of bank failures and losses to depositors, on the other hand, banks take excessive risk purely to maximize the shareholders' wealth at the expense of debt holders. However, these studies (Pessarossi and Weill 2013; Almazari, 2013), concentrated on competition in the banking sector using SFA and conventional financial ratios respectively while this study looked at the insurance companies using two stage DEA.

Sentero, (2012), sought to determine the effect of capital adequacy requirements on the efficiency of 43 Kenyan commercial banks for a period of five years. Using DEA, the study suggested that there was a significant relationship between capital adequacy and efficiency. The study further recommended that in order to improve solvency and liquidity, regulators should ensure strict adherence to laid down financial regulations on capital adequacy requirements and that higher regulations may be good for stability, but not necessarily for improved efficiency in the industry. However, the study did not consider time lags.

Malik, (2011), used Return on Assets as a measure of profitability to investigate firm-specific factors that determine the profitability of 34 insurance companies in Pakistan. The study concluded that the volume of capital was positively and significantly related with profitability. Malik, (2011), suggested that capital adequacy promoted the efficiency and stability of a financial system and an important indicator of an insurer's capability to withstand losses from the customers' claims. However, the study used the traditional financial ratios while this study used two stage DEA which is a frontier approach of measuring performance in terms of efficiency.

2.3.3. Claims Experience and Revenue Efficiency

Mbakisi, Batsirai & Tendai, (2017), used factor analysis and multiple linear regression models to determine the factors affecting the performance of insurance companies in Zimbabwe. The variables under study were size of company, claims experience, liquidity and leverage. The study concluded that claims experience had a negative significant effect on insurance performance. However, the study looked at insurance performance while this study looked at insurance revenue efficiency.

Tajudeen & Ajemunigbohun, (2015), using cross sectional survey design investigated the effectiveness, efficiency and promptness of claims handling process within the Nigerian insurance industry. The study mooted that the effective and efficient claims management significantly affected the operational processes in claims management and consequently helped in fraud detection and prevention. However, the study did not look at how the customer's claims experience affected revenue efficiency.

Amoroso, (2011), looked at driving operational excellence in claims management of insurance firms in America. The study opined that it was crucial for insurers to shift their goals from claims handling to efficient claims management. Claims are critical on how the insured and the insurer relate to each other with a firm's success being dependent on the customer's claim experience. However, the study was carried out in a developed economy hence the need of this study to address the issues of a frontier economy.

Kiana, (2010), looked at the challenges in management of general insurance claims in Kenya. Using descriptive statistics, the study observed that weak underwriting standards and fraud are the major areas of concern. Although the study was carried out in Kenya, it

failed to look at the relationship between claims experience and revenue efficiency, using the two stage DEA this study in determined how claims experience affects revenue efficiency of insurance companies in Kenya

Kiarie, (2004), looked at Insolvency and winding up of insurance companies. The study mooted that improper claims management by the insurer and bad customer claims experience may lead to possible insolvency and winding up of insurance companies. However, the study failed to relate the customers' claims experience to revenue efficiency.

2.3.4. Asset Quality and Revenue Efficiency

Lawal, Oluoch & Muturi, (2018), examined asset quality and the operational efficiency in the Nigerian banks. Using descriptive and inferential statistics, the study concluded that asset quality had a positive relation with the operational efficiency of the Nigerian deposit money banks and that unimpaired assets are an incentive to increased revenue in terms of reduced cost/expenses. However, the study examined the banking industry while this study looked at the insurance industry.

Cheruiyot, (2016), looked at the effect of asset quality on profitability of commercial banks in Kenya. Using descriptive statistics, the study concluded that asset quality and profitability of commercial banks in Kenya have a positive relationship. However, the study was on commercial banks in Kenya but not the insurance companies in Kenya.

Kumar & Ghimire, (2013), examined the financial performance of life insurance companies in Nepal basing on the CAMEL Parameters. Using the Debtors/ (gross premium + Reinsurance Recoveries) ratio to determine asset quality, the study concluded that debtors have a negative relationship with the financial performance of Nepal Life insurance firms.

According to the study, higher amounts of debtors implies a weak credit policy one that threatens the solvency position of the firm resulting to liquidity problems. However, the study concentrated on asset quality and the financial performance of life insurance firms in Nepal while this study assessed asset quality and revenue efficiency of insurance firms in Kenya.

2.3.5. Risk and Revenue Efficiency

Deyganto & Alemu, (2019), sought to determine the factors affecting financial performance of insurance companies operating in Hawassa, Ethiopia. Using the ordinary least squares model and the key variables being underwriting risk, premium growth, solvency ratio, growth rate of GDP and inflation rate the study concluded that the underwriting risk had a significant effect on financial performance of insurance companies in Hawassa, Ethiopia. However, the study looked at financial performance of insurance companies while this study looked at revenue efficiency of insurance companies.

Gebremariyam, (2014), examined the effects of firm specific factors and macroeconomic factors on profitability. The study concluded that firm specific factors were negatively related to profitability while the macroeconomic factors were not significant determinants of profitability. The study demonstrated that non-life insurance companies with low underwriting risk were more profitable as compared to those with high underwriting risk. The study opined that excessive risk-taking impacts negatively on the revenue efficiency of insurance firms as a result, insurers that underwrite risky businesses become less profitable as compared to their counterparts with low underwriting risk. However, the study did not consider the moderating effect of competition.

Mehari and Aemiro, (2013), using panel data from nine insurance companies sought to investigate the determinants of performance of insurance companies in Ethiopia. The results of the ordinary least squares regression analysis indicated that risk had a negative and significant influence on financial performance of the nine insurance companies. They observed that insurance business is a risky venture therefore companies in the industry have to put up measures that will reduce their susceptibility to underwriting losses and ensure maximization of returns on invested assets. However, Mehari and Aemiro, (2013) did not consider time lags hence the need for this study.

Curak *et al.*, (2011), using Return on Assets, sought to investigate how firm-specific and economic characteristics affect the Croatian composite insurance companies' financial performance. The panel data analysis, suggested that the underwriting risk positively had influenced the performance of the insurance companies. However, the study was conducted in Croatia which is a developed economy while Kenya is a frontier economy.

2.3.6. Competition and revenue efficiency

Bruce & Odhiambo (2017), examined the Moderating Influence of Industry Competition on the Relationship between Corporate Strategy and Organizational Performance. Using descriptive cross-sectional survey design, the study concluded that industry competition had a significant moderating effect on the relationship between corporate strategy and organizational performance. However, the study concentrated on corporate strategy and organizational performance while this study concentrated on revenue efficiency.

Amue & Igwe, (2014), using both the qualitative method and the quantitative method assessed the Moderating Effects of Competitive Intensity, Endogenous Parameters and

Indirect Effects on Customer Equity and Financial Performance Link from twenty quoted money deposit banks in Nigeria. The findings of the study were that competitive intensity significantly moderated the relationship between customer equity and financial performance. However, the study was based on financial performance of deposit banks in Nigeria while this study was on revenue efficiency of insurance companies in Kenya.

Jeremias, (2006), determined the competitive intensity as a quasi-moderator of the relationship between innovative efforts and performance. The key variables being performance, innovative efforts and competitive intensity. Using HHI, the study results indicated that the relationship between innovative efforts and performance was moderated by competitive intensity. However, the variables under study except for competition are different from those looked at in this study.

2.4. Summary of Literature Review and Research Gaps

Enhanced revenue efficiency ensures improved company profitability and consequently growth and expansion, (Philips *et al.*, 2010). From the reviewed literature, most of the studies focused on developed countries, however this does not apply to Kenya which is a frontier economy. Additionally, they did not consider time lags and competition as a moderator. A close look at previous studies reveals varying results by several researchers with similar variables. This study sought to determine the effect of firm characteristics on revenue efficiency of insurance companies in Kenya. The study considered dynamism, and the moderating effect of competition.

Table 2.1: Summary of Literature Review and Research Gaps

Author(s)	Purpose of Study	Research Findings	Research Gap	How the study filled the gap
Lawal, Oluoch & Muturi, (2018)	Asset Quality and the Operational Efficiency Nigerian banks.	Concluded that asset quality had a positive relation with the operational efficiency of the Nigerian deposit money banks.	Focused on Nigerian deposit money banks	Focused on the Kenyan Insurance companies.
Wasseja and Mwenda, (2015)	To Analyse the Efficiency of Life Assurance Companies in Kenya Using the DEA-Model	Concluded that the efficiency of life Assurance companies had been declining during the study period (2004-2009)	Used DEA model and the variables under study were size, age, quoted and line of specialization	Used two stage DEA and the variables were size, Claims experience, capital adequacy, asset quality, risk.
Kaya, (2015)	To determine the Effects of Firm-Specific Factors on the Profitability of Non-Life Insurance Companies in Turkey	Suggested that size, age, loss ratio, current ratio, and premium growth rate affected profitability.	Carried out in Turkey which is a developed economy and did not consider the moderating effect of competition	Focused on the Kenyan insurance firms incorporating competition as a moderating variable.
Tajudeen & Ajemungbohun, (2015)	To determine the Effectiveness, Efficiency and Promptness of Claims Handling Process within the Nigerian Industry	Opined that, effective and efficient claims management significantly affected the operational processes in claims management and assisted in fraud detection and prevention	Focused on claims management	Focused on claims experience and how it affected revenue efficiency
Kaguri, (2013)	To determine the relationship between firm characteristics	Opined that the variables under study had a statistical influence on the financial performance	Used SPSS and concentrated on financial performance of life	Used two stage DEA to evaluate firm characteristics

	and financial performance of life insurance companies in Kenya	of life insurance companies	insurance companies	and revenue efficiency.
Mehari and Aemiro, (2013)	To establish Firm specific factors that determine insurance companies' performance in Ethiopia.	Concluded that Loss ratio negatively affects performance of insurance companies in Ethiopia.	Investigated on firm specific characteristics and performance of Ethiopian insurance companies.	Looked at firm characteristics and revenue efficiency on Kenyan insurance companies.
Mahdavi <i>et al.</i> , (2011)	To investigate cost, revenue and profit efficiency: The case of Iranian companies	Larger firms were found to be more revenue and profit efficient as compared to their smaller sized counterparts.	The study determined the relationships between size, operating costs, profitability, asset turnover ratio and different efficiency measures using DEA	Investigated size, capital adequacy, asset quality, risk, Claims experience and competition on revenue efficiency using two stage DEA

Source, Researcher, 2019

2.5. The Conceptual Framework

A conceptual framework assists the reader to comprehend how the variables under study relate to each other at a glance, (Mugenda and Mugenda, 2003).

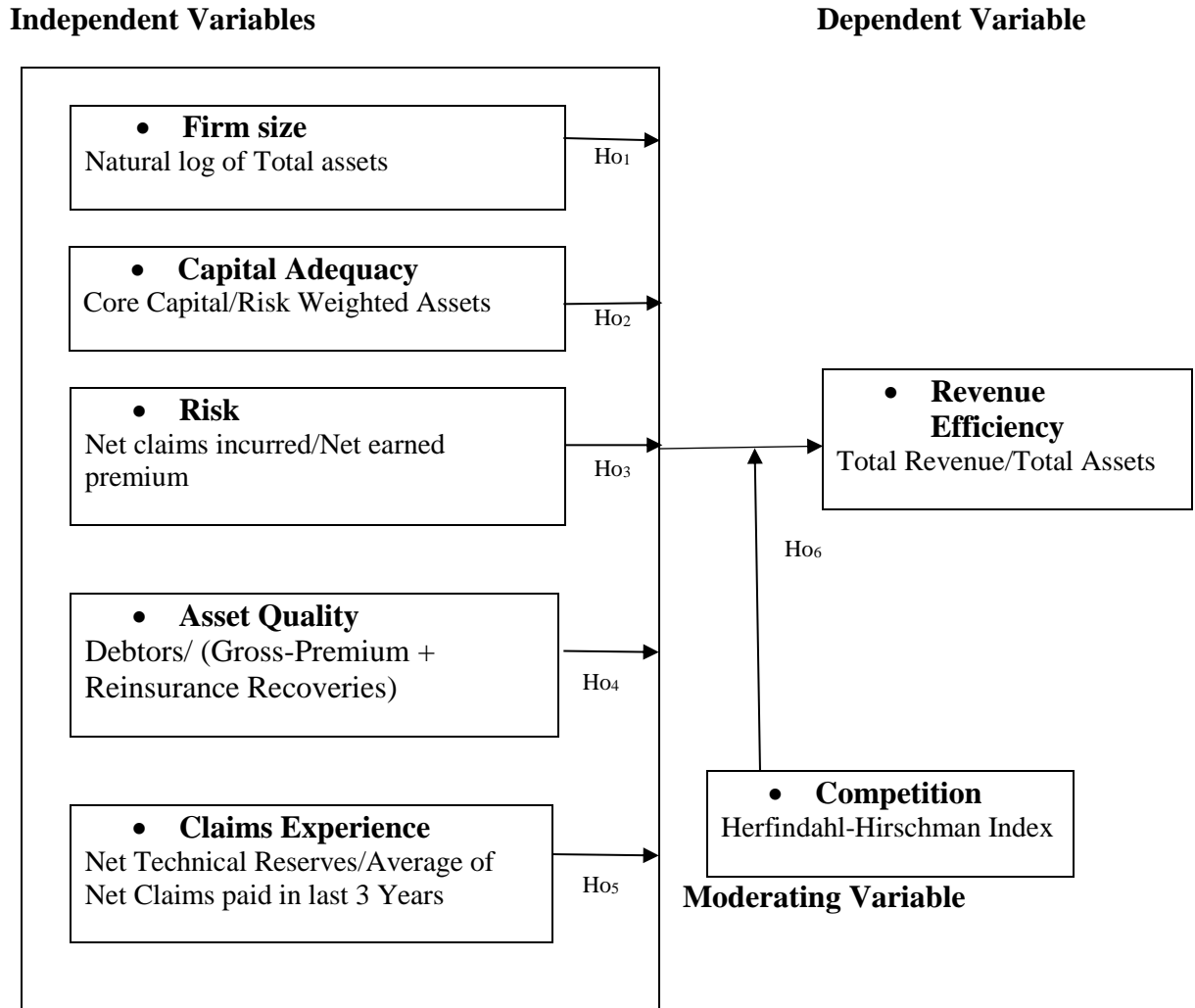


Figure: 2.1: Conceptual Framework

Source, Researcher, (2019)

From figure 2.1 above, Firm size was expected to have a positive effect on revenue efficiency since larger firms have better technology and are more diversified as compared to smaller firms, (Mahdavi *et al.*, 2011). Capital Adequacy as measured by the CAR is a measure of managements' risk preference and was expected to have a positive effect on

revenue efficiency, (Pessarossi and Weill, 2013). Risk was expected to have a negative relationship with revenue efficiency, (Mehari and Aemiro, 2013). Claims Experience as measured by the survival ratio was expected to have a negative relationship with revenue efficiency, (Asokere & Nwankwo, 2010). Competition was expected to have a positive effect on revenue efficiency. The Kenyan insurance industry is perceived to be oligopolistic in nature with a greater concentration of market share in a small number of firms, (Cyttonn Report, 2015; Gitau, 2013), therefore the HHI was expected to be high meaning that with all other factors held constant, competition in the market will be weak. The greater the competition in the industry, the greater the efficiency in the insurance firms.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1. Introduction

The chapter details research procedures and methods used during the study. The chapter includes the research design adopted, research philosophy, empirical model, operationalization and measurement of variables, sampling design adopted, the data collection procedure used and finally data instrument and presentation.

3.2. Research Philosophy

This research embraced the positivism philosophy. Research philosophy is crucial in the advancement of the research background and research knowledge (Saunders *et al.*, 2007). Research philosophy can be classified either as positivism or realism or interpretive philosophy, (McNabb, 2008). Positivism philosophy is an extremely structured methodology that assesses the result with the help of statistical methods, it recognizes objective reality. Positivism philosophy embraces a quantitative perspective to examine a case while the post-positivism is inclined on the in-depth examination of a phenomena from a qualitative approach, (Crossan, 2003).

3.3. Research Design

The study adopted a causal research design. A research design is an operational plan used by the researcher to ensure the research questions are validly, objectively and accurately answered, (Kumar, 2005; Kothari, 2004). This research adopted a causal research design since it is associated with greater levels of validity as it involves an in-depth analysis of a situation in order to explain the patterns of relationships between variables through systematic selection of subjects, (Saunders *et al.*, 2012)

3.4. Empirical Model

The study used the two stage Data Envelopment Analysis. The rationale behind the use of DEA by this study to measure revenue efficiency is; First there is no need of making assumptions on the production or cost function and the error terms, this acts to reduce the chances of potential estimation bias resulting from model misspecification (Xie, 2010; Sinha and Chatterjee, 2007; Popovic and Martic, 2005); Second using linear programming techniques, DEA determines efficiency of DMUs under study using the input and output variables without prior knowledge of how the variables relate to each other, (Charnes *et al.*, 1978); Third DEA produces a single measure of efficiency for a group of DMUs under study by optimally weighting the inputs and outputs irrespective of their number and establishing a best practice among a set of DMUs, then takes a comparison of all the DMUs under study in relation to the best practice and shows the degree of inefficiencies and possible improvements for the inefficient DMUs (Abel and Le Roux, 2016; Yang, 2006). Finally, DEA is appropriate in case of a small sample, (Kamarudin *et al.*, 2014). This study used the two stage DEA model as proposed by Banker and Natarajan, (2008a), whereby the efficiency scores obtained in stage one were regressed in the second stage using the ordinary least squares to determine their effect on revenue efficiency as below:

3.4.1. Stage one: Determination of Revenue Efficiency

Two models have been developed in the DEA methodology; Constant Returns to Scale, (Charnes, *et.al*, 1978) and Variable Returns to Scale, (Banker, *et.al*, 1984). The Constant Returns to Scale (CRS) model assumes that there is no significant relationship between the scale of operations and efficiency therefore it gives the overall technical efficiency (OTE). That assumption is viable when all the DMUs operate at an optimal scale otherwise the

computed measures of technical efficiency will be contaminated with scale efficiencies, (Sufian, 2007). The Variable Returns to Scale Model measures pure technical efficiency (PTE), which is the measurement of technical efficiency, free from the scale efficiency effects, (Seiford, 1996).

The study adopted the DEA models presented by (Cook & Seiford, 2009, Sufian, 2007). Assuming n insurance companies ($i=1, \dots, n$), based on a vector of y outputs with s elements (y_1, y_2, \dots, y_s) and a vector of x inputs with m elements (x_1, x_2, \dots, x_m), the problem is specified as a mathematical problem below to necessitate the choice of an optimal weight;

$$\begin{aligned}
 \text{Max}_{u, v} \theta = \frac{\sum_{r=1}^s u_r y_{rj}}{\sum_{i=1}^m v_i x_{ij}} \dots \dots \dots (3.1) \quad \text{Subject to;} \quad & \frac{\sum_{r=1}^s u_r y_{rj}}{\sum_{i=1}^m v_i x_{ij}} \leq 1 \quad \forall j = 1 \dots n \\
 & u_1 \dots u_s \geq 0 \\
 & v_1 \dots v_m \geq 0
 \end{aligned}$$

Where; u – Vector of weights on the outputs (Total Revenue)

v – Vector of weights on the inputs (Total Assets)

The objective of the DEA program is to determine the u and v that maximizes θ subject to program constraints, (Sufian, 2007). The weight vectors u and v that maximize the ratio of the weighted average outputs to the weighted average inputs for the first insurance firm are determined first, (Athanasopoulos & Shale, 1997). The first condition constrains the maximum efficiency (θ), so the program initially selects weights u and v which produce an efficiency of one, (Avkiran, 1999). This first potential vector of weights for the first insurance company is applied to all other insurance companies in the study. As with the

first insurance company, the efficiency for the remaining 26 insurance companies is also constrained to be one or less. If these weights yield a calculated efficiency greater than one for any insurance firm, u and v weights are rejected and the program selects another set of weights and starts the process again, (Cook & Seiford, 2009).

The program repeatedly tests different weighting schemes against the other insurance firms until a set of weights that maximizes θ for the first insurance firm is selected while not yielding a calculated efficiency greater than one for any other insurance firm. This insurance-specific set of weights u and v are used to calculate the efficiency score for the first insurance firm. The DEA program then repeats the same procedure with the second, third and all the remaining twenty-three firms until all the DMU-specific weights and corresponding efficiency scores for each of the n insurance companies have been calculated (Sufian, 2007). The efficiency scores range from zero to one where observations with a value of one are on the efficient frontier.

3.4.2. Stage two: Dynamic Panel Regression Model

Stage Two involved the determination of the potential effect of firm size, capital adequacy, risk, asset quality, claim experience and competition as a moderating variable on the revenue efficiency score obtained in stage one using the dynamic panel regression model as follows:

A panel regression model is based on panel data; these are observations on the same individual unit over several time periods. The relationship between the dependent variable Y and the independent variables Xs is given by:

$$Y_t = Y_{t-1} + \beta_1 X_{1t} + \beta_2 X_{2t} + \dots \beta_n X_{nt} + \varepsilon \dots \dots \dots (3.2)$$

In this study, the Xs are replaced by Firm size, Capital Adequacy, asset quality, Risk, Claims Experience and Competition as a moderating variable. The study sought to determine the effect of firm characteristics on revenue Efficiency of insurance companies in Kenya.

The basic model provides a direct relationship between the independent variables and revenue efficiency as below;

$$RE_{it} = RE_{it-1} + \beta_1 FS_{it} + \beta_2 CA_{it} + \beta_3 R_{it} + \beta_4 AQ_{it} + \beta_5 CE_{it} + \varepsilon \dots\dots\dots (3.3)$$

The Model with Moderation is as below;

$$RE_{it} = RE_{it-1} + \beta_1 FS_{it} + \beta_2 CA_{it} + \beta_3 R_{it} + \beta_4 AQ_{it} + \beta_5 CE_{it} + \beta_6 FS * H_{it} + \beta_7 CA * H_{it} + \beta_8 R * H_{it} + \beta_9 AQ_{it} * H + \beta_{10} CE * H_{it} + \varepsilon \dots\dots\dots (3.4)$$

Where:

<i>CA</i>	Capital Adequacy	<i>RE_{it-1}</i>	One year lagged Revenue Efficiency of firm i
<i>AQ</i>	Asset Quality	<i>FS</i>	Firm Size
<i>CE</i>	Claims Experience	β_1, \dots, β_n	Regression coefficients
<i>H</i>	Competition	ε	The residual error of the regression
<i>R</i>	Risk	<i>I</i>	Number of insurance companies
<i>RE_{it}</i>	The Revenue Efficiency Measure	<i>T</i>	Time Period

The Herfindahl-Hirshman Index of Competition will be determined by the following;

$$H = \sum_{i=1}^n MS_i^2 \dots\dots\dots (3.5)$$

Where: MS = Market Share of company *i*

n = Number of insurance firms in the industry.

The market share can be measured on the basis of either total assets or premium revenue or premium income plus investment income, and the value of HHI tends to zero for an

industry with a very large number of small firms and a higher value of about 10,000 for a monopolistic industry, (Murat *et al.*, 2002). This study intends to use total assets as a measure of market share.

3.4.3 Operationalization and Measurement of Variables

The study intended to establish which among the variables had a statistically significant effect on revenue efficiency of insurance companies in Kenya.

Table 3.1: Operationalization and Measurement of Variables

Variable	Type	Operationalization	Measurement	Hypothesized direction
Revenue Efficiency	Dependent	The attainment of maximum output with the available resources.	Total Revenue/Total Assets	Positive/ negative
Firm size	Independent	A measure of Total Assets owned by a firm.	Natural log of Total assets	Positive /Negative
Capital Adequacy	Independent	A measure of the available capital in relation to the minimum required capital	Core Capital/Risk Weighted Assets	Positive/ Negative
Claims Experience	Independent	A measure of insurance survival	Net Technical Reserves/Average of Net Claims paid in the last 3 years.	Positive/ Negative
Asset Quality	Independent	A measure of the credit risk associated with an asset	Debtors/Gross-Premium+ Reinsurance Recoveries	Positive/ Negative
Risk	Independent	A measure of the underwriting risk	Net claims incurred / Net earned premiums	Positive/ Negative
Competition	Moderating	A measure of the market concentration	Herfindahl-Hirschman Index	Positive/ Negative

Source, Researcher, (2019)

3.5. Target Population

For a clear analysis of the insurance market in Kenya the target population was the 27 insurance companies that have consistently been in operation throughout the study period 2008 to 2017 and registered by the IRA, excluding the new entrants and the firms that exited during the study period. (See Appendix IV)

3.6. Sampling Design

In order to achieve a balanced panel Data, the study took a census of all the 27 insurance companies that have consistently been in operation throughout the period under consideration and registered by the IRA. Therefore, the unit for analysis was the insurance industry. A census is recommended if practical as it reduces the sampling errors, (Saunders *et al.*, 2009). In this case, secondary data was readily available from the IRA annual reports for all the 27 insurance companies from 2008-2017, thus supporting the use of a census. The study period of ten years was assumed to be sufficient in achieving the objectives of this study for five years and above is assumed to be the best timeframe for carrying out research in finance, (Abate, 2012).

3.7. Data Collection Procedure

Secondary data from 27 insurance companies in Kenya for a period of 10 was used, translating into 270 data observations. The data was obtained from the insurance companies audited financial statements as presented to IRA for the period 2008-2017. A desk review of the audited financial statements for the period was carried out. Secondary data is perceived to be convenient, accessible and easily available, (Ghauri & Gronhaug, 2002). Panel data as opposed to cross sectional data was preferred since each firm was observed severally over a period of time consequently a better analysis of revenue efficiency was

realized, (Wasseja and Mwenda, 2015). In order to boost accuracy, reliability and suitability of the data during the collection process a data collection schedule was drawn and used, (See Appendix I)

3.8. Data Analysis and Presentation.

Data analysis is carried out to convert data into a more suitable form for use, (Field, 2005). Before analysis was carried out, the variables were first converted into their ratio formats. The study used both descriptive and inferential statistics for data analysis while data presentation was in form of statistical graphs and tables. Descriptive statistics (mean, median, kurtosis, standard deviation and skewness) determined the general pattern and distribution of the data. Inferential statistics tested the effects of different variables in combination with other variables, (Brooks, 2008). Inferential statistics involved correlation analysis and two stage DEA; stage one involved the determination of the companies' revenue efficiency scores for the years 2008 to 2017 using data envelopment analysis, (See Appendix II). In Stage two, efficiency scores obtained in stage one being used as dependent variables were regressed on the firm characteristics. The mathematical linear programming problems were solved using the DEA Computer Program Version 2.1 while the pooled data forming the dynamic panel model was incorporated into STATA 14.

3.9. Diagnostics Tests

The basic assumptions to consider when using DEA are that the random errors in the DMU's efficiency scores are normally distributed, identically distributed and independent, (Kumbhakar & Lovell, 2000). A model with a Lagged Dependent Variable generates biased estimates if the model residuals are strongly correlated thus the need to test for autocorrelation, (Achen, 2000). Greene, (2003) states that nonstationary data leads to

incorrect estimates while using OLS with LDV and instead other techniques of cointegrated data should be used thus a need to carry out the test of stationarity.

3.9.1. Tests for Normality

Brooks, (2008), suggested that before conducting hypothesis test on a model, the assumption of normality must be realized. The study used the Bera-Jarque (BJ) test to determine departures from normality. The BJ test applies the property of a normally distributed random variable characterized by the first two moments that is mean and variance, (Wooldridge, 2002). The histogram will be bell-shaped in case of normally distributed residuals and the BJ statistic would therefore not be significant, (Greene, 2008). If the p-value is bigger than 0.05 do not reject the null of normality at the 5% level. Statistical tests will be inaccurate in case of non-normality but for large sample sizes violation of normality assumption is inconsequential and there is no direct answer on what has to be done if the disturbances are not normally distributed (Greene, 2002).

3.9.2. Autocorrelation

This is a mathematical representation for calculating the correlation and independence between two different time series, that is, its original form (t) and lagged (t-1) or more time periods (t-n), (Greene, 2008). Serial correlation occurs among error terms when a DMU's error in one period is correlated with its errors in other time periods, (Baltagi, 2008). The autocorrelation test determines the existence of correlation between trouble errors in the period t with an error in the period t-1 in a linear regression model, (Greene, 2002). The study used the wooldrige test for autocorrelation in panel data. If the results of the test indicate that some or all of the independent variables are highly correlated, the regression model will be unable to untangle its separate explanatory effects on the dependent variable

consequently, the model will have problems in isolating its separate influences, (Brooks, 2008). To remedy this, the study will be forced to use lagged values of both the explanatory variables and the dependent variable, (Gujarati, 2003)

3.9.3. Heteroscedasticity

Refers to errors that violate the assumption of homoscedasticity that is errors do not have a constant variance, (Brooks, 2008). Heteroscedasticity is more common in cross sectional data. It results from either omission of some important variables making the error term systematic that is the error term will change as the omitted variable changes or due to skewness in the distribution of one or more regressors in the model or the presence of outliers or averaging data or errors of measurement which increase as the dependent variable increases as it checks for consistency and reliability in the data collection process, (Halcoussis, (2005); Kumbhakar, (2000)). To establish if the errors are identically distributed, a Heteroscedacity test across the DMU's using the white's test was carried out, disregarding heteroscedasticity will lead to misleading inferences, (Greene, 2008; Gujarati, 2003). If heteroscedasticity was present, the study would have used a logarithmic transformation which has the effect of compressing the scales in which the variables are measured and the coefficients are interpreted as percentages, (Tsay, 2000).

3.9.4. Unit Root Test

This test determines whether a time series variable is non-stationary. It is a general assumption that time series data is stationary, a stationary series exhibits constant mean, constant variance and constant autocovariances (Gujarati, 2003). The Hadri Lagranger Multiplier test was used. If the test confirms stationarity in the time series data, the

equations will be estimated using regression analysis, otherwise using them as they are will result into misleading inferences due to spurious regressions (Granger and Newbold, 1974)

3.10. Ethical Considerations

Approval was sought from Kenyatta University, National Commission for science, technology & Innovation (NACOSTI) and also the consent of the IRA whose data was used in the study. Data sources were clearly indicated within the document and where data modification if necessary was indicated and clearly explained.

CHAPTER FOUR: RESEARCH FINDINGS

4.1. Introduction

This chapter provides the research findings and their interpretations. The results were presented in tables and graphs.

4.2. Descriptive Statistics

Table 4.1 shows the summary statistics of the variables included in the model with their: minimum, maximum, mean, standard deviation, skewness, kurtosis and the jarque bera test of normality. Mean locates the centre of the relative frequency distribution; standard deviation shows the dispersion in a series, skewness measures either negative or positive symmetry of a distribution around its mean whilst kurtosis gives the peakedness of the distribution.

Table 4.1: Summary of Descriptive Statistics

	Revenue Efficiency	Capital Adequacy	Firm Size	Asset Quality	Claims Experience	Risk	Competition
Minimum	0.096	0.000	12.740	0.10	-0.040	0.010	1515
Maximum	1.00	0.900	19.260	0.87	86.70	1.880	2094
Mean	0.944	0.084	15.075	0.333	0.619	0.568	1740
SD	0.076	0.811	1.194	0.155	5.526	0.191	153
Skewness	0.000	0.000	0.000	0.168	0.000	0.000	0.000
Kurtosis	0.000	0.000	0.639	0.229	0.000	0.000	0.84
Jarque Bera	101.25	101.25	62.7111	87.652	101.25	101.25	52.488
Prob.	0.000	0.000	0.0006	0.1857	0.000	0.000	0.000
Obs.	270	270	270	270	270	270	270

Source, Research Data, 2019

From table 4.1, the results showed that capital adequacy had a minimum of 0.0, this is an indicator that some insurance companies were not adequately capitalized and were unable

to meet the minimum capital ratios as required by the IRA, (Cytonn Report, 2019). Capital Adequacy had a mean of 0.084; Firm Size a mean of 15.075, Asset Quality had a mean of 0.333 while Claims Experience, Risk and Competition had a mean of 0.619, 0.5681 and 1740 respectively. Analysis of skewness shows that with the exception of asset quality, which was skewed to the right, all the variables had zero skewness implying they are symmetric around their means. Competition and firm size were the most highly peaked compared to other variables, Kurtosis values reveal that all the variables follow a Platykurtic distribution.

Jarque-Bera test determines if the series is symmetric around its mean, it measures the difference of the skewness and kurtosis of the series. The null hypothesis for this test is that the variables are normally distributed and would lead to a bell curved distribution. Jarque-Bera test for normality shows that Capital Adequacy ($P = 0.000$), Firm Size ($P = 0.00$), Claims Experience ($P = 0.0006$), Risk ($P = 0.000$), and Competition ($P = 0.000$) are not normally distributed since their p-value were smaller than 0.05 at 95% confidence level, the residuals are not normally distributed which would lead to model bias (Jarque and Bera, 1980). Asset Quality ($P = 0.1857$) was found to be normally distributed. Brooks, (2008) recommends sticking to OLS in case of non-normality since for sufficiently large samples violation of normality is inconsequential.

4.3. Time Series Graphs and Trends of the Variables

The variables exhibit an upward general trend except for Claims Experience and capital adequacy which reflects an autogressive trend.

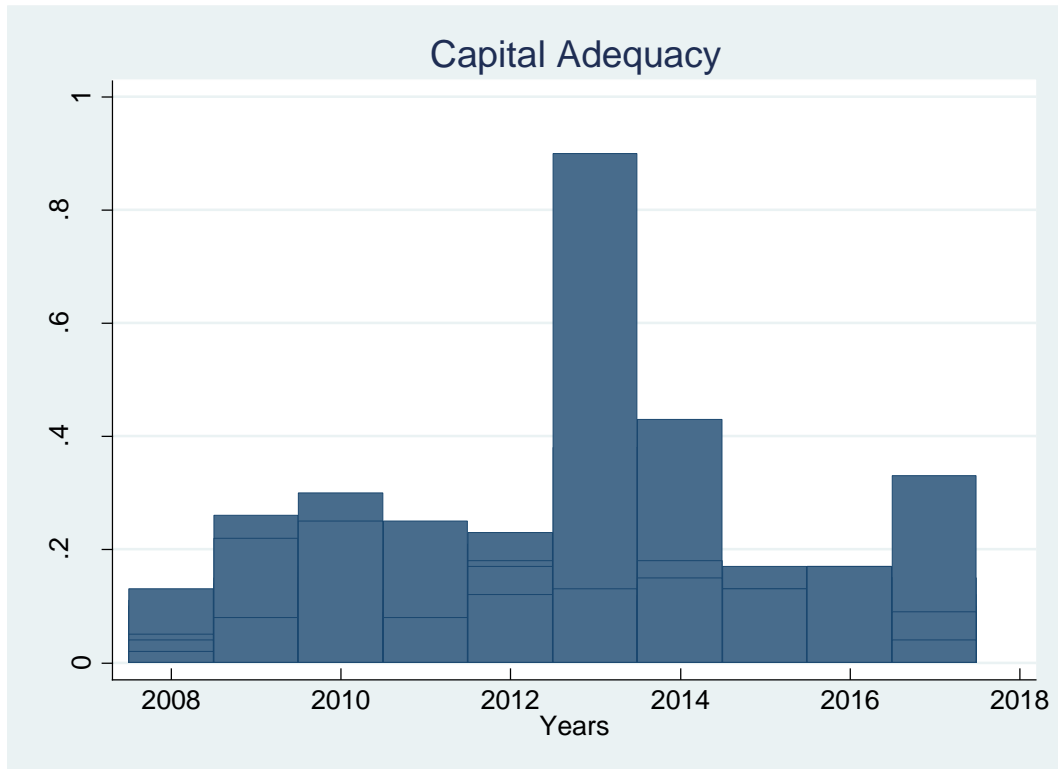


Figure 4.1: Trends in Capital Adequacy

Source, Research data, 2019

Capital Adequacy as shown in figure 4.1 exhibits a random trend and is seen to peak in 2013 this is occasioned by a dramatic change in the capital structure in the industry by the introduction of the Risk Based Capital (RBC) regime by the IRA and an increase in the minimum capital requirement each insurer is expected to hold. The introduction of the RBC regime is meant to support the implementation of the risk-based supervision framework that was introduced in the year 2008

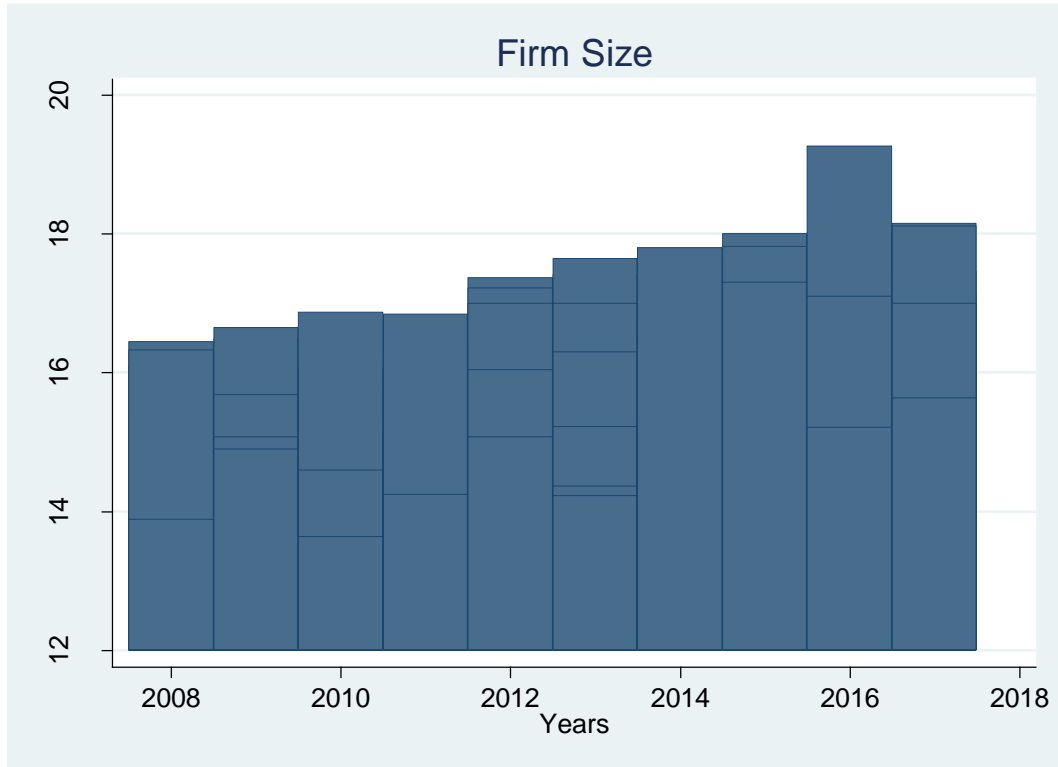


Figure 4.2: Trends in Firm size

Source, Research data, 2019

From figure 4.2 we conclude that there has been a steady growth in the insurance industry firm size. IRA Reports, (2017) attributes this steady growth in firm size to increased mergers and acquisitions from both foreign and local investors due to the attractiveness of the Kenyan insurance industry and the legal provision that no one individual should own more than 25% of the share capital of an insurance company.

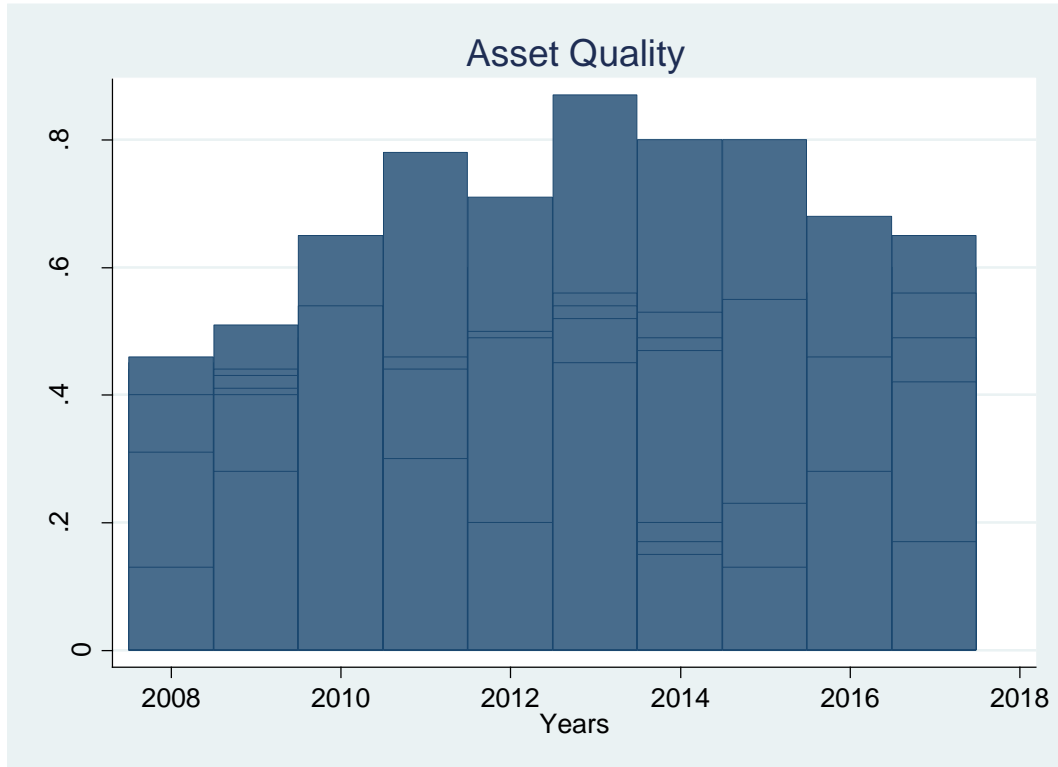


Figure 4.3: Trends in Asset Quality

Source, Research data, 2019

Figure 4.3 shows that the trend in Asset Quality throughout the study period was stable with minimum or slight upward and downward movements. This might be attributed to unstable and unreliable weak credit policies by the insurance companies under study. Strong credit policies translate into a decline in the risk of defaulting by the debtors consequently a reduction in the size of debtors held by a company, (Kumar & Ghimire, 2013).

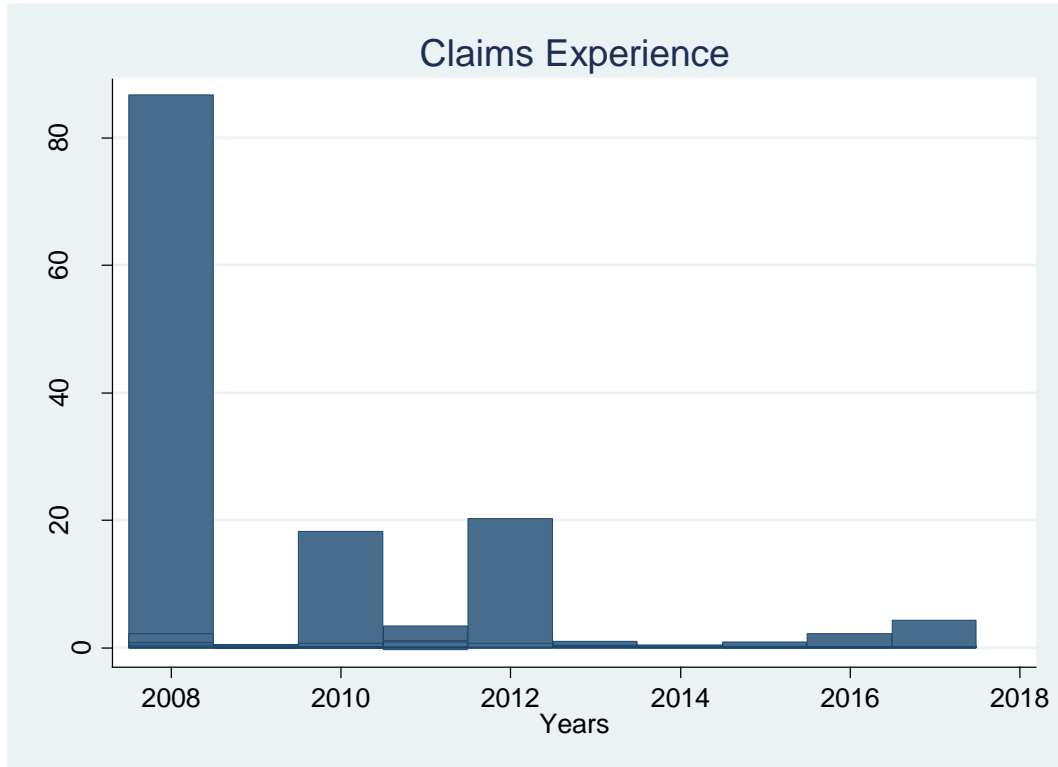


Figure 4.4: Trends in Claims Experience

Source, Research data, 2019

From figure 4.4, Claims Experience has been on a downward trend from 2008 throughout the study period to 2017. This implies that the speed, accuracy and effectiveness of processing a customer's claim by the insurance companies have been worsening from 2008 to 2017. The sharp decline in Claims Experience can be attributed to the fact that despite the growth in the insurance industry, most firms are turning away clients and failing to pay claims as a result of mismanagement of their finances but not delayed premiums, (BIAK, 2017)

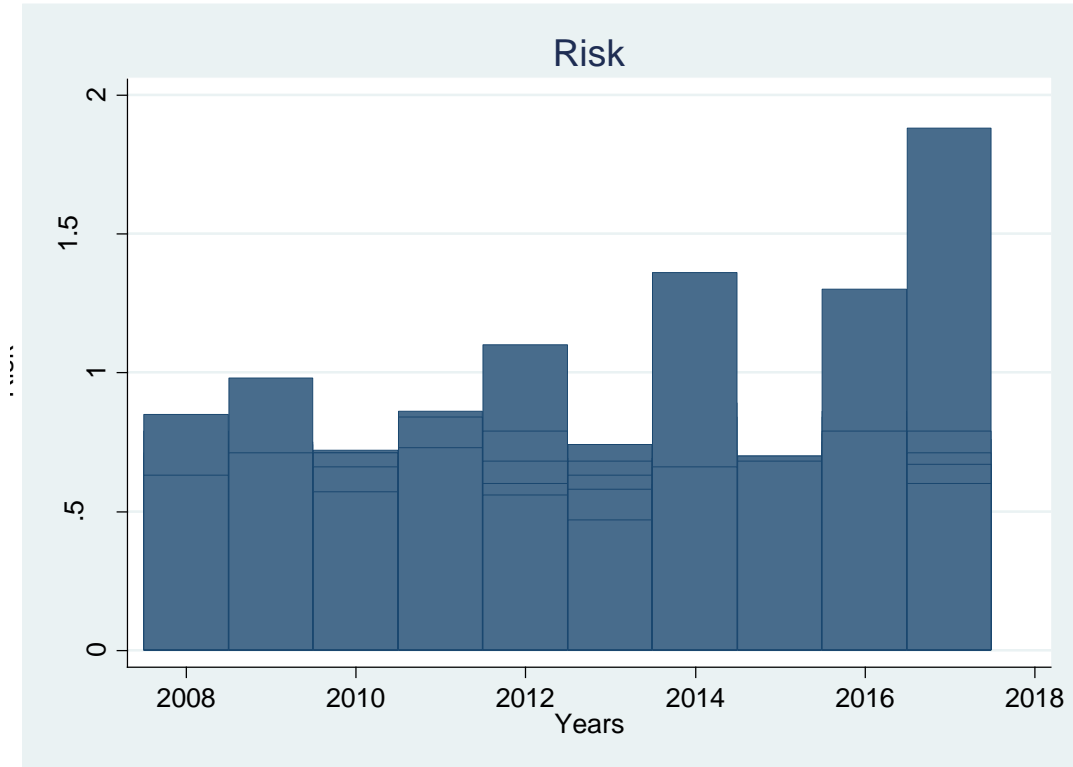


Figure 4.5: Trends in Risk

Source, Research data, 2019

From figure 4.5 above, risk is on a zigzag trend throughout the study period with an increase in the year 2017. This unstable trend might have been caused by the absence of strong policies on insurance risk leading to a surge in the number of fraud cases occasioned by fake and or exaggerated insurance claims, (KPMG, 2015). The fraud cases might even be higher than documented because of the unreported cases and medical insurance covers, where hospitals double or even triple the cost of medication for patients with insurance covers, (BLAK, 2017).

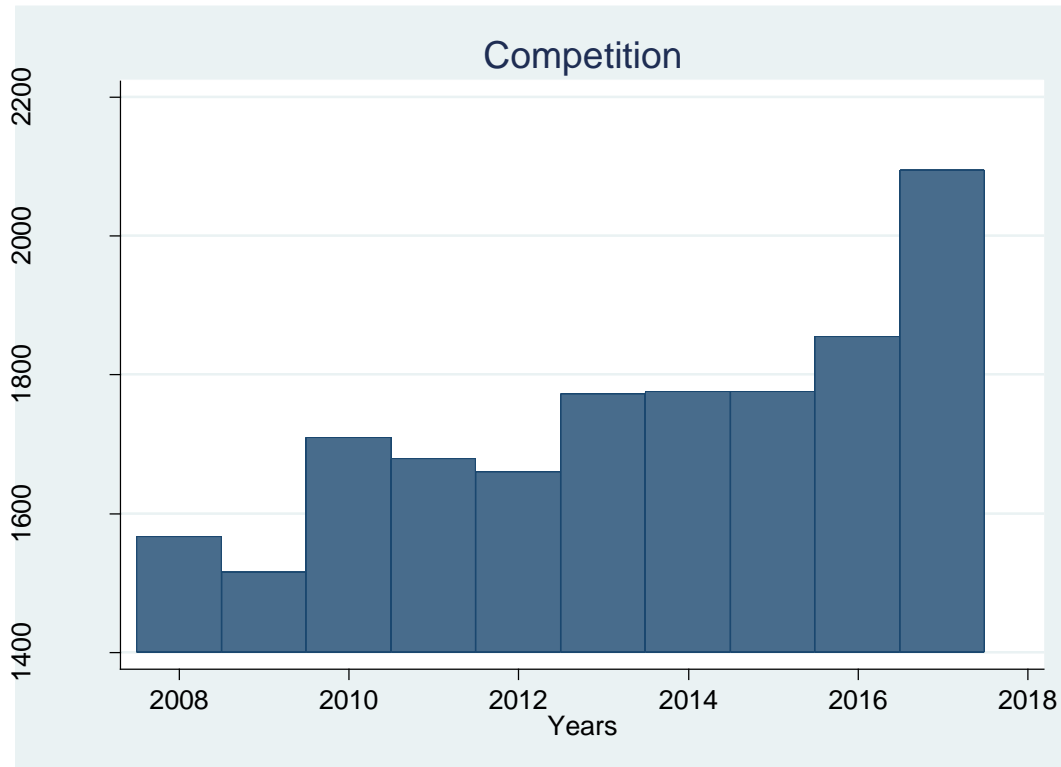


Figure 4.6: Trends in Competition

Source, Research data, 2019

Figure 4.6 reveals that Competition in the insurance industry is on an upward trend during the study period, picking in the year 2017. According to (AIB Capital Ltd Report, 2017), this is attributed to a low insurance penetration standing at 2.7% in 2017 which led to relentless competition amongst the insurance companies to win these markets.

4.4. Correlation Analysis

The descriptive analysis and the time series trends above pointed out the feasible problems likely to be faced in the inferential analysis but there was need to carry out statistics with a more intuitive quantitative analysis. The correlation matrix helped in determining which independent variables best explained the movement in the dependent variable and the

strength and nature of association. The study used the Pearson correlation at 5% significant level to determine the relationship between variables as shown in table 4.2.

Table 4.2: Pearson Correlation Matrix

	revenue~y	capita~y	firmsize	assetq~y	claims~e	risk	compet~n
revenueeff~y	1.0000						
capitalade~y	0.1663* 0.0062	1.0000					
firmsize	-0.3037* 0.0000	-0.0575* 0.3466	1.0000				
assetquality	-0.0498* 0.4152	0.1458* 0.0165	-0.4603* 0.0000	1.0000			
claimsexpe~e	0.0605* 0.3220	-0.0233 0.7030	-0.1372* 0.0241	-0.0010 0.9868	1.0000		
risk	-0.1521* 0.0123	-0.0261 0.6694	0.2679* 0.0000	-0.1644* 0.0068	-0.2146* 0.0004	1.0000	
competition	0.0147 0.8098	0.0149 0.8070	0.3289* 0.0000	0.0872* 0.1530	-0.0764* 0.2108	0.0899* 0.1406	1.0000

Source: Research data, 2019

Table 4.2 reveals the existence of a negative non-significant relationship between the Revenue Efficiency and Asset Quality ($\rho = -0.0498$, $P = 0.4152$). A positive non-significant relationship between Revenue Efficiency and Claims Experience ($\rho = 0.0605$, $P = 0.3220$); Competition ($\rho = 0.0147$, $P = 0.8098$). A positive significant relationship was established with Capital Adequacy ($\rho = 0.1663$, $P = 0.0062$) while a negative significant relationship was established with Firm Size ($\rho = -0.3037$, $P = 0.00$); and Risk ($\rho = -0.1521$, $P = 0.0123$). The correlation coefficient values of the independent variables as reflected in table 4.2 above are all less than 0.3. Although the Pearson Correlation reveals

the strength of a linear relationship between two variables, it fails to completely characterize the relationship, thus, the need for a unit root test, (Babak, 2012)

4.5. Unit Root Test

In data analysis, it is crucial to know whether a series contains a unit root (not stationary) or stationary. It is a general assumption that time series data is stationary, that is, constant mean, constant variance and constant autocovariances, (Gujarati, 2003). The study used the Hadri Lagrange Multiplier unit root test and the results are as shown in the tables below:

4.5.1. Hadri Lagrange Multiplier test

This was carried out by first testing at levels then at first differences; if the test rejects the H₀ at levels but fails to reject at 1st differences then the series contains one-unit root. The constant term and trend were included whilst the lags were automated. Table 4.3 and 4.4 below shows the results of Hadri LM both at levels and at first difference respectively; at levels the unit root test rejects the null hypothesis, however at first difference the test fails to reject the null hypothesis at 1%, 5% and 10% critical values.

Table 4.3: Hadri LM Results: At Levels

Variable	Test Statistic	P-value	Stationarity
Revenue Efficiency	1.4259	0.0770	YES
Capital Adequacy	-0.0526	0.5210	YES
Firm Size	19.3143	0.0000	NO
Asset Quality	9.7029	0.0000	NO
Claims Experience	5.9058	0.0000	NO
Risk	6.7821	0.0000	NO
Competition	18.7680	0.0000	NO

Source: Research data, 2019

Table 4.3 shows that all the variables except for revenue efficiency and Capital Adequacy were not stationary at levels; Revenue Efficiency($P=0.0770$), Capital Adequacy ($P=0.5210$), the p-value is greater than the critical values at 1%, 5% while Firm Size ($P=0.0000$), Asset quality ($P=0.0000$), Risk($P=0.000$) and Competition($P=0.0000$), were not stationary at levels since the Hadri LM test values were smaller than the critical values at 1% and 5% in absolute terms.

Table 4.4: Hadri LM results: At differences

Variables	Test Statistic	p-value	Stationary
Revenue Efficiency	-3.8302	0.9999	YES
Capital Adequacy	-3.3650	0.9996	YES
Firm Size	-3.0496	0.9989	YES
Asset Quality	-1.4773	0.9302	YES
Claims Experience	0.9977	0.1592	YES
Risk	-2.5493	0.9946	YES
Competition	-0.3387	0.6326	YES

Source, Research data, 2019

Results from table 4.4 reveals that all the variables were stationary at 1%, 5% and at 10%. Hence, we fail to reject the null hypothesis of all the panels are stationary; furthermore, the data was also converted to natural logarithms.

4.6. Testing for Autocorrelation

It is necessary to test for serial correlation when using dynamic panel methods to avoid the problem of biased standard errors resulting to less efficient estimates in case serial correlation is present, (Drukker, 2003). The study used the Wooldridge Drucker test for autocorrelation in panel data as shown below:

Table 4.5: Result for Serial Autocorrelation Test

```

Wooldridge test for autocorrelation in panel data
H0: no first-order autocorrelation
      F( 1,      26) =      2.029
      Prob > F =      0.1662

```

Source, Research Data, 2019

The result in table 4.5 shows that the p value is more than 0.05 ($P=0.1662$) therefore we fail to reject the null hypothesis, which means there is no serial correlation in the standard errors.

4.7. Heteroscedasticity Test

Heteroscedasticity refers to the errors that violate the assumption of homoscedasticity, (Brooks, 2008). Disregarding heteroscedasticity leads to misleading inferences, the whites test of Heteroscedasticity was used and the results are as shown below:

Table 4.6: Heteroscedasticity Test

```

White's test for Ho: homoskedasticity
      against Ha: unrestricted heteroskedasticity

      chi2(27)      =      3.93
      Prob > chi2  =      1.0000

```

Cameron & Trivedi's decomposition of IM-test

Source	chi2	df	p
Heteroskedasticity	3.93	27	1.0000
Skewness	2.01	6	0.9192
Kurtosis	1.02	1	0.3117
Total	6.96	34	1.0000

Source, Research data, 2019

From table 4.6, ($P = 1.000$) at 5% significant level, therefore we fail to reject the null thus the errors do not violate the assumption of homoscedasticity.

4.8. Dynamic Panel Regression Analysis

The first empirical analysis sought to establish the effect of firm characteristics on revenue efficiency. In research it represents direct relationships between dependent variable and the independent variable. The results are presented in two stages. First stage was determining revenue efficiency scores using DEA (Appendix II)

Stage Two involved the determination of the potential effect of firm size, capital adequacy, risk, asset quality, claim experience and competition as a moderating variable on the revenue efficiency scores obtained in stage one using the Ordinary Least Squares. The study used the Dynamic Panel Data Model proposed by Arellano-Bover (1995) and Blundell-Bond, (1998). The Arellano-Bover/Blundell-Bond Generalized Methods of Moments estimator enables us to control for potential biases without relying on strictly exogenous instrumental variables. The results are as shown below:

Table 4.7: Dynamic Panel Regression Analysis

revenueeffi~y	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
revenueeffi~y L1.	-.0514045	.0604531	-0.85	0.395	-.1698904	.0670814
capitaladeq~y	.1466093	.0703283	2.08	0.037	.0087684	.2844501
firmsize	-.0250228	.0080985	-3.09	0.002	-.0408956	-.0091499
assetquality	-.1614322	.0735277	-2.20	0.028	-.3055437	-.0173206
claimsexper~e	.0025791	.0036608	0.70	0.481	-.004596	.0097542
risk	-.0176855	.0347077	-0.51	0.610	-.0857113	.0503403
_cons	1.421316	.1432542	9.92	0.000	1.140543	1.70209

Source, Research data, 2019

From table 4.7, revenue efficiency at time (t-1) ($P = 0.395$) at 0.05 significant level. This means previous revenue efficiency has no significant effect on the current revenue efficiency of insurance companies in Kenya.

4.8.1. The Effect of Firm Size on Revenue Efficiency

The null hypothesis stated that Firm Size had no significant effect on revenue efficiency of insurance firms in Kenya. From the results in table 4.7 above ($\beta = -0.0250228$, $P = 0.002$) at 0.05 significant level, therefore we reject the null and conclude that firm size had a negative statistical significant effect on revenue efficiency of insurance companies in Kenya. This implies that an increase in firm size reduces the capacity of an insurance firm to realize revenue efficiency. This finding supports the finding by (Almajali *et al.*, (2012); Zanghieri, (2008); Fenn *et al.*, (2008); Yuqi Li, (2007), that proposed that size had a negative effect on efficiency, that is larger firms suffer from diseconomies of scale resulting from bureaucracy and the complexity of their operations causing efficiency to reduce. However, contradicts the findings by (Cummins & Rubio-Misas, 2006), that suggested a positive relationship between size and revenue efficiency occasioned by the scale advantages large insurers enjoy as the mean cost per unit of output decreases as the volume of actual output increases.

4.8.2. The Effect of Capital Adequacy on Revenue Efficiency

The null hypothesis stated that Capital Adequacy had no significant effect on Revenue Efficiency of insurance firms in Kenya. From Table 4.7, Capital Adequacy has a positive statistically significant effect on revenue efficiency ($\beta = 0.1466093$, $P = 0.037$) at 0.05 significant level, thus we reject the null hypothesis. This means that the more an insurance company improves on its capital adequacy in relation to the minimum required capital, the more revenue efficient it becomes. This finding supports the findings by Malik, (2011), who suggested that capital adequacy promoted the efficiency and stability of a financial

system and Sentero, (2012), using DEA, suggested that there was a significant relationship between capital adequacy and efficiency.

4.8.3. The Effect of Asset Quality on Revenue Efficiency

The null hypothesis stated that Asset Quality had no significant effect on revenue efficiency of insurance firms in Kenya. From table 4.7 above, Asset Quality has a negative statistical significant effect on revenue efficiency ($\beta = -0.164322$, $P = 0.028$) at 0.05 significant level, therefore we reject the null hypothesis. This means an increase in asset quality reduces the capacity of an insurance firm to realize revenue efficiency. This finding is in tandem with Kumar & Ghimire, (2013), findings which suggested that debtors have a negative relationship with the financial performance of insurance firms. Higher amounts of debtors imply a weak credit policy that threatens the solvency position of the firm resulting to liquidity problems.

4.8.4. The Effect of Claims Experience on Revenue Efficiency

The null hypothesis stated that Claims Experience had no significant effect on revenue efficiency of insurance firms in Kenya. From table 4.7 above, Claims Experience has no statistically significant effect on revenue efficiency ($\beta = 0.0025791$, $P = 0.481$) at 0.05 significant level. This means that a change in claims experience has no effect on insurance firm's revenue efficiency. We fail to reject the null hypothesis. This is contrary to the findings by Kiarie, (2004) and Mbakisi, Batsirai & Tendai, (2017), who mooted that improper claims management by the insurer and bad customer claims experience may lead to possible insolvency and winding up of insurance companies due to decreased efficiency.

4.8.5. The Effect of Risk on Revenue Efficiency

The null hypothesis stated that Risk had no significant effect on revenue efficiency of insurance firms in Kenya. From the table 4.7, risk did not have a statistically significant effect on revenue efficiency ($\beta = -.0176855$, $P = 0.610$) at 0.05 significant level, therefore we fail to reject the null hypothesis. This means an increase in underwriting risk does not necessarily reduce the capacity of an insurance firm to realize revenue efficiency. This finding is contrary to the finding by Deyganto & Alemu, (2019) and Gebremariyam, (2014) who demonstrated that excessive risk-taking impacts negatively on the revenue efficiency of insurance firms.

The following regression model was established:

$$RE_{it} = -0.025 FS_{it} + 0.147 CA_{it} - 0.161 AQ_{it} + 1.421$$

Where: FS Firm size

CA.... Capital Adequacy

AQ.....Asset Quality

4.9. The Dynamic Regression results of the Moderating Effect of Competition

The study investigated whether competition moderated the relationship between firm characteristics and revenue efficiency. The yearly HHI Competition indices were computed (**Appendix III**) and the results reflected a range between 1500 and 2500. This result was an indicator that market concentration of the selected insurance companies in Kenya was moderate. For a competitive market the HHI is greater than 1500, HHI between 1500 and 2500 the competition is moderate while HHI greater than 2500 is highly concentrated. The results of the moderated regression revealed that the relationship between capital adequacy

and revenue efficiency; claims experience and revenue efficiency are moderated by competition while firm size, asset quality, and risk are not moderated by competition as presented in the table below:

Table 4.8: The Moderating Effect of Competition

revenueeffi~y	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]	
revenueeffi~y L1.	-.0146803	.026705	-0.55	0.583	-.067021	.0376605
capitaladeq~y	6.215201	1.924171	3.23	0.001	2.443894	9.986508
firmsize	-.050047	.0157303	-3.18	0.001	-.0808779	-.0192161
assetquality	-.4519684	.3066636	-1.47	0.141	-1.053018	.1490813
claimsexper~e	.0646282	.0281863	2.29	0.022	.0093842	.1198722
risk	-.6542973	.3910239	-1.67	0.094	-1.42069	.1120954
CapitalACompe	-.0034186	.0010786	-3.17	0.002	-.0055327	-.0013046
FirmSizeCompe	6.14e-06	8.93e-06	0.69	0.492	-.0000114	.0000236
assetQCompe	.0001564	.0001768	0.88	0.376	-.0001901	.0005028
ClaimsCompe	-.0000359	.0000163	-2.20	0.028	-.0000678	-3.95e-06
RiskCompe	.0003782	.0002126	1.78	0.075	-.0000385	.0007949
_cons	1.585612	.0582465	27.22	0.000	1.471451	1.699773

Source, Research data, 2019

From table 4.8, the result of competition as a Moderator on how Capital adequacy and Revenue Efficiency relates was ($\beta = -.0034186$, $P = 0.002$) at 0.05 significant level, this implied that competition moderates the relationship between capital adequacy and revenue efficiency in a negative and statistically significant manner. This means that as competition amongst companies increases, the relationship between capital adequacy and revenue efficiency deteriorates. From table 4.8 above the result of competition as a Moderator on how firm size and Revenue Efficiency relates was ($\beta = 6.14e-06$, $P = 0.492$), at 0.05 significant level, the effect is not statistically significant, this means that competition does not moderate how firm size and revenue efficiency relates.

From table 4.8 above the result of competition as a moderator on how Asset Quality and Revenue Efficiency relates was, ($\beta = .0001564$, $P = 0.376$) at 0.05 significant level, the effect is not statistically significant, this means that competition does not moderate how asset quality and revenue efficiency relates. From table 4.8 above, the result of competition as a moderator on how Claims Experience and Revenue Efficiency relates was, ($\beta = -.0000359$, $P = 0.028$) at 0.05 significant level, the effect was negative and statistically significant, this means that competition moderates how claims experience and revenue efficiency relates. An increase in competition amongst firms in the insurance industry translates into a weakened and diminishing relationship between claims experience and revenue efficiency. From table 4.8 above, the result of Competition as a moderator on how Risk and Revenue Efficiency relates was, ($\beta = .0003782$, $P = 0.075$) at 0.05 significant level, the effect is not statistically significant. This implies that a change in competition amongst firms in the insurance industry does not necessarily have an effect on the relationship between risk and revenue efficiency.

Competition had no significant effect on the relationship between firm size, asset quality, risk, and revenue efficiency. This could be attributed to the fact that the insurance industry in Kenya is oligopolistic in nature with a few companies controlling the market share, (Gitau, 2013, Cytonn Report, 2016). Five out of 52 insurance companies controlled 47.9% of the market as at Dec 2017, (IRA, Annual Report 2017)

The following regression model was established:

$$RE_{it} = -0.050 FS_{it} + 6.215 CA_{it} + 0.064 CE_{it} - 0.034 CA * H_{it} + 1.585$$

Where: FS - Firm Size

CE – Claims Experience

CA - Capital Adequacy

H - Competition

CHAPTER FIVE: SUMMARY, CONCLUSION AND RECOMMENDATION

5.1. Introduction

The chapter discusses key findings presented in chapter four, conclusions reached based on the findings and recommendations there-to. The chapter is organized into summary of the findings, conclusions, recommendations and suggestions for further research.

5.2. Summary of Findings

The study sought to determine how revenue efficiency of insurance companies in Kenya responds to changes in firm characteristics. To achieve the objective, the study employed annual secondary data for the period 2008 to 2017 on capital adequacy, firm size, asset quality, claims experience, risk and competition. The regression model expressed the revenue efficiency scores obtained in stage one using DEA as a function of capital adequacy, firm size, asset quality, claims experience, risk and competition.

The null hypothesis stated that capital adequacy had no significant effect on revenue efficiency but the study findings revealed that capital adequacy had a positive statistically significant effect on revenue efficiency of insurance companies in Kenya. Therefore, we reject the null. The positive effect of capital adequacy on revenue efficiency is consistent with the earlier findings of Malik, (2011) and Sentero, (2012) who concluded that the effect of capital adequacy on revenue efficiency was positive and significant.

The null hypothesis stated that firm size had no significant effect on revenue efficiency. The study findings indicate that Firm size had a negative statistically significant effect on revenue efficiency of insurance companies in Kenya. Consequently, we reject the null. This

finding is in line with the earlier findings of Amajali *et al.*, (2012) and Zanghieri (2008) who found a negative relationship between firm size and revenue efficiency.

The null hypothesis stated that Asset quality had no significant effect on revenue efficiency. The study results showed that asset quality had a negative statistically significant effect on revenue efficiency of insurance companies in Kenya. We reject the null. The result that asset quality had a negative effect on revenue efficiency is in tandem with prior findings by Kumar & Ghimire, (2013) which suggested that debtors have a negative relationship with the financial performance of insurance companies.

The null hypothesis stated that Risk had no significant effect on revenue efficiency of insurance companies in Kenya. The results of this study reveal that risk had no significant effect on revenue efficiency. Therefore, we fail to reject the null. The result that risk had no effect on revenue efficiency is contrary to earlier findings by Gebremariam, (2014), who concluded that excessive risk-taking impacts negatively on revenue efficiency. Claims Experience had no significant effect on revenue efficiency, the study concluded that a change in claims experience does not necessarily have an effect on revenue efficiency.

On the moderating effect of competition on revenue efficiency, the results indicated that capital adequacy and claims experience had a negative significant effect. The negative effect on revenue efficiency implies that the IRA should regulate competition amongst insurance firms to avoid and or reduce poor claims experiences by the customers and ensure adherence to the minimum required capital by the insurance firms. While the moderating effect of competition on revenue efficiency indicated that Firm size, asset quality and risk had an insignificant effect on revenue efficiency. This implies a change in

competition does not necessarily have an effect on the relationship between firm size, asset quality and risk with revenue efficiency.

5.3. Policy Recommendations and Practice

The findings of this study have some crucial policy implications. The results indicate that capital adequacy is a very significant firm characteristic affecting the revenue efficiency of insurance companies in Kenya for it was found to have a significantly positive effect on revenue efficiency. Therefore, the capital maintained by an insurance company in relation to the minimum required capital set by the IRA at a particular time is an important factor to the revenue efficiency of the company. The study recommends that the IRA through a holistic analysis of an insurer's risk position and capital held at all times should be able to link the company's capital adequacy to the amount of risk the company underwrites, therefore adopting risk-based approach and emphasize on implementation of solvency II framework.

The result showed a negative effect of firm size on revenue efficiency, an indicator of diseconomies of scale. Insurance companies holding a lot of assets yet generating less revenue. The study recommends that insurance companies should be encouraged to form strategic business units through spin-offs, which will encourage specialization for the different units, and also reduce too-big-to fail phenomenon.

Asset quality had a negative relationship with revenue efficiency. The insurance companies should come up with robust measures to ensure remittance of policy premiums especially from insurance agents and brokers to reduce high amounts of debtors. The IRA should put in place strong credit policies through changes in the insurance Act CAP 487, to make it

mandatory for insurance agents and brokers to remit policy premiums to insurance firms within a specified time period, failure to which should be punishable by law. This will act to reduce the amount of debtors thus decreasing the threats to the solvency position of the firm and liquidity problems.

The results indicated that Claims experience and risk did not have a statistical effect on revenue efficiency. This implies that a firm's underwriting risk; the speed, accuracy and effectiveness of processing a customer's claim do not necessarily have any bearing on the revenue efficiency of an insurance company. Basing on the results, the researcher recommends that insurance companies' investors should pay attention to capital adequacy; firm size; risk and asset quality due to the significant effect these variables have on revenue efficiency of insurance companies and ignore the effects of claims experience since its effect was not statistically significant.

5.4. Suggestions for Further Research

Future researchers should attempt to improve the decision-making techniques used in this study by expanding the model through addition of more firm characteristics and by improving the model performance by the use of parametric frontier efficiency methods such as the stochastic frontier approach, thick frontier approach and distribution free approach instead of the nonparametric DEA. Furthermore, research in this area can be improved by looking at different time periods- before the risk-based supervision was established by the IRA. Future researchers should attempt to establish other firm characteristics that significantly affect the revenue efficiency other than the once identified in this study. Researchers may use different frameworks on the same data set, different assumptions and different research methods.

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APENDICES/ ANNEXES

Appendix I: Data Collection Form

Firm	Variables	Total Revenue	Total Assets	Risk Weighted Assets	Net Technical Reserves	Net Claims	Debtors	Gross premium	Reinsurance Recoveries	Net Claims Incurred	Net Earned Premium
Firm 1	Source	IRA	IRA	IRA	IRA	IRA	IRA	IRA	IRA	IRA	IRA
	Period										
	DEC 2008										
	DEC 2009										
	DEC 2010										
	DEC 2011										
	DEC 2012										
	DEC 2013										
	DEC 2014										
	DEC 2015										
	DEC 2016										
	DEC 2017										
Firm 2	Period										
Firm	Period										

Source, Research data, 2019

Appendix II: Efficiency Scores obtained in Stage one

YEARS	2008			2009			2010			2011			2012		
FIRMS	crste	vrste	scale	crste	vrste	scale	crste	vrste	scale	crste	vrste	scale	crste	vrste	scale
1. Amaco	0.969	0.991	0.979 irs	0.476	0.918	0.519 irs	0.487	0.944	0.516 irs	0.352	0.974	0.362 irs	0.497	0.969	0.513 irs
2. APA	0.357	0.862	0.414 irs	0.248	0.838	0.296 irs	0.195	0.884	0.221 irs	0.212	0.917	0.231 irs	1.000	1.000	1.000 -
3. Britam	0.236	0.794	0.298 irs	0.091	0.789	0.115 irs	1.000	1.000	1.000 -	1.000	1.000	1.000 -	1.000	1.000	1.000 -
4.Cannon	0.106	0.902	0.118 irs	0.397	0.873	0.455 irs	0.536	0.958	0.559 irs	0.301	0.902	0.334 irs	0.976	0.984	0.992 irs
5. CIC	0.330	0.889	0.372 irs	0.181	0.863	0.209 irs	0.426	0.888	0.480 irs	0.854	0.426	irs	0.610	0.875	0.698 irs
6. Corporate	0.585	0.988	0.592 irs	0.430	0.958	0.449 irs	1.000	1.000	1.000 -	0.181	0.949	0.191 irs	1.000	1.000	1.000 -
7. Directline	0.404	0.964	0.419 irs	0.383	0.914	0.419 irs	0.382	0.982	0.389 irs	0.539	1.000	0.539 irs	1.000	1.000	1.000 -
8. Fidelity	0.305	0.943	0.323 irs	0.817	0.935	0.875 irs	0.648	0.966	0.671 irs	0.315	0.944	0.334 irs	0.575	0.921	0.625 irs
9. First Assuranc	0.929	0.985	0.944 irs	0.447	0.893	0.501 irs	0.438	0.955	0.458 irs	0.694	0.963	0.720 irs	0.666	0.965	0.690 irs
10. Geminia	0.343	0.954	0.360 irs	1.000	1.000	1.000 -	0.432	0.956	0.452 irs	0.404	0.940	0.430 irs	0.981	1.000	0.981 irs
11. Heritage	0.298	0.850	0.351 irs	0.080	0.842	0.095 irs	0.335	0.911	0.367 irs	0.559	0.926	0.604 irs	1.000	1.000	1.000 -
12. Intra Africa	0.507	0.966	0.525 irs	0.651	0.953	0.683 irs	0.989	0.995	0.994 irs	0.920	0.996	0.924 irs	0.538	0.978	0.550 irs
13. Jubilee	0.446	1.000	0.446 irs	1.000	1.000	1.000 -	1.000	1.000	1.000 -	0.537	0.900	0.597 irs	0.865	0.953	0.908 irs
14. Kenindia	0.446	1.000	0.446 irs	0.424	0.934	0.454 irs	1.000	1.000	1.000 -	0.130	0.872	0.149 irs	1.000	1.000	1.000 -
15. Kenya Orient	1.000	1.000	1.000 -	0.692	1.000	0.692 irs	0.000	0.983	0.000 irs	0.592	1.000	0.592 irs	0.920	1.000	0.920 irs
16. Madison	0.000	0.860	0.000 irs	0.119	0.863	0.137 irs	0.617	0.974	0.633 irs	0.134	0.936	0.143 irs	0.545	0.912	0.597 irs
17. Mayfair	1.000	1.000	1.000 -	0.119	0.957	0.124 irs	0.272	0.987	0.276 irs	0.223	1.000	0.223 irs	0.228	0.999	0.228 irs
18. Metropolitan	1.000	1.000	1.000 -	1.000	1.000	1.000 -	1.000	1.000	1.000 -	0.479	0.996	0.481 irs	1.000	1.000	1.000 -
19.Occidental	1.000	1.000	1.000 -	1.000	1.000	1.000 -	0.962	1.000	0.962 irs	0.479	0.996	0.481 irs	0.662	0.991	0.668 irs
20. Old Mutual	0.000	1.000	0.000 irs	0.305	0.862	0.353 irs	0.360	0.922	0.391 irs	0.373	0.963	0.388 irs	0.000	1.000	0.000 irs
21. Pacis	0.083	1.000	0.083 irs	0.456	1.000	0.456 irs	0.735	0.980	0.750 irs	0.371	1.000	0.371 irs	0.362	0.965	0.376 irs
22. Phoenix	0.221	0.882	0.251 irs	0.151	0.896	0.168 irs	0.344	0.901	0.382 irs	0.132	0.925	0.143 irs	0.394	0.919	0.429 irs
23. Pioneer	0.000	1.000	0.000 irs	0.270	0.955	0.282 irs	0.298	1.000	0.298 irs	0.191	1.000	0.191 irs	0.280	1.000	0.280 irs
24. Sanlam	1.000	1.000	1.000 -	0.000	1.000	0.000 irs	0.546	1.000	0.546 irs	0.000	1.000	0.000 irs	0.000	1.000	0.000 irs

25.Tausi	0.343 1.000 0.343 irs	0.131 0.925 0.141 irs	0.757 0.974 0.777 irs	0.277 0.968 0.286 irs	0.731 0.972 0.752 irs
26. The Monarch	0.413 0.984 0.420 irs	0.000 0.969 0.000 irs	0.000 1.000 0.000 irs	0.548 0.959 0.571 irs	0.386 0.982 0.393 irs
27.Trident	0.620 0.980 0.632 irs	1.000 1.000 1.000 -	0.192 0.948 0.203 irs	0.135 0.961 0.141 irs	1.000 1.000 1.000 -

Source: Research Data, 2019

YEARS	2013	2014	2015	2016	2017
FIRMS	crste vrste scale	crste vrste scale	crste vrste scale	crste vrste scale	crste vrste scale
1. Amaco	0.064 0.928 0.069 irs	0.268 0.916 0.292 irs	0.359 0.897 0.400 irs	0.065 0.912 0.071 irs	0.076 0.958 0.079 irs
2. APA	0.074 0.862 0.086 irs	0.421 0.830 0.507 irs	0.494 0.825 0.599 irs	0.409 0.831 0.492 irs	0.509 0.874 0.582 irs
3. Britam	0.279 0.852 0.327 irs	0.715 0.878 0.815 irs	0.600 1.000 0.600 irs	0.472 0.811 0.582 irs	0.453 1.000 0.453 irs
4.Cannon	0.049 0.882 0.056 irs	0.272 0.890 0.306 irs	0.000 0.890 0.000 irs	1.000 1.000 1.000 -	1.000 1.000 1.000 -
5. CIC	0.105 0.867 0.122 irs	0.395 0.813 0.486 irs	0.535 0.810 0.660 irs	0.000 0.824 0.000 irs	0.207 0.886 0.234 irs
6. Corporate	0.126 0.947 0.133 irs	0.731 0.956 0.764 irs	1.000 1.000 1.000 -	0.134 0.948 0.142 irs	0.195 0.980 0.199 irs
7. Directline	0.074 1.000 0.074 irs	0.970 1.000 0.970 irs	0.298 0.877 0.340 irs	0.000 0.930 0.000 irs	0.303 1.000 0.303 irs
8. Fidelity	0.113 0.922 0.122 irs	0.599 0.924 0.648 irs	0.520 0.911 0.571 irs	0.383 0.935 0.410 irs	0.352 0.972 0.362 irs
9. First Assuranc	0.121 0.904 0.134 irs	0.543 0.879 0.617 irs	0.502 0.873 0.575 irs	0.115 0.892 0.129 irs	0.000 0.938 0.000 irs
10. Geminia	0.129 0.895 0.144 irs	0.511 0.897 0.569 irs	0.302 0.886 0.341 irs	0.372 0.899 0.414 irs	0.558 0.933 0.598 irs
11. Heritage	0.246 0.935 0.263 irs	0.665 0.888 0.749 irs	0.672 0.883 0.761 irs	0.983 1.000 0.983 drs	0.886 0.972 0.911 irs
12. Intra Africa	0.064 0.954 0.067 irs	0.171 0.952 0.179 irs	0.600 0.955 0.628 irs	0.208 0.964 0.216 irs	0.375 1.000 0.375 irs
13. Jubilee	0.095 0.881 0.108 irs	1.000 1.000 1.000 -	0.751 0.804 0.934 irs	0.484 0.895 0.540 irs	1.000 1.000 1.000 -
14. Kenindia	0.198 0.937 0.211 irs	0.625 1.000 0.625 irs	0.792 0.842 0.941 irs	0.364 0.954 0.381 irs	0.329 0.958 0.343 irs
15. Kenya Orient	0.136 0.943 0.144 irs	0.642 0.914 0.702 irs	0.667 0.962 0.693 irs	0.591 1.000 0.591 irs	0.878 1.000 0.878 irs
16. Madison	0.066 0.924 0.072 irs	0.113 0.813 0.139 irs	1.000 1.000 1.000 -	0.000 0.851 0.000 irs	0.134 0.940 0.142 irs
17. Mayfair	0.153 0.931 0.165 irs	0.587 0.908 0.646 irs	0.781 0.918 0.851 irs	0.785 0.945 0.830 irs	0.759 0.948 0.800 irs
18. Metropolitan	1.000 1.000 1.000 -	1.000 1.000 1.000 -	1.000 1.000 1.000 -	0.535 1.000 0.535 irs	0.430 1.000 0.430 irs
19.Occidental	0.143 0.942 0.152 irs	0.730 0.932 0.783 irs	1.000 1.000 1.000 -	0.489 0.941 0.520 irs	0.575 0.971 0.592 irs
20. Old Mutual	1.000 1.000 1.000 -	0.081 0.865 0.094 irs	0.800 1.000 0.800 irs	1.000 1.000 1.000 -	0.123 1.000 0.123 irs
21. Pacis	0.188 0.938 0.200 irs	0.507 0.951 0.533 irs	0.385 0.943 0.408 irs	0.207 0.960 0.215 irs	0.269 1.000 0.269 irs
22. Phoenix	0.082 0.922 0.089 irs	1.000 1.000 1.000 -	0.435 0.933 0.466 irs	1.000 1.000 1.000 -	0.096 1.000 0.096 irs

23. Pioneer	0.029 1.000 0.029 irs	1.000 1.000 1.000 -	0.473 0.906 0.523 irs	0.000 0.905 0.000 irs	0.072 0.943 0.076 irs
24. Sanlam	1.000 1.000 1.000 -	0.639 1.000 0.639 irs	0.069 0.800 0.087 irs	0.218 1.000 0.218 irs	1.000 1.000 1.000 -
25.Tausi	0.166 0.935 0.178 irs	0.606 0.947 0.640 irs	1.000 1.000 1.000 -	1.000 1.000 1.000 -	1.000 1.000 1.000 -
26. The Monarch	0.101 1.000 0.101 irs	1.000 1.000 1.000 -	1.000 1.000 1.000 -	0.224 0.961 0.234 irs	0.903 1.000 0.903 irs
27.Trident	0.049 0.890 0.056 irs	0.204 0.893 0.228 irs	0.297 0.891 0.333 irs	0.109 0.727 0.150 irs	0.131 0.945 0.138 irs

Source: Research Data, 2019

Appendix III: The Herfindahl- Hirshman Index of Market Concentration

Year	HHI Index
2008	1567
2009	1515
2010	1709
2011	1679
2012	1660
2013	1772
2014	1776
2015	1776
2016	1855
2017	2094

Source, Research Data, 2019

Appendix IV: Target Population

1. Africa Merchant Assurance Company (AMACO)
2. APA Insurance – part of Apollo Investments Company
3. Britam Holdings Limited formerly British American Insurance Co.
4. Cannon Assurance Company Limited
5. CIC Insurance Companies
6. Corporate Insurance Company
7. Direct line Assurance Company
8. Fidelity Shield Insurance Company
9. First Assurance Kenya Limited
10. Geminia Insurance Company
11. Heritage Insurance Company
12. Intra Africa Assurance Company.
13. Jubilee Insurance Company Limited
14. Kenindia Assurance Company
15. Kenya Orient Insurance
16. Madison Insurance Company Kenya
17. Mayfair Insurance Company
18. Metropolitan Life Insurance Kenya
19. Occidental Insurance Company
20. Old Mutual Life Assurance Company
21. Pacis Insurance Company
22. Phoenix of East Africa Assurance Company
23. Pioneer Assurance Company
24. Sanlam Kenya plc – was Pan Africa Life Assurance
25. Tausi Assurance Company
26. The Monarch Insurance Company
27. Trident Insurance Company

Source, IRA, Annual Reports, 2008 – 2017