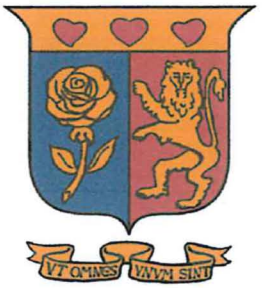

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The X-efficiency of insurance companies in Kenya

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DECLARATION

I declare that this work has not been previously submitted and approved for the award of a degree by this or any other University. To the best of my knowledge and belief, the Research Project contains no material previously published or written by another person except where due reference is made in the Research Project itself.

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..... [*Signature*]

13th November 2015 ..... [*Date*]

This Research Project has been submitted for examination with my approval as the Supervisor.

Dr. John Oluoch ..... [*Name of Supervisor*]

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ABSTRACT

This project seeks to determine the X-efficiencies of both life and non-life insurance companies in Kenya. It also establishes whether the X-efficiency of these insurance companies is affected by the type of business (life or non-life insurance companies), size of the firm and the profitability of the company. The data set consists of reinsurance costs, total benefits paid, administrative expenses, other expenses which altogether constitute the inputs and gross premiums are the outputs for the companies. The model to be used in this study is the Data Envelope Analysis. Using the Data Envelope analysis, the study shall be restricted to analyze the efficiency of insurance companies by use of output-oriented Constant Return-to-Scale (CRS). It is expected that firms operating at optimal economies of scale are expected to have the lowest costs and the resulting higher profits lead to higher market concentrations (Hao, 2004). The results of the mean X-efficiency scores for the full sample of the large and small insurance companies was also determined. The large insurance companies recorded high mean efficiency scores compared to the small insurance companies. This implies that the larger insurance companies are operating efficiently relative to the small companies. The large insurance companies recorded a mean X-efficiency score of 69% compared to 29% for the small insurance companies. This means that the large insurance companies are operating at 69% output-oriented constant returns to scale while the small insurance companies are operating at 29% output-oriented constant returns to scale.

ABBREVIATIONS

AKI- Association of Kenya Insurers

CRS- Constant Returns to Scale

DEA- Data Envelopment Analysis

DMU- Decision Making Unit

GDP- Gross Domestic Product

IRA- Insurance Regulatory Authority

ROI- Return on Investment

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CHAPTER ONE

1.0 Introduction

1.1 Background Information

The efficient operation of financial intermediaries such as: banks, insurance and pension fund firms, government agencies is instrumental for the efficient functioning of the financial system and fuelling of the economies of the 21st century. The financial sector mobilizes savings and allocates credit across space and time. It enables firms and households cope with economic uncertainties by hedging, pooling, sharing and pricing risks thereby facilitating the flow of funds from the ultimate lenders to the ultimate borrowers, improving both the quantity and quality of real investments and thereby increasing income per capita and raising our standards of living.

The insurance industry plays a critical role in providing individual and businesses with a broad spectrum of financial security products and playing a major role in financial intermediation, thus enhancing a nation's financial and economic development. Individuals and their families look to insurance companies to provide life insurance, retirement income, health insurance, and automobile and home-owners property and liability coverage. Businesses rely on insurers for similar coverage as well as workers compensation and more specialized products like marine insurance. Inefficient insurers cannot survive long in a competitive market (Jhantasana, 2005).

1.2 Definition of X-efficiency

Production theory identifies several types of inefficiencies including allocative, technical, scale, scope and X-efficiency. Allocative inefficiency arises when companies use the costly combination of inputs in producing output. Technical inefficiency occurs when the company fails to produce an efficient production frontier. Scale inefficiencies arise when the firm cannot lower average costs by increasing or decreasing its output levels. Scope inefficiencies exist when the firm can lower average costs by changing its output mix.

(Leibenstein H. , 1966) identified a fifth approach of examining efficiency, and called the term X-efficiency to describe the resulting difference between actual and minimum cost.

In economics, X-efficiency is the effectiveness with which a given set of inputs are used to produce outputs. If a firm is producing the maximum output it can, given the resources it employs, such as men and machinery, and the best technology available, it is said to be technical-efficient. X-inefficiency occurs when technical-efficiency is not achieved.

(Leibenstein, 1978) Describes X-efficiency as follows: Suppose that certain inputs have been allocated to a firm. These inputs can be used with various degrees of effectiveness within the firm. The more effectively they are used the greater the output. When an input is not used effectively, the difference between the actual output and the maximum output attributable to that input is a measure of the degree of X-inefficiency. Effective use depends simultaneously on both the decisions that are made on how to use inputs and the actual performance based on these decisions. Thus, within the firm, the concept of X-inefficiency captures both the detailed decision making process which may determine the intent of how to use inputs and the actual performance aspect.

1.3 The Kenyan Insurance Industry

The industry is represented by, AKI, which is a well, organized trade body and is regulated by a relatively new and empowered regulator, the Insurance Regulatory Authority (IRA) which was established under the Insurance (Amendment) Act of December 2006. The IRA, which has been in operation since 2007, formulates and enforces insurance standards, particularly in relation to compulsory lines such as compulsory third-party motor liability insurance. It also approves tariffs and rates of insurance, deals with complaints from the public, and monitors the viability of insurers. It monitors and enforces claims settlement, ownership of insurance companies limiting it to 25% for an individual shareholder and increasing the minimum capital requirements.

IRA has also effected the separation of life and general insurance business in an effort to rein in on malpractices where composite insurance companies are reportedly diverting life

funds to settle claims from general insurance. In addition, the IRA has adopted the risk based supervision model, which is a shift away from the previous regulation model that gave financial health to an insurer based on the ability to meet the minimum share capital. The law presently requires the separation between life and non-life insurance.

Currently the minimum capital requirements are One hundred and fifty million for life insurers, three hundred million for general insurance business and four hundred and fifty million for composite insurance companies.

Embracing ICT, research and innovation expands the industry's capacity to exploit the existing untapped insurance market. This development coupled with improvement in regulatory environment and the review of the Insurance Act is expected to enhance the insurance penetration beyond the current level of about 2.84% of the GDP. The East African Common Market that came into effect on 1st July 2010 is expected to herald a new dawn for the insurance industry. With an expanded market of 126 million people, the insurance industry benefits greatly both in terms of volume of business underwritten and capacity to undertake risks. These developments are meant to improve scale and scope efficiency of operations in the insurance industry.

The life and non-life business have low penetration rates in comparison with the developed world. Regulation plays a great role in the success of the insurance industry. The overall sector is very sensitive to changes in regulations that affect companies' ability to adapt products to their operating environment. There have been many new products launched, most of which are particularly tied in to the micro-insurance segment.

The Kenyan insurance industry is not as vulnerable to changes in the political and economic conditions in the country and the sector is expected to grow. The industry is now keen on designing products accessible to as much of the Kenyan population as possible, particularly small and medium-sized businesses such as the sharia-compliant insurance, Takaful (Business Monitor International, 2011), and the APA's BimaBamba insurance product payable in easy instalments.

Insurance companies are grouping themselves together in an effort to build economies of scale. A source of growth for life products had been by bundling together all the insurances relevant to a particular social group or industry. Kenya's life insurers have been able to achieve growth by introducing innovative new products, exploiting one distribution

channel or another or improving their rates. However, life insurance is not regarded by households as an important channel for long-term savings and/or provision against adverse events. The ability and opportunity to save over the long-term is extremely limited in the country. The local life insurance industry, accounts for about a third of total premiums (Business Monitor International 2011 insurance report).

1.4 Statement of the Problem

Recent changes in the Kenyan insurance industry that include changes in the regulatory environment, government intervention as well as increased innovation brought about by competitive pressures within the financial sector and increased consumer knowledge have intensified interest in the analysis of insurer efficiencies. The efficient-structure hypothesis predicts a reverse causality between competition and cost efficiency. The central argument for this hypothesis is that more efficient firms have lower costs which directly increase their profits. These firms are also capable of capturing larger market shares that may result in high levels of concentration. The greater efficiency may be in the form of X-efficiency, in which some firms have superior management or production processes that allowed them to operate at lower costs and subsequently reap higher profits. The resulting higher market shares might also have led to higher market concentration. Alternatively, the greater efficiency might be in form of scale efficiency, in which some firms simply produced output levels closer to the minimum average cost point (the scale efficiency hypothesis).

Determination of the X-efficiencies of the insurance sector in Kenya is essential for companies to judge their production levels. Approaches of determining these efficiencies have been a bit tedious and involving especially the Stochastic Econometric Cost Frontier Approach which involves estimation of many parameters. This reduces the efficiency of the model. Data envelopment analysis has been rather a better choice though it does not permit insurers to deviate from the frontier due to random error. The problem of estimation of efficiencies of companies has been noted.

Firms operating at optimal economies of scale are expected to have the lowest costs and

the resulting higher profits lead to higher market concentrations. In the efficient-structure hypothesis, the positive relationship between efficiency and market structure is spurious because efficiency is the principal determinant of market structure. There is therefore, reverse causality running from efficiency to competition as compared to the Structure-Conduct-Performance paradigm. Given that higher market concentration means lower competition, there should be an inverse relationship between competition and efficiency. Indeed, the existence of scale economies on a market means that an increase in the number of competitors results in higher average costs for each incumbent firm. Consequently, competition would decrease cost efficiency (Fenn, 2006).

This research uses a one-stage estimation approach to explore directly the relationship between market structure and the cost efficiency.

1.5 Research Objective

1.5.1 General Objectives of Study

To investigate determinants of X-efficiency of insurance companies in Kenya.

1.5.2 Specific Objectives of Study

1. To investigate whether X-efficiency of insurance companies in Kenya is affected by size of the firm.
2. To determine whether X-efficiency of insurance companies in Kenya is affected by expenses.

1.6 Research Question

a) Does the size of the firm affect X-efficiency of insurance companies in Kenya?

b) Do expenses affect X-efficiency of insurance companies in Kenya?

1.7 Significance of the Study

The importance of this study is to determine the efficiency of insurance firms and find explanations of efficiency that would help inform government policy, identify the

economic conditions that create inefficiency, and improve managerial performance.

The information obtained can be used to inform government policy by assessing the effects of deregulation, mergers, or market structure on efficiency; to address research issues by describing the efficiency of an industry, ranking its firms and to improve managerial performance by identifying best practices and worst practices associated with high and low measured efficiency, respectively, and encouraging the former practices while discouraging the latter

CHAPTER TWO

2.0 Literature Review

2.1 Introduction

There has been significant development in studies of efficiency over time. In the 1950s, the studies of efficiency just examined technical efficiency by comparing input to their corresponding output (FARRELL, 1957). However, (Leibenstein H. , 1966) introduced the study of X-inefficiency whereby the element of cost in the study of efficiency was introduced. The concept of x-efficiency was introduced by Harvey Leibenstein in his paper "Allocative efficiency v. X-efficiency" in American Economic Review 1966. The X-efficiency hypothesis of (Leibenstein H. , 1966) is that organizations typically do not optimize as proposed by classical economic doctrine but rather may exhibit some degree of inefficiency.

(Leibenstein, 1978) Defines X-efficiency as the degree of effectiveness in the use of inputs. The more effectively inputs are used, the greater the output. When an input is not used effectively, the difference between the actual output and the maximum output attributable to that input is a measure of the degree of X-inefficiency. Effective use depends simultaneously on both the decisions that are made on how to use inputs and the actual performance based on these decisions.

The X-efficiency theory by (Leibenstein, 1978) not only considers as one of its basic tenets, the existence of principals and agents, but also the likelihood of a clash of their interests. This is a deviation from traditional economic theory where all economic activity takes place between principals and, even if agents exist, their interests do no clash with the principal. (Leibenstein, 1978) Found that in any type of complex society with multi-person firms, agents are likely to have opportunities to pursue their own interests in such a way that they deviate to some degree from maximizing the interests of their principals.

Insurance management is a very particular field, with many specific characteristics which can create barriers to success for managers with no previous experience of the insurance

industry. The managers may promote the elimination of those constraints encountered by companies which affect general efficiency. There are certain elements intrinsic to the management of companies that make some of them more efficient than others (Baros, 2005).

The findings of the study by (Jhantasana, 2005) on the relationship between profitability and suggested the need for rationalization in the insurance industry. They found that the mean inefficiency is negatively correlated with size and advocated for the consolidation of the large number of smaller insurers as well as an increase in capital requirements.

In a dynamically changing environment, many insurers may be adopting new approaches to producing their outputs. This provides more opportunities for firms to make mistakes in the choice of technology, perhaps leading to excessive consumption of inputs even by best practice firms (Cummins D. J., 1996). The higher complexities and hence moral hazard for managers provides more opportunities for firms to make mistakes in using technology. Managers may make mistakes in their decisions on the approaches used to produce outputs.

Inputs of insurance companies used in this study include total benefits payable i.e. claims, management expenses and any other expenses. Input prices are defined as the rate of interest variable to reflect the cost of debt capital obtained from the long-term government bond rates. Outputs on the other hand include the Total premiums paid Revenue is defined as net earned premiums plus investment income and other incomes as reported in life and non-life technical accounts at the end of the year. Costs are defined as total operational costs and expenses which include investment management expenses, commissions and other costs as reported in the technical and non-technical accounts at the year-end

2.2. X-Efficiency of Insurance Companies

(Cummins D. J., 1996) Conducted an analysis of technical efficiency and productivity growth in the Italian insurance industry. They examined the technical efficiency of insurance firms, changes in technical efficiency over time and technical change over time. The analysis found that activities requiring low management discretion resulted in greater efficiency lending credence to the argument that management decisions affect efficiency

of insurance companies. The study revealed that firms with assets requiring more active management were associated with lower firm efficiency than those requiring less active management. Insurance companies with more standardized procedures and requiring less managerial expertise were found to be more efficient than the more complex types of business. This finding implies that more complex operations requiring more managerial skill and discretion are associated with lower technical efficiency.

Other factors such as claims ratios that we will consider in the study reveals that insurance companies with higher loss ratios are more technically efficient than those with lower loss ratios because the longer settlement period presents higher complexities and hence moral hazard for managers and provides more opportunities for firms to make mistakes in using technology. The evidence suggests that management may make mistakes in their decisions on the approaches used to produce outputs.

Organizational form was also found to have an effect on the technical efficiency of the firm. (Cummins D. J., 1996) Found evidence that firms that conduct both life and non-life insurance business are significantly less efficient than those that specialize in either life or non-life insurance. This suggests that economies of scope may not be an important factor in this market, at least with respect to technical efficiency. Their study found no relationship between business mix and efficiency scores.

(Cummins D. J., 1996) Found that there was a decline in productivity over the period of study and that insurers had become less efficient and experienced technical regress. Large declines were noted in periods affected by deregulation. Most of the deterioration was attributed to technical change. The sample period spanned the period of initial implementation of European economic unity, and was able to provide information on the effect of this deregulation on efficiency in the Italian insurance market. They also found that an increase in the complexity of insurance products and markets could lead to inefficiency.

(Rai A. , 1996) In his study on the cost efficiency of international insurance firms examined the cost efficiency of insurance firms located in 11 countries over a five- year period, 1988-1992. He derived two X-inefficiency measures, one from the stochastic cost

frontier model and the other from the distribution-free model. The results show that x-inefficiencies not only vary by country but by size and specialization. The study found that on average, small firms are more cost efficient than large firms worldwide. The study also found that insurance that offer single or specialized services also operate more cost efficiently than those offering a combination of life and nonlife services (combined firms). The results also indicated that the X-inefficiency estimates derived from the stochastic cost frontier model are more suitable for this sample of data than those derived from the distribution-free model.

(Meador Joseph W R. H., 1997) Tested for a relationship between the firms' output choice and measures of X-Efficiency for the U.S life insurance companies. Using the study period from 1990 to 1995, the study tested two hypotheses regarding the effect of a firm's output choice on estimates of its X-efficiency: Diversification hypothesis in which X-efficiency increases when managers make resource allocation decisions for a broader range of distinct but related outputs, and Concentration hypothesis where managers focus on a particular area of expertise and a small number of product lines. The study found that diversification across multiple insurance and investment product lines resulted in greater X-efficiency than a more focused production strategy. The findings suggest that in comparison to their counterparts in more narrowly focused firms, the managers of diversified firms appear better able to contain costs by reallocating inputs among independent product lines when adjusting to shifts in product demands and are able to generate cost savings by concentrating their financial and human resources in a single area of expertise. This relationship remained even after controlling for organizational structure and firm size. In addition, the study found a negative relationship between X-efficiency and regulation.

(Hao, 2004) Carried out a study on the efficiency on Taiwan's life insurance industry using X-Efficiency approach. Using the study period from 1981 to 2003, he found that firms with larger market share are cost efficient supporting the need for reorganization of financial markets through mergers and acquisition with a goal to increase efficiency. His findings also support the need for life insurance firms that want to increase their ordinary

life insurance premium revenue to improve its investments ability and offered evidence that compels government to pay more attention to financial solvency for the life insurance.

(Hao, 2004) Also found that the inefficient firms had smaller economies of scale compared to the more efficient firms. This result coincides with the current policy that encourages mergers and acquisitions. In addition he sought to provide some evidence on the relationship between the total assets, market share, and diversification products strategy. His study revealed that non-admitted assets impacted on firm's efficiency, and this suggested that these assets, excluded for solvency regulation, were potentially productive to the firm. Of the control variables employed in the efficiency regression, only size as measured by total assets was significantly related to efficiency. From this regression, the variable significantly related to profitability was market share (market power theory). The findings suggested that firms with larger market share were more profitable. He also found that the diversification products strategy did not help the firm to improve its operation efficiency. It is also important to note that the findings showed no significant change, because the Taiwan life insurance firms were observing the standardized policy regulation.

2.3 Estimation Techniques of Efficiency

The most commonly used methods to measure X-efficiency in insurance companies are Data Envelopment Analysis (DEA) and Stochastic Econometric Cost Frontier Approach (SECFA). Both methods have their advantages and drawbacks. (Constantin, 2009). DEA is a non-parametric approach that does not require the specification of a cost function but rather computes an efficient best practice cost frontier based on convex combinations of firms in the industry. The alternative approach is to estimate an econometric cost frontier. Both DEA and the Stochastic Econometric Frontier Approach have been used extensively in the recent years and both have strong advocates.

2.4 Data Envelopment Analysis

Unlike the econometric stochastic frontier approach, DEA, permits the use of multiple inputs and outputs, but does not impose any functional form on the data; neither

does it make distributional assumptions for the inefficiency term. By the application of non-parametric methods as Data Envelopment Analysis, the index is calculated by distance functions obtained by mathematical programming and allows for the absence of price information, utilizing physical quantities of multiple inputs and products instead. The main two components of the underlying index are technical change (innovation) and efficiency change (catching up effect towards the frontier).

The principal limitation of the DEA approach is that it does not permit insurers to deviate from the frontier due to random error but measures all departures from the frontier as inefficiency.

CHAPTER THREE

3.0 Research Methodology

3.1 Introduction

This chapter presents the research methodology that entails: the population and the data sample respectively, the sample design and the research method deployed.

3.2 Population

Currently, Kenya has 38 general insurance companies out of which some are composite insurers. The life business companies are 24 in number. All these companies shall constitute the population under study.

3.3 Data Sample

X-efficiency estimates are obtained for each type of business (operating either in life or non-life) to investigate how efficiency measures vary among the various insurance companies by type of business undertaken. The sampling of the insurance companies in Kenya to be involved in the study will depend on the availability of data in 2014/2015

3.4 Sample Design

The number of insurance firms considered in this study shall constituted 38 Non-Life insurance companies currently operating in Kenya and 24 Life insurance companies that were operating in Kenya as at 2014/2015 fiscal year. This sample size shall exclude insurance companies that are currently under statutory management and those that have been closed down. The companies are to be selected through random sampling. The sample will be picked on the basis of the central limit

theorem in statistical theory which implies that any sample equal to or greater than 30 is representative enough irrespective of the whole population size.

3.5 Research model

3.5.1 The Mathematical Formulations of DEA

The linear programming technique will be used to find the set of coefficients (u's and v's) that gives the highest possible efficiency ratio of outputs to inputs for the service unit being evaluated. A DEA mathematical model is shown below:

$$Maximize\ \theta = \frac{u_1 y_{1j}+u_2 y_{2j}+\cdots+u_r y_{rj}}{v_1 x_{1j}+v_2 x_{2j}+\cdots+v_m x_{mj}} = \frac{\sum_{r=1}^{s}.\sum_{j=1}^{n} u_r y_{rj}}{\sum_{i=1}^{m}.\sum_{j=1}^{n} v_i x_{ij}} \qquad (1)$$

3.5.2 Specification of Variables

The terms used in a DEA mathematical model are:

j = Decision Making Company (DMC) being compared in the DEA analysis

DMC_j= Decision Making Unit number j

θ =Efficiency rating of the Decision Making Company being evaluated by DEA

y_{rj} =Amount of output r used by Decision Making Company j

x_{ij}= Amount of input i used by Decision Making Company j

i = Number of inputs used by the Decision Making Units

r = Number of outputs generated by the Decision Making Company

u_i= coefficient or weight assigned by DEA to output r

v_r= coefficient or weight assigned by DEA to input i

By use of a linear programming model, objective function shall be obtained as;

(Maximizing efficiency rating θ for the Decision Making Company j)

Subject to the following constraints;

$$DMU_1 : \frac{u_1y_{11}+u_2y_{21}+\cdots+u_1y_{r1}}{v_1x_{11}+v_2x_{21}+\cdots+v_mx_{m1}} = \frac{\sum_{i=1}^{d} u_r y_{r1}}{\sum_{i=1}^{m} v_i x_{i1}} \leq 1 \quad (2)$$

$$DMU_2 : \frac{u_1y_{12}+u_2y_{22}+\cdots+u_ry_{r2}}{v_1x_{12}+v_2x_{22}+\cdots+v_mx_{m2}} = \frac{\sum_{r=1}^{d} u_r y_{r2}}{\sum_{i=1}^{d} v_i x_{i2}} \leq 1 \quad (3)$$

...

$$DMU_O : \frac{u_1y_{1o}+u_2y_{22}+\cdots+u_ry_{1o}}{v_1x_{1o}+v_2x_{2o}+\cdots+v_mx_{mo}} = \frac{\sum_{r=1}^{d} u_r y_{ro}}{\sum_{i=1}^{m} v_i x_{io}} \leq 1 \quad (4)$$

...

$$DMU_j : \frac{u_1y_{1j}+u_2y_{2j}+\cdots+u_ry_{rj}}{v_1x_{1j}+v_2x_{2j}+\cdots+v_mx_{mj}} = \frac{\sum_{r=1}^{d} u_r y_{rj}}{\sum_{j=1}^{m} v_i x_{ij}} \leq 1 \quad (5)$$

$u_1, \ldots, u_d \geq 0 \; and \; v_1, \ldots, v_m \geq 0$

The data required to apply DEA will be the actual observed outputs produced $y_{rj}$and the actual inputs usedx_{ij}, during one time period for each service unit in the set of units being evaluated.

The data set consists of reinsurance costs, total benefits paid, administrative expenses, other expenses which altogether constitute the inputs and gross premiums are the outputs for the companies. The data will be collected from insurance companies in Kenya for their 2014/2015 fiscal year. To measure the X-efficiency level of insurance companies in Kenya, The Data Envelopment Analysis model as a maximum likelihood Approach will be used. It involves the estimation of the input function and the derivation of the X-efficiency estimate based on the deviation from the efficient cost frontier respectively.

If the value of θ for the service unit being evaluated will be less than100%, then that unit is inefficient, and there is the potential for that unit to produce the same level of outputs with fewer inputs. The theoretical development of this approach was discussed in detail in (Cooper, 2000).

CHAPTER FOUR

4.0. Data Analysis, Results and Discussion

4.1. Introduction

The chapter show the X-efficiency findings of this study. Each section is based on the tests that were carried out towards achieving the research objectives of the study. A Data envelope Analysis model was used to carry out the test for both life and non-life insurance companies in Kenya

4.2. Summary Statistics

Table 1: Summary Statistics of General Insurance companies in Kenya.
(*All figures are in Kshs. Billions*)

Table 1 below shows the mean inputs for the general insurance companies in Kenya given by paid claims and bonuses is at Kshs. 0.65 billion. Other inputs are at Kshs. 0.06 billion for unsettled claims and Kshs. 1.30 billion for paid up capital and reserves. The mean output given by gross premiums for those companies is at Kshs. 1.87 billion. In general insurance, the inputs of paid claims, unsettled claims and paid-up capital and reserves are used to produce gross premiums that generates revenue for the companies.

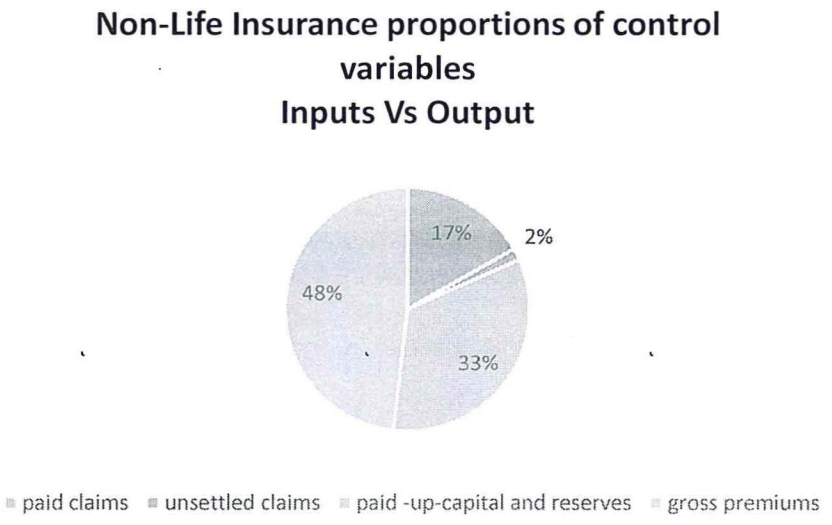
	Kurtosis	Skewness	Mean	Median	Variance	Standard Deviation	Min	Max
Paid Claims and bonuses	5.89	1.97	0.65	0.34	0.61	0.78	0.06	3.01
Unpaid Claims	8.41	2.44	0.06	0.01	0.01	0.11	0.00	0.49
Paid-up capital and Reserves	9.38	2.46	1.30	0.79	1.56	1.25	0.32	6.30
Gross Premiums	4.69	1.58	1.87	1.19	3.02	1.74	0.25	6.99

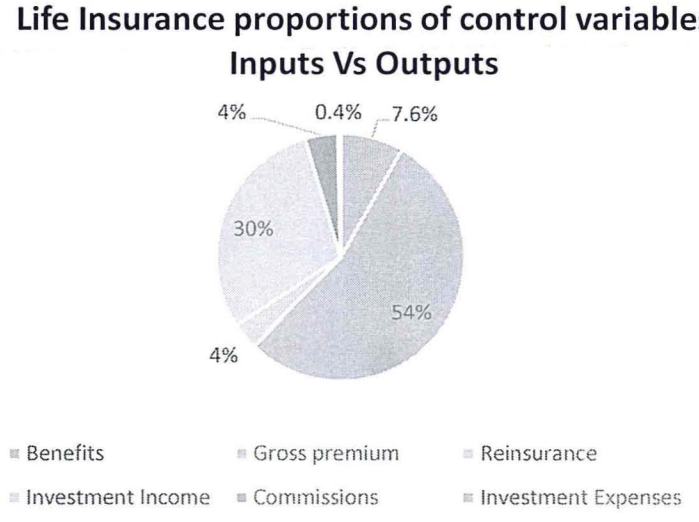
Table 2: Summary Statistics of life insurance industry.
(*All figures are in Kshs. Billions*)

Table 2 above shows mean outputs for the life insurance companies in Kenya given by Investment income and gross premiums is at Kshs. 0.76 billion and Kshs 1.39 billion respectively. The mean inputs include benefits at Kshs. 0.21 billion, reinsurance costs at Kshs. 0.09 Billion, commissions at Kshs. 0.11 billion and investment expenses at Kshs. 0.01 billion. On the other hand, in life insurance business, the inputs of benefits, reinsurance costs, commissions and investment expenses are used to produce gross premiums and investment income that generates revenue.

	Kurtosis	Skewness	Mean	Median	Variance	Standard Deviation	Min	Max
Benefits	6.51	2.07	0.21	0.01	0.17	0.41	0.00	1.55
Gross Premiums	3.19	1.29	1.39	0.45	3.56	1.89	0.01	5.92
Reinsurance	2.10	0.68	0.09	0.04	0.01	0.09	0.00	0.30
Investment income	4.33	1.65	0.76	0.09	1.44	1.20	0.01	3.71
Commissions	9.32	2.58	0.11	0.01	0.04	0.20	0.00	0.86
Investment expenses	5.28	1.96	0.01	0.00	0.01	0.01	0.00	0.04

Source: Author's calculations based on data collected from IRA





4.3 Results from the Analysis of X-Efficiency

Under this study, we used the Data Envelopment Analysis (DEA) to estimate the X-efficiencies of the insurance companies in Kenya. The maximum likelihood approach is used to calculate the variances and other measures of central tendency to the data set. X-efficiency estimates were obtained for each type of business (operating either in life or non-life) to investigate how efficiency measures vary among the various insurance companies by type of business undertaken.

The overall mean X-efficiency score based on the output-oriented constant returns to scale for the period of the study is 62% indicating that insurance companies in Kenya were not maximizing their current levels of outputs given the level of inputs used. Technical inefficiency for the companies was 38% meaning that the companies needed to increase their production, while holding the input levels constant, by 38% in order to attain full technical efficiency. The standard deviation shows the variation in the X-efficiency scores. The deviation during the period of study was at 28% for the full sample of insurance companies indicating that 62% of insurance companies had their X-efficiencies lying between 25% and 75%.

The results of the mean X-efficiency scores for the full sample of the large and small insurance companies was also determined. The two distinct size groupings were determined by using the median of the average of asset size recorded for companies over the period of study. The median was the preferred measure of central tendency to distinguish between the two sizes because it defines the middle value of the asset sizes arranged in order of size and therefore reflects the placement scenario of asset sizes. Companies that recorded a higher average asset size than the median were classified as large and those with an average asset size lower than the median score were classified as small.

The large insurance companies recorded high mean efficiency scores compared to the small insurance companies. This implies that the larger insurance companies are operating efficiently relative to the small companies. The large insurance companies recorded a mean X-efficiency score of 69% compared to 29% for the small insurance companies. This means that the large insurance companies are operating at 69% output-oriented constant returns to scale while the small insurance companies are operating at 29% output-oriented constant returns to scale.

The mean X-efficiency of insurance companies by organizational type was also determined. We discovered that the X-efficiency scores were at 57% and 68% for the Non-life and Life insurance companies respectively. Efficiency estimates obtained were between 0 and 1. Values close to 0 meant that the company was highly inefficient while those close to 1 meant that the company was operating with low inefficiency. A company with an efficiency score of 1 was regarded as efficient in its operations.

DMU	Score
Apollo Life	1
British American	0.262338
Cannon Assurance	0.755251
Capex Life	1
CFC Life	1
CIC Life	1
Corporate	1
First Assurance	0.279207
GA Life	1
Geminia	1
ICEA Lion Life	1
Industry	0.417268
Jubilee	0.527733
Kenindia	1
Kenyan Alliance	0.190817
Madison	0.243499
Mercantile	1
Metropolitan Life	0.159138
Old Mutual	0.458582
Pan Africa Life	0.278127
Pioneer	0.382003
Shield Assurance	1
The Monarch	0.424324
UAP Life	1
AAR Insurance	1
AIG Kenya	0.849898
AMACO	0.666652
APA	0.318948
British American	0.453297
Cannon	0.500757
CIC General	0.413681
Corporate	0.62337
Directline	0.466251
Fidelity Shield	0.484276
First Assuarance	0.391938
GA	0.493881

Gateway	0.4814
Geminia	0.4116
Heritage Insurance	1
ICEA Lion General	0.790349
Industry	0.391474
Intra Africa	0.299039
Invesco	0.909851
Jubilee	0.319483
Kenindia	0.625673
Kenya Orient	0.462888
Kenyan Alliance	0.567479
Madison	0.492552
Mayfair	0.40666
Mercantile	1
Occidental	0.379363
Pacis	0.285446
Phoenix	0.383428
Real	0.511176
Resolution Health	1
Takaful	1
Tausi	0.565449
The Monarch	0.522733
Trident	0.503183
UAP Insurance	0.510146
Xplico	0.659512

4.4. Discussion

This research identifies the X-efficiency scores of the insurance companies analyzed. The average X-efficiency score based on the output-oriented constant returns to scale for the period of the study is 62% indicating that insurance companies in Kenya were not maximizing their current levels of outputs given the level of inputs used. The results indicate that the Kenyan insurance companies are, on average, relatively inefficient and therefore there is room for their levels of efficiency to be upgraded, specifically in the case of those companies operating below the mean X-efficiency. The estimates of mean X-efficiency over the period of the study offers insights into the effects on the operational environment for insurance companies. Investment costs incurred by insurance

companies to upgrade technology of production and staff training costs are also an additional cost faced by the insurance industry. Large companies were found to be more cost inefficient than the small companies and supports findings from other studies such as those by (Rai A. , 1996) and (Cummis, 1996).

Too much expenditure on the cost factors adds to inefficiency, particularly when this expenditure is not converted into outputs. Of the control variables employed in the analysis of X-efficiency, only cost of investment, commissions and reinsurance costs and were found to be significantly related to efficiency.

Fraudulent claims is one of the major risks facing insurance firms in the region. According to a survey by Price Water house Coopers (PWC) on risk in East Africa's financial services sector, PWC estimate that Insurance companies in Kenya lose a total of Sh4 billion, paid every year to undeserving parties. Motor insurance is the worst hit industry segment and a bulk of the money paid lost in fraudulent claims by insurers is through rampant fraud in motor insurance. According to the AKI, fraudulent claims account for more than a third of the money paid by insurance firms.

The financial services sector witnessed a number of changes over the decade. Previous legislation changes made were aimed at improving regulation and governance in the insurance sector. Key among the changes were: Insurance companies were required to have paid up capital of at least Kshs. 300 million for general business, Kshs 150 million for life business and Kshs 450 million for composite insurance business respectively by 14th June, 2010. There was also regulation requiring financial statements of insurance companies to be prepared in accordance with International Financial Reporting standards. The new regulation also allowed insurance agents to transact business for more than three companies making the costs of acquiring business from agents higher because of competitive pressure.

Increased regulation will increase the industry's costs according to a survey conducted by the Centre for the study of financial innovation (CSFI) in conjunction with PWC in Kenya and other parts of the world. The burden of regulation that is being placed on the insurance industry by a wave of regulatory reform at international and local levels has raised concern that the industry will bear heavy costs, and distract management from the task of running profitable businesses.

The findings also validate the existing regulation effected in the year 2010 that requires the separation of the life and non-life lines of insurance business for insurance companies operating in Kenya. The non-life business records a lower X-efficiency when compared to the life business.

A possible explanation for this is that the increased regulatory initiatives particularly in regard to pricing of insurance products could have led to premium income that cannot adequately cover the costs arising from claims paid out. These findings are similar to those of (Meador Joseph W R. H., 1997) who found a negative relationship between regulation and X-efficiency of the United States life insurance companies.

The Kenyan insurance industry is a free market although the regulatory authority has imposed minimum premium rates for insurance companies to charge. The regulatory authority has an important role to play in improving the efficiency of insurance companies. The Insurance Regulatory Authority has moved from assessing the strength of insurance companies based on whether a company is able to meet the share capital requirements to using risk based supervision. The increased transparency and enforcement of rules relating to technical provisions and solvency is envisaged in the next few years, with the introduction of the Solvency II rules and the application of the IAS (International Accounting Standards).

(Barros, 2005) Found that there are certain elements intrinsic to the management of companies that make some of them more efficient than others. Therefore, upgrading the quality of the management practices should be given major priority by insurance companies. (Japh, 2010) Cites lack of skills in the Kenyan insurance workforce as one of the challenges facing the Kenyan insurance industry. Encouraging or insisting on continuous educational improvement through skills acquisition and upgrades among the workforce and management is an example of what can be done to improve efficiency in the Kenyan insurance industry

CHAPTER FIVE

5.0. Summary and Conclusions

5.1. Introduction

This chapter presents the summary, conclusions from the results of the study and offers recommendations for further studies.

5.2. Summary of the Study

This study used the Data Envelopment Model to model the efficiency of insurance companies in Kenya during the period of study. X-efficiency scores were obtained using maxdea licensed software add-in for Access in windows. Efficiency estimates obtained were between 0 and 1. Values close to 0 meant that the company was highly inefficient while those close to 1 meant that the company was operating with low inefficiency. A company with an efficiency score of 1 was regarded as efficient in its operations.

Company data in the year 2013 was used. Control variables used were: paid claims, unsettled claims, paid benefits, paid-up capital and reserves, gross premiums, reinsurance costs, investment expenses, commissions and investment income. This study made a presumption on the underlying technology of producing insurance being similar, and the accounting data consistent, across all insurance companies.

The large insurance companies recorded high mean efficiency scores compared to the small insurance companies implying that the large companies were technically efficient relative to the small companies. More than half of the full sample of insurance companies had their efficiency scores between 25% and 75% implying that the distribution of sample's X-efficiency estimates was approximately normal. During the study, it was also discovered that life insurers were more technically efficient than the non-life insurers.

5.3. Conclusion

This research paper outlines the estimation of X-efficiency using the Data Envelopment Analysis which is a maximum likelihood approach of estimating technical efficiency of organizations. DEA is a non-parametric model of estimating technical efficiency.

The regulatory agency has an important role to play in improving the efficiency of insurance companies. Policies should include publishing data on individual companies in order to introduce greater transparency into the market, resulting in increased competition and enforcing the regulations such as technical provisions and reserve ratios relating to the companies themselves.

Legal backing by government agencies to deal with fraud that has caused insurance companies to incur increased costs arising from the settlement of fraudulent claims as well as increased monitoring is expected to yield increased efficiency for the insurance industry. The risk based supervision adopted by the Insurance Regulatory Authority is recognized as contributing positively to the efficiency scores captured.

The policy implication of this research is that increased regulation and fraud increases the costs of insurance companies. The increased monitoring however will result in the less efficient firms exiting the market as has been the case with insurance companies that are placed under statutory management. Increased capital share requirements imposed through the regulatory authority will also result in mergers and acquisitions and hence increased inputs for the insurance companies.

The industry has taken measures to root out fraudulent elements that have resulted into high costs for insurers. The Kenya Auto Repair Association (KARA), a professional lobby for garage operators is already working with insurers, motor assessors and investigators to fight fraud. The Association of Kenya insurers (AKI) has obtained a legal backing to enable them to take action on service providers in the motor industry such as garages operating outside the professional code of ethics as well as engaged the Kenya Bureau of Standards to create standards for the industry.

With regard to the new solvency system, it should be more risk-based. Insurance companies should be required to improve their risk analysis and risk mitigation techniques, in order to formulate their capital and earnings needs more precisely, which is highly significant in today's harder capital markets (Barros, 2005).

Increased monitoring by the regulatory authority through increasing the scrutiny of the accounts, the adequacy of reserves and the quality of management, and thus stimulating the less efficient companies to exit the market is required. The regulatory authority should also take measures to avoid excessive concentration and dominant firms, which might mitigate competition and decrease efficiency.

Policies that the regulatory authority should develop include publishing data on individual companies in order to introduce greater transparency into the market, resulting in increased

competition and enforcing the regulations such as technical provisions and reserve ratios relating to the companies themselves. These regulatory activities should be pursued without complacency by the regulatory agency because it is unfeasible to regulate a market with too many inefficient companies, displaying relatively low efficiency scores, particularly large companies with substantial market share (Barros, 2005).

5.4. Limitations of the Study

This paper enumerates two main limitations: first, limitations related to the data set and second, limitations related to the method. During the study, accounting data, which is prone to accuracy distortion arising from the use of different accounting basis, was used. A limitation which the study was unable to overcome.

The principal limitation of the DEA approach is that it does not permit insurers to deviate from the efficient frontier due to random error but measures all departures from the frontier as inefficiency (Cummins D. J., 1998).

5.5. Suggestion for Further Research

This study concentrated on X-efficiency as measured by Data Envelope Analysis model. A study on X-efficiency based on revenue and profitability of insurance companies in Kenya is a suggested future research. The reason behind this is that large insurance companies by asset size may not be an indicator of the institutions financial strength and efficiency and some insurance companies which are large have been found to operate inefficiently and have been placed under statutory management.

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