MEASURING THE EFFICIENCY BETWEEN CONVENTIONAL GENERAL INSURANCE AND GENERAL TAKAFUL IN MALAYSIA

By

CHEAH CHEE KEONG

Thesis Submitted to

Othman Yeop Abdullah Graduate School of Business,

Universiti Utara Malaysia,

in Partial Fulfillment of the Requirement for the Master of Sciences (Finance)

PERMISSION TO USE

(For Master Sciences by Coursework Candidate)

In presenting this thesis in fulfillment of the requirements for a Post Graduate degree from the Universiti Utara Malaysia (UUM), I agree that the Library of this university may make it freely available for inspection. I further agree that permission for copying this thesis in any manner, in whole or in part, for scholarly purposes may be granted by my supervisor(s) or in their absence, by the Dean of Othman Yeop Abdullah Graduate School of Business where I did my thesis. It is understood that any copying or publication or use of this thesis or parts of it for financial gain shall not be allowed without my written permission. It is also understood that due recognition shall be given to me and to the UUM in any scholarly use which may be made of any material in my thesis.

Request for permission to copy or to make other use of materials in this thesis in whole or in part should be addressed to:

Dean of Othman Yeop Abdullah Graduate School of Business

Universiti Utara Malaysia

06010 UUM Sintok

Kedah Darul Aman

Abstract

One of recommendations to achieve the vision of The Financial Sector Blueprint launched by Bank Negara Malaysia (BNM) in year 2011 is to intensify the internationalization of Islamic finance through regional and global takaful/ retakaful outreach in Malaysia. While these discussions continue, the performance, particularly in the general or non-life sector whether has consistently achieve a productivity level that outpaced the conventional general insurance in Malaysia. This thesis examines the efficiency of general insurance and takaful industry in Malaysia during the period 2009 to 2013. A total of 31 of general insurance and 8 general takaful operators are selected in this study which cover all the firms in the general insurance industry. The inputs of claim expenses and management expenses, outputs of premium/ contribution earn and investment income are selected based on approach consistent with several literature to measure the efficiency scores. This study employed a non parametric approach which is Data Envelopment Analysis (DEA) base on input orientation measurement to estimate the technical efficiency, pure technical efficiency and scale efficiency to compare the difference between both industries sector. The model results based on constant return to scale (CRS) and variable return to scale (VRS) to assess the efficiency scores between both industries sector. The findings indicate that there is a significant difference in efficiency between takafui industry and insurance industry where that takaful has higher efficiency than conventional insurance throughout the year 2009 to 2013. The finding shows that the general takaful industry improves of their efficiency compare with previous literature where takaful have lower efficiency compare to conventional insurance. The Malmquist productivity index shows a significant improvement in overall productivity of both industry sectors. The study suggests diversified and more selective of risk business while underwrites the risk portfolio in general insurance and takaful industry in Malaysia reduce the claim ratio.

Key words: DEA, Efficiency, Insurance, Islamic, Takaful

Abstrak

Salah satu cadangan dalam pengantarabangsaan kewangan Islam di Malaysia untuk mencapai visi Pelan Sektor Kewangan yang dilancarkan oleh Bank Negara Malaysia (BNM) pada tahun 2011 adalah mengukuhkan integrasi kewangan serantau dan antarabangsa dalam bidang takaful. Padahal, sektor takaful am di Malaysia hari ini sama ada telah mencapai satu tahap produktiviti yang mengejar konvensional insurans am. Tesis ini mengkaji tahap kecekapan konvensional insurans am dan takaful am di Malaysia pada tahun 2009 hingga tahun 2013. Sebanyak 31 daripada syarikat konvensional insurans am dan 8 syarikat takaful am yang merangkumi semua syarikat di dalam industry dipilih dalam kajian ini. Perbelanjaan tuntutan dan perbelanjaan pengurusan dipilih sebagai faktor , sumbangan premi dan pendapatan perlaburan dipilih sebagai pendekatan untuk menguji skor kecekapan yang konsisten dengan kajian literatur terkenal. Kajian ini menggunakan Data Envelopment Analysis (DEA) berdasarkan penilaian input untuk menganggar kecekapan teknikal , kecekapan pure teknikal dan kecekapan skala untuk membuat perbandingan sama ada perbezaan antara sector konvensional insurans am dan takaful am. Model penilaian berdasarkan pulangan berterusan kepada skala (CRS) dan pulangan berubah kepada skala (VRS) digunakan untuk menilai skor kecekapan. Hasil kajian menunjukkan bahawa takaful mempunyai kecekapan yang lebih tinggi daripada konvensional insurans kebelakangan ini. Hasil kajian juga menunjukkan bahawa industri takaful am mancapai peningkatan dalam keekapan berbandingkan dengan literatur sebelumnya di mana takaful mempunyai lebih skor kecekapan lebih rendah. Indeks Malmquist perubahan produktiviti juga menunjukkan peningkatan keseluruhan yang ketara bagi kedua-dua sektor. Kajian ini mencadangkan insurans am dan takaful am mempelbagaikan risiko dengan lebih berwaspada apabila menilai insurans baru untuk mengurangkan nisbah tuntutan.

Kata kunci: DEA , Kecekapan , Insurans, Islam , Takaful

Acknowledgments

First and foremost, I wish to express my deepest gratitude and sincere gratitude to my supervisor, Dr. Norshafizah Hanafi for her kind encouragement and patient while this thesis was in process. She provided me with invaluable guidance and support to develop my research skill while completing the project paper. Also special thanks to all the lectures and staff of the University Utara Malaysia for their teaching, guidance and assistance which help a lot to me.

I would like to thank my family especially my father A.L. Cheah for his encouragement. I will forever be grateful to my wife and my children for their patience and many sacrifices they made to enable me to complete my postgraduate study. Not forgetting, special thanks to all my friends in UUM Kuala Lumpur to make this learning process full of enjoyment.

Finally, a sincere appreciation to Ministry of Education Malaysia to provide the MyBrain 15 scholarship which the financial support helping a lot for me to complete the study.

CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ABBREVIATIONS/NOTATION/GLOSSARY OF TERM

BNM	Bank Negara Malaysia
CSR	Constant Returns to Scale
DEA	Data Envelopment Analysis
EFFCH	Efficiency Change
M&A	Merger and Acquisition
MII	Malaysia Insurance Institute
MTA	Malaysia Takaful Association
PECH	Pure Efficiency Change
PTE	Pure Technical Efficiency
TE	Technical Efficiency
TECHCH	Technical Efficiency Change
TFP	Total Factor Productivity
TFPCH	Total Factor Productivity Change
SE	Scale Efficiency
SECH	Scale Efficiency Change
VRS	Variable Returns to Scale

CHAPTER ONE

INTRODUCTION

1.1 Introduction

This chapter provides introduction to the conventional insurance and takaful background of Malaysia and international context. The problem statement and research question are also discussed followed by the research objectives, research methodology, the current scope and possible limitations of the study, and finally the layout of the research of overall study.

1.2 Background of the Study

Since early 1960, Malaysia insurance industry has grown dramatically in the recent decades which bring economic growth and national income increase. A remarkable progress of the Malaysia insurance industry which began in the year 1988 when Bank Negara Malaysia (BNM) started to regulate and supervise the industry. Before this, the insurance industry in Malaysia had been facing a period of structural changes under the unregulated environment, and now towards a significant regulated sector similar to the banking industry as controlled by central bank. An Insurance sector Master Plan of Malaysia (IMP) designed by BNM since 1990s with its main objective to build local insurers to gain a competitive advantage in the global insurance market. On the other hand, consumers also being protected by the insurance products purchase and served by a wide range of the products development (BNM).

Recently, the introduction of the Financial Sector Blueprint (FSB) launched by Bank Negara Malaysia (BNM) in year 2011 which intensified to the internationalization of Islamic finance in Malaysia, especially to the local financial institution that includes Islamic banking, takaful and retakaful was able to outreach to the regional and globally level. Moreover, the performance, particularly in the general or non-life sector by local general takaful operators has consistently achieved a productive and efficient level that was able to outpace the conventional general insurance in Malaysia, and become global competitiveness since more encouragement by government to this sector in the recent years. Following to Malaysia government's ambition to become the regional hub of Islamic finance in the world as mentioned and the potentially growth of takaful industry in Malaysia, this study attempts to make a comparison test of efficiency between conventional and takaful industry focus in the general business sector. By the benchmarking comparison analysis, we can know whether the takaful industry is at the right trend to improve their efficiency in overall and outpace their conventional counterpart today.

1.1.1 Conventional Insurance Industry

According to the latest data released by BNM, there has been a persistent and significant growth in conventional general insurance and general takaful business in Malaysia. The general or non-life business recorded a grown in premium and contribution since year 2009 and achieved a total premium of RM11.52 billion for conventional general insurance and RM1.38 billion for general takaful in year 2013. The premium has increased from RM7.3 billion

for conventional general insurance as compare to RM0.7 billion for takaful since 2009.

Table 1.1: Premium and contribution between conventional general insurance and general takaful in Malaysia.

Industry	2009 (RM '000)	2010 (RM '000)	2011 (RM '000)	2012 (RM '000)	2013 (RM '000)
Conventional General Insurance	7,311,830	8,616,135	8,976,344	10,192,711	11,523,628
General Takaful	706,776	1,014,599	873,942	1,299,839	1,376,678

Source: BNM

Even though the industry recorded a fast growth, there is still a large untapped general insurance market in Malaysia which has achieved a growing size like those developed countries such as Japan, United States, and Singapore. The major potential growth area is such as providing wide and broad coverage of coverage asset like those countries. With highly regulation in insurance industry sector and the increases of competitive environment, insurance companies has expected to operate at a higher costs atmosphere relative to the higher demand growth for their products. For example, although there was an expansion growth of general insurance business in Malaysia, the current paradigm of regulatory framework in Malaysia made the insurer could not easily raise the product's selling price to cover its operating cost. Hence, insurers now are motivated not only to improve the profit and financial performance but at the same time they should look into the area of efficiency and productivity.

The main objective of this thesis is concentrate to develop a statistical comparison of efficiency between various insurers between the conventional general insurers and takaful operators on their achievement and maximum

productivity. The improvement of their productivity and efficiency would be determined by how many output should they achieve by given the input employed. The efficiency is able to test by applying the major input cost which is the management expense and claim expenses from the insurance and takaful companies, in order to generate the major revenue output such as premium or contribution collected and investment income. It can be improved by involving in product innovation and improving underwriting selection of risk. Thus, the insurance companies have to adapt to the changing environment that taking into account efficiency in operation. The growth in efficiency is very important especially the underwriting risk which has become complicated and more complex nowadays. Moreover, with the risk awareness among the Malaysia population also will increase the demand for various insurance products. Hence, the challenge of the management of the insurer and takaful is to increase in profitability and underwriting gain by implementing a strategic underwriting portfolio to attract good business growth and reducing the inefficiency cost.

1.1.2 Takaful Industry

Globally, the takaful and retakaful industry is expected to achieve an annual growth of approximately 20%, with contributions or premium collected is expected to reach USD7.4 billion by 2015 (Ernst and Young 2013). In Malaysia, there is a total of 11 takaful companies and 9 of them are running the general takaful business. Since the enactment of the Takaful Act 1984, and with the first takaful company, namely, Takaful Malaysia was

incorporated in year 1985, the takaful business has achieved a significant growth of development and evolution. The combined assets of family and general business were RM21 billion as at December 2013. However, the total assets of general takaful only recorded RM3 billion or 14.2% of overall assets of takaful business in Malaysia.

Despite the takaful industries recorded a tremendous growth recently, as today the overall of the takaful business is still considered a small size of segment as compared to the Islamic finance industry in Malaysia. The 11 takaful operators on record a total assets of RM22 billion compare to 16 Islamic Banks with total assets of RM460 billion in September year 2014. As of today, there is only a single foreigner takaful operator running the business in Malaysia which is AIA Public Takaful Bhd as compared to 6 foreign Islamic banks which currently operating in Malaysia. Despite low competition environment in takaful, the local takaful operator should increase their efficiency and productivity hence result to the profitability in order to improve their competitiveness.

According to the statistical data from BNM, Malaysia has a relatively high ratio of written contributions (premium) to the national income (GDP), with the 11 takaful operators achieving a written contributions a total of RM6.2 billion in 2013 and with the general takaful recorded a written contribution of RM1.7 billion. For general takaful business, as of 2013 contributed about 0.1% of Malaysia's Gross National Income and approximately 77,804 takaful agents continue their career in this industry (BNM 2014).

As part of the new industry strategy, the improvement of the inputs factors such as management expenses and claim management which influencs the efficiency of takaful operator in the country has become importantly. This attribute factors which affects the efficiency could be attract the interest of shareholders, governments and other stakeholders to enable them to make better management and investment decisions.

1.3 Problem Statement

The expected low profit margins in 2014 makes insurance and takaful operator in Malaysia face pressure to identify opportunities for top line and bottom line growth. In this regard, successful insurers will develop an efficient business model to garner a competitive advantage and thrive. Thus, the efficiency of the insurer's corporation should seek to implement new techniques to identify and improve the competitive standing such as to reduce their expenses or in other area. In a nutshell, insurers must look into the area of improve management expenses and risk underwriting by reviewing existing processes, increasing data analytics capabilities, outsourcing and focusing more diligently on core operations.

Moreover, the developments in insurance and takaful business had also contributed to the country economic expansion, growth, and development. Such impressive growth is expected to continue in the coming future and will motivate insurers and takaful operators to improve their business model to become more efficient and effective.

However, there is limited study in Malaysia on the measurement of efficiency test for the conventional general insurance and general takaful industries (Ismail, et al., 2011, Saad, 2012). In prior studies, research based on selected sample of conventional insurance companies ignores the effect of the rest of the similar firms such as general takaful operators, family takaful operators, retakaful operators and takaful brokers. Moreover, to the knowledge until this study, the latest research on the efficiency investigate to the insurance and takaful industries which until the sample year of 2009 (Saad, 2012). In this instance, this study is looking to fill up the research gap by providing a comprehensive of companies with the latest data until year 2013.

1.3 Research Question

As regard to the investigation of efficiency and productivity between the general conventional insurer and general takaful operators, the following research questions are developed.

i. Did the general takaful industry in Malaysia outpace conventional general insurance industry in local market by comparing the efficiency level?

ii. Did the efficiency and productivity improve for general insurers and general takaful sector in Malaysia in the recent year?

1.4 Research Objective

To answer this research question, the following objectives are identified for this study.

i. To analyse and compare the efficiency benchmarking between conventional general insurance and general takaful sector in Malaysia.

ii. Compare the technical efficiency, pure technical efficiency and scale efficiency from each of the conventional general insurance companies and general takaful operators in Malaysia.

iii. To estimate the changes in of productivity conventional general insurance companies and general takaful operators in Malaysia between the year 2009 to 2013.

iv. To investigate the factors of inputs that is inclusive of claim expenses and management expenses of general conventional insurer and general takaful operator in Malaysia as it influences to the productivity.

1.5 Significance of Study

The study of this thesis has a significant various aspect to the researcher, the industry and policyholders.

The researcher gains a significant reference result from this study of the comparison efficiency performance among Malaysia conventional general insurance and general takaful operators running their operations in the

industry. The methodology applied in this investigation also enables the researcher to engage to similar research in other industries. Moreover, it also provides a guidance or reference input for future researcher who is interested in this field and to fill up the research gap which show in the limitation in this study (Eling and Luhnen, 2010a).

This study provides a result to the industry whereby an operating remuneration to the claim and management expenses whether if it is compatible in encouraging the premium growth and investments return. Hence, conventional insurers and takaful operators would be able to make a comparison over the time from how the productivity level between external marketing channels and internal managerial in the development of new and innovative product offered (Ismail, et al., 2011).

Consumer and policyholders are able to elevate the quality of advice and service provided by conventional insurers and takaful operators which reflects their productivity, professionalism and quality of service. The internal performance of such company will end up a result by an ability to pay the claim of the losses. Hence, while in the earlier stage by chosen the company to purchase insurance and takaful coverage products, policyholder would have to refer the firm internal efficiency performance. This will enable the policyholders to have a speedily process on the claims paid out and for the takaful sector which may have an opportunity gain for no claims rebate or Mudharabah payment (Othman, et al. 2009).

1.6 Scope and Limitations of the Study

There are few scopes and limitations of this study which may not able to be covered full aspect and comprehensive research.

1.6.1 Input Limitation

The present study only covers secondary data of conventional general insurance and general takaful industry in Malaysia from 2009 to 2013, the time period is for the selected sample rather short. Moreover, only management expenses and claim expenses of selected industry are included for the analysis. Importantly, there are still need to acknowledge that the methodological involved in this study may not considered all the relevant inputs and outputs factors to measure of operating efficiency such as other operating expenses and agency commission. The study also is limited to only the general takaful companies and the conventional general insurer and the findings not conclusive and representative the whole takaful and insurance industry in Malaysia.

1.6.2 Country Limitation

This study is restricted to insurance and takaful corporation in Malaysia because of the researcher interest in his based country. The suggestions and conclusions reviewed might have a possible difference to the main stream idea and international research such as Japan, UK, US and other Islamic country like Pakistan, Bahrian and Saudi Arabic.

1.6.3 Lack of Information Sauce

The main source of the resource and data collected which are from the internet and UUM library database where includes BNM, Statistical Departments of Malaysia, PIAM, LIAM, Malaysia Insurance Association, Malaysian Takaful Association and the related conventional general insurer and takaful companies websites, academic journals and etc. However, despite that there is a wide of information source available however only a small numbers of studies is conducted in Malaysia context. There are few literatures to be reviewed locally because most of the journals do not focus much interest in Malaysia and those international studies are unable to exemplify in Malaysia context.

1.7 Organization of the Thesis

The study consists of five chapters. Chapter one, the introduction will give introduction of the conventional insurance and takaful background of Malaysia and international context. The problem statement and research question also would be identified and discussed followed by the research objectives, research methodology applied into this study, the current scope and possible limitations of the study, and finally the layout of the research of overall study.

Chapter two focuses into the literature review. This chapter mainly review the relevant field in studying the performance efficiency and its productivity result on insurance and takaful sector in cross countries, responses of the

conventional insurer and takaful operators in certain environmental change and also tries to find out any possible research gap to elaborate.

Chapter three relates to the research methodology which includes the background of methodology used to examine and measure the efficiency score and overall productivity analysis of conventional insurers and takaful operators. The non-parameters mathematical programming namely Data Envelopment Analysis (DEA) would to be applied into this study also have a comprehensive review and discussion. The relevant formula and mathematical logic applied into the DEA mode also will be further explained in this chapter.

Chapter four focuses on data analysis and interpretation would show all the results of comparative efficiency scores and statistical analysis of conventional insurers and takaful operator results shows in this chapter. The result will start with statistical analysis by comparing the efficiency scores among various DEA term and the growth of various Decision Making Unit (DMU). The test result is following by a Malmquist Index to examine the efficiency change over the time comparison on the productivity growth basis.

Chapter five is where the final part of this thesis work would be discussing the findings and conclusions. This concluding chapter summarize all the findings and makes the conclusions of the study. It may comment that any positive suggestions to be implemented which is able to make the conventional insurance and takaful sector for the prospective growth.

CHAPTER TWO

LITERATURE REVIEW

2.0 Introduction

This chapter mainly focus on reviewing the relevant theories related to the insurance, takaful and efficiency measurement in the field of finance. The orientation in this chapter mainly provides an overview of previous researches on performance efficiency and its productivity result on insurance and takaful sector in Malaysia. Furthermore, this research also reviews some of the analysis in the global and cross-country literature regarding the performance of conventional insurance and takaful sector.

2.1 Agency Theory

In corporate finance, agency theory introduces by Jensen and Meckling (1979) found that an agency costs would be a burden to the firms due to the conflict of interest between a principal and an agent. When the manager of a business organization who has the authority relates to important decisions of the firm, when he or she is not the primary claimants of the firm's net assets, they might make a decision that is not objective to the corporate finance which is to maximize the shareholders wealth. However, the principle or shareholders have always expected the manager to always defend the main interest of the principles.

To solve this conflict, it is necessary to align some of the compensated schemes to the managers or the agent by the shareholders or the principals.

The form of compensated which pays the manager or agent is call as the agency costs. The cost paying to the agent should able to result in improving of a firm profitability and gain a significant value to shareholders (Jensen & Meckling, 1979)

In this study, one of the selected inputs to measure the productivity and efficiency of conventional insurance and takaful is management expenses. It assumes that managers are hired to act on behalf of shareholders; however, the informational advantage controlled by the managers of the firm provides them an opportunity to pursue their own interests. Interests of management which try to maximum their employee benefit conflicted with the shareholder wealth of maximum profit. The firm can provide a remuneration pay to solve the conflict would result in management expenses (Cummins & Weiss 2013).

Moreover, all of the insurance companies and takaful operators have its own set of underwriting guidelines for corporate underwriter to decide whether any new business of insurance risk should be taken into consideration. The information and techniques applied to evaluate or underwrite insurance risk business of an applicant depend on the type of coverage involved. Certain insurance classes has higher claim base on an actuarial model should be avoided taken into underwriting consideration. The underwriting guideline which was decided by the management team would ended up with higher claim expenses if certain insurance class relative with a higher claim ratio, such as motor insurance. The management team would most likely avoid such the risk category which would affect the firm performance. This can be done by encouraging the manager to set a tighter company underwriting guideline over the insurance risk coverage.

2.2 Efficiency Measurement Theory

The other objective of the corporation is to maximize the profit which is stated in the economy theory. In order to achieve the goal above, a firm is required to minimize the cost or maximum the sales revenue in order to gain operation efficiency. The improvement in a firm efficiency and productivity level determines by a economy concept which is economies of scale. The theory suggests that in a long run the average costs per unit decreases in the same time the output volume increases. The firm can achieve the economies of scale by reducing the long run firm total costs by producing a larger volume of output. The total costs such as rental, capital goods and managerial expenses minimize while per unit output increase (Cummins, et al. 2013).

On the other hand, by specializing in carrying out specific tasks among the staff and workers also reduces the firm's average cost while in the same time increases the insurance premium collected. An insurance firm is able to gain a impact of risk reducing while large volume of insurance premium pools collected, and ended up with diversifying most of the possibility losses.

Economies of scale for insurance and takaful industry are achievable while certain premium or contributed collected is able to minimize overall cost over a time. However, inefficiencies might exist when a firm continues to expand their output causing additional costs arising from management bureaucracy and decreasing productivity of overall input cost. A large organization requires extra tiers in the hierarchical organization structure especially in management level, and this causes expensive costs in their operation. Moreover, bigger firm structure also has the potential to create negative

impact such as red tape and agency costs (Coelli, et al. 2005). This study is to measure the degree of firm ability in achieving economies of scale in conventional insurers and takaful operator, indicated maximum premium revenue and investment income over the insurance management cost and claim expenses over a time.

The earlier study on the efficiency analysis focus on creating a framework to test how far a firm is able to achieve an optimization level, and as a result, few techniques are developed and evaluated the benchmarking comparison between the firms to the most efficient firms in the industry (Farrell, 1957). Econometric approaches such as stochastic frontier analysis has been developed to estimate the efficiency frontiers (Greene, et al. 2004). However, the methods applied are non-parametric mathematical linear programming approaches such as data envelopment analysis (DEA) introduced to evaluate the efficiency (Cooper, Seiford, and Tone, 2007).

There are many studies conducted that compared the performance of insurance corporation which includes both life and general insurance industry such as Boonyasai, et al. (2002), Diacon, et al. (2002), Greene and Segal (2004), Leverty, et al. (2004), Hao & Chou (2005), Saad, et al. (2006), Klumpes (2007), Barros, et al. (2008), Davutyan, et al. (2008), Cummins, et al. (2010), etc. Before this, the comparison and benchmarking has conducted by accounting financial ratios such as the return on equity, turnover on assets, debt ratios and etc. The current development of the frontier efficiency technique makes the traditional methods become infamous among researchers due to the weakness of financial ratio. It is because of the estimation by financial ratio was too simplified that summarized the firm performance in a

single statistical measurement that ignores the firm size and the overall input cost (Cooper, et al. 2007).

The other method to test on the efficiency would be the econometric approach by applying a specific function to the firm cost and production, revenue and profit with design a regression model and by assuming the distributions of the function will be normal with error terms. The methodology called stochastic frontier approach (SFA) tests whether any significant relative of inputs over the output performance (Greene, et al. 2004).

Although there are many methodologies studied the efficiency in the insurance industries, however, the most famous and applicable among most of the researcher would be apply a mathematical programming approach namely data envelopment analysis (DEA). This approach used a linear mathematical programming to measure the relationship of assigned resources (inputs) to how productivity and efficiency in producing a level of goods and services (outputs). DEA approach ends with a result simplified by determining an efficiency score, and interpreted the estimation scores to compare the performance among each of the firms in the sample (Cummins, et al. 2013).

2.3 Insurance

The concept of insurance emerged in England since 16th century where Richard Mortin issued the first policy on William Gybbon's life in the year 1536. Two companies named Hand in Hand Company and The Mercer's Company came into existence in 1696 and 1698 respectively. Later, the

English parliament passed an act which allowed life insurance companies to be set up (Hardy, 1922). The Commission on Insurance Terminology of the American Risk and Insurance Association has defined insurane as the pooling of fortuitous losses by transfer of such risks to insurers, who agree to indemnify insured's for such losses, to provide other pecuniary benefits on their occurrence, or to render services connected with the risk (Rejda & McNamara, 2013). The other scholars from several disciplines such as law, economics, history, actuarial science, accounting, and sociology might have difference point of view regarding the definition. However, in overall the most important key point of the origin of insurance derives from the concept of uncertainty. It relates to our daily activities related to social economic, science and technology which face unknown circumstances beyond control all the time.

With the mathematical probability distributions, an insurance company is feasible to formulate a pay out to the uncertainty with the agreed amount stated in contract. This classification is based on the terminology introduced by Knight (2005). "Risk" is measurable and thus insurable uncertainty while "true uncertainty" is non-measurable and therefore cannot be insured. While the other scholar Arrow (1965) provides a clear definition of insurance as the exchange of money now for money payable contingent on the occurrence of certain events. Müller (1995) pointed out that insurance is "guarantee information concerning certain states of its purchasers" which improves their information regarding to the outcomes of their decisions while not concerning states of nature" creates a growth in product innovation in the industry whereas wide range of coverage do provide base on the customer needs.

In the general insurance context, it is also called the Property and liability insurance or casualty insurance. This type of insurance indemnifies property owners against the loss or damage of real or personal property caused by various perils, such as fire, lightning, windstorm, or tornado. Moreover, it also covers the insured's legal liability arising out of property damage or bodily injury to others; legal defence costs. In practice, general insurers typically use the term property and casualty insurance (rather than property and liability insurance) to describe the various broad field of coverage includes fire, marine, and life insurance; casualty lines include auto, liability, burglary and theft, workers compensation, and health insurance as well (Rejda & McNamara, 2013).

2.4 Takaful

Takaful derived from an Arabic word which means 'joint guarantee' or 'guaranteeing each other' (Mahmoud, 2008) where the possible loss will be shared collectively and voluntarily by the participants involved in the system. The takaful businesses carried out by the Malaysian takaful operators are also divided into family (life) takaful and general takaful business. Family takaful business which involves a combination of long-term investment and mutual financial assistance scheme whereas the general takaful scheme is purely for mutual financial help on a short-term basis, usually 12 months to compensate its participants for any material loss, damage or destruction that any of them might suffer arising from a misfortune that might inflict upon his properties or belongings.

The agreed parties after collecting the contribution will agree to provide a protection and pay on any loss or damage which occurs during the coverage period. Theoretically, the takaful based on the Islamic principles which are ta'awun (mutual cooperation) and tabarru' (donation). In the theoretical scholar, takaful is an arrangement by a group of people with common interests to guarantee or protect each other from certain defined misfortunes such as premature death, disability and property damages (Obaidullah, 2005).

In Islamic finance, the products and services involve with any elements of riba (usury), gharar (uncertainty) and maysir (gambling) are prohibited. Riba, or excessive profit which gain from financial interest without showing any productive activity, gharar and maysir, may arise from any speculative element present in a contract, such as an unequal exchange of the amount of money due to gambling with uncertainty risk. In insurance practice, those prohibited elements extended in any kind of the scope of coverage, from the terms of the contract coverage, source of the claim payments as well as investment activities. Unlike the conventional insurance, syariah board operates in the country closely monitor and frequently audit whether such takaful products currently available in the market comply with its syariah requirements which the takaful arrangement should meet the elements of mutual cooperation, shared responsibility, mutual protection, and joint indemnity (Archer, Karim & Nienhaus, 2011).

Theoretically, in order for the operational term to comply the shariah requirement, the participants pay the takaful company a "Wakalah" fixed management fee or a "Mudharabah" profit-sharing fee, or a combination of both, as well as premium contributions to cover potential claims (Othman, et

al. 2009). The elements of management expenses and claim expenses paid would be defined as inputs to measuring the efficiency score in this study. In return, the insurer manages the contribution collected and pays claims against the accumulated funds. The takaful company also invests the participant's contributions in shariah acceptable assets to yield return. As result, premium contribution and investment income would be use as outputs to show productivity to the takaful operators for this study.

2.5 Malaysia Studies

In Malaysia, Mansor & Radam (2000) examined the productivity and efficiency for 12 life insurance firms from year 1987 to 1999 by using the DEA method to measure the technical efficiency and applied the Malmquist Index for productivity test over the sample time period. They found that the average technical efficiency is considered high with 72.65% over sample period which relatively lower proportional amount of input that can be reduced without reducing output. The life insurance sector experiences a productivity growth but remain low growth rate as compared to real growth rate of economy.

Following this, Saad, Majid, Yusof, Duasa and Rahman (2006) investigates the efficiency of the life insurance industry in Malaysia from 2002 to 2005 by comparing 13 life insurance and family companies from conventional insurances and takaful operator. The methodology used which was DEA and Malmquist Index with a result has shown the efficiency change is largely contributed by scale efficiency rather than pure technical efficiency, means

overall the firms experience in growth in productivity due to by produce output at optimal scale rather than reduce its inputs. Moreover, they found that the size of the companies does matter in affecting efficiency changes however the insurance firms are found to be experiencing improvement of technical progress that focus of control of the inputs used.

Ismail, Alhabshi and Bacha (2011) studied the relationship between efficiency and organizational structure on a sample of 19 firms over the period of 2004-2009 for conventional and takaful operators in Malaysian. This study also employed DEA to estimate the technical efficiency for both industries and found that takaful operators have lower technical efficiency and scale efficiency compare to conventional insurance. More importantly, they conclude that the organization form which takaful operates under mutual form (policyholder's owner firms) has a large influence to the efficiency compare to stock form (shareholder owner firms).

Saad (2012) investigates the efficiency of general takaful and insurance industry in Malaysia for a sample period between 2007 to 2009 of a panel of 28 general insurances and takaful firms. They used DEA and found that the TFP of the general takaful and insurance industry Malaysia mainly recorded a positive efficiency change and the main sources of the efficiency change are both scale efficiency and pure efficiency that the firms improvement in produce an output level reach to the optimal scale and in the same time manage to reduce the inputs used.

Recently, Chen, Liu & Kweh (2014) investigate changes in productivity of general insurance firms in Malaysia for the period from 2008 to 2011 by

examining the impact of intellectual capital comprising of debt and equities. The main objective is to test on changes in productivity. This study applied the Malmquist Index and further test on second stage test the changes in productivity through ordinary least square (OLS) and Tobit regressions. They concluded that all sample firms experienced growth in efficiency change over the sample period. This change also leads to positive impacts on productivity growth. Finally they suggested that general insurers in Malaysia should invest in intellectual capital, including improving their managerial skills, to gain sustainable growth in productivity for coming future.

2.6 International Studies on Conventional Insurance Efficiency

While referring to the international studies conducted for the efficiency test on insurance and takaful industry, majority of the empirical findings mostly focused on the conventional field for US and Euro region; and takaful industry is considered as a narrow industry normally conducted by Middle East and Asia. Most of the studies using DEA methodology are to examine the correlation between the rate of efficiency across companies, across country, organization form, regulator, merger and acquisition and improvement over the period.

For life insurance market, Boonyasai, Grace & Skipper (2002) analyzed the impact of liberalization and deregulation of four life insurance markets in Korea, Philippines, Taiwan, and Thailand using DEA methodology. The Korea and Philippines underwent modest liberalization and deregulation efforts, whereas Taiwan and Thailand undertook modest liberalization efforts.

Their findings concluded that liberalization and deregulation of the Korean and Philippine life insurance industries have stimulated increases and improvements in productivity compared Taiwanese and Thailand with only small effect of productivity growth. They suggested liberalization and deregulation in order to promote competition to gain more on social welfare.

In Europe, Diacon, Starkey and O'Brien (2002) examined the efficiency of European specialists and composite insurers transacting long-term insurance businesses. They applied DEA to generate efficiency measures to compare international differences among several European countries of their business mix and value mix in long run. The results showed insurers transacting long-term business in the UK, Spain, Sweden and Denmark are likely to have higher average level of technical efficiency compared to their European counterparts. UK insurers likely to be the most efficient firms due to the companies in this country specialize in group pension business.

The other study in Europe country which conducted by Cummins, Rubio-Misas & Zi (2004) analysed the Spanish insurance industry over the ten-year period from 1989 to1998. They used DEA and Malmquist Index test over the industry best practice as benchmarking production and cost frontiers for each year and total factor productivity change. They found that small, inefficient and financially underperforming firms were eliminated from the market due to insolvency and liquidation. Further to this study, they concluded the large firms of the insurance industry in the country should focus on improving efficiency by adopting best practices rather than aim for further growth.

In Asia, Leverty, Lin & Zhao (2004) conducted an investigate efficiency and productivity for the China insurance industry. This study found an annual average productivity growth of 15.8% over the sample period for general insurance sector. Furthermore, they discovered that the factors such as deregulation and restrictions on foreign insurer in the country lead to inefficiency. However, foreign and joint-venture organizations with the local firms are consistent with significant increases in total factor productivity. This study concluded that social economical environment moving towards to the liberalization of the insurance market in China will makes high consumer welfare achievable.

In Japan, Hirao & Inoue (2004) tested economies of scale and economies of scope for the general insurance companies in Japan. They applied regression model by fitting a composite cost function to a set of Japanese firms over the period from 1980 to 1995. They found local and foreign insurance firms in Japan reached economies of scale in long run, which most of the firms operated in long run with lower cost.

Another study by Greene & Segal (2004) to test on efficiency employed the stochastic frontier (SF) method. The researchers derived cost efficiency by SF method to test the mean inefficiency to vary with organizational form and the outputs. The study focused on the relationship between cost inefficiency and profitability in the U.S. life insurance industry. The main contribution of this study is identified earnings have particular importance to life insurance companies because earnings and capital determine the viability of the insurer. Since the life insurance industry is mature and highly competitive, cost efficiency may be the main driver of profitability. The analysis results showed

evidence of inefficiency due to organizational form and also notice that stock companies (shareholder ownership) are as efficient and profitable as mutual companies (policyholder ownership).

The other method that test on efficiency which is estimating the translog cost function for 26 life insurance companies in Taiwan using 23 years of data from 1977 to 1999 by Hao & Chou (2005). The method employed which namely distribution free approach (DFA) and Battese and Coelli model are used to estimate inefficiency. The results showed that the efficiency has significant positive relation to the market share, diversification products strategy, scale efficiency and market growth ratio. They concluded that firms with larger market share are more profitable and product diversification does not improve any efficiency to the firm.

Moreover, the other field that tests on the efficiency which is mergers and acquisitions (M&A) also popular among the scholars. Klumpes (2007) examines the relationship between efficiency and scale economies in the major European insurance markets relating to M&A activities. He found acquiring firms achieve greater efficiency gains than either target firms or firms that have not been involved in mergers or acquisitions. Furthermore, financially vulnerable firms are more likely to be acquisition targets. The study also concluded that M&A in the major European insurance markets reflect to the efficiency effects of market segmentation and concentration. While cross country comparison between UK and Continental European also found a significant difference of efficiency level between the regulatory frameworks of the two countries.

While further development for the current DEA model, Kao & Hwang (2008) modified the conventional DEA model by taking into account the series of relationship of the two sub-processes within the whole process by two-stage DEA. This study tested the Taiwan general insurance companies and showed that some unusual results which have appeared in the independent model do not exist in the relational model. In other words, the rational model developed is more reliable in measuring the efficiencies. However, consequently the model is capable of identifying the causes of inefficiency more accurately. They concluded that two-stage DEA able to significance reveal of operating performance effectively. In the same time, each insurance company also able to realize its strengths and weaknesses in different production stages.

The other test related to M&A activities is conducted by Davutyan & Klumpes (2008). They examine the relationship between mergers and acquisitions, efficiency and scale economies in the major European insurance markets. This study found that asset size increases as scale efficiency goes up but technical efficiency moves down and the results for the general insurance sector are stronger than life insurance sector. They explain that the drivers of after M&A activity in the life insurance sector, majority of the targets and acquirers firms, reduced their labour workers. However, these effects do not have any positive impact to targets firms in general insurance M&A.

Eling and Luhnen (2010a) evaluated the efficiency in the international insurance industry consist of 36 countries by applying both DEA and the Stochastic Frontier Approach (SFA). They used a sample consisting of 6,462 insurers from 2002 to 2006. Their findings indicated that developed countries have higher average technical efficiency than developing countries and less

developed countries. Denmark and Japan have the highest average efficiency, whereas the Philippines is the least efficient.

In United States, Cummins, Weiss, Xie & Zie (2010) tested the both life and general insurance sector and found that general insurers realize cost scope economies which is more efficiency, offset by revenue scope diseconomies that inefficiency in long run. However, the life and health insurance sector realize both cost and revenue scope in the diseconomies of scale or inefficiency.

Further to the empirical study by enhance DEA model, Barros, Nektarious & Assaf (2010) analysed 71 insurers operated in the Greek insurance industry over the period 1994 to 2003. The methodology applied was using two stages DEA. They found that there was an overall technical inefficiency between 1994 and 2003 of Greek insurers. The main findings indicated the majority of insurance companies are operating on declining efficiency level more than 24% after 1997 due the inadequacies in management and technology.

Cummins & Xie (2013) examines the efficiency, productivity and scale economies in the U.S. general insurance industry using DEA and Malmquist Index. They found that the majority of firms below median size in the industry are operating with increasing returns to scale, and the majority of firms above median size are operating with decreasing returns to scale. Over the sample period, the industry experienced significant improvement in total factor productivity. The diversified firms and insurance groups were more likely to achieve efficiency and productivity gains. Higher technology

investment especially information technology would be more likely to be the reason of efficiency and productivity improvements.

Another gross country comparison is among the BRIC (Brazil, Russia, India, and China) conducted by Huang & Eling (2013) analyzed the efficiency of general insurance company's performance. Results indicated that the fast growing markets have significant differences in efficiency due to the political and economic environment. They employed the DEA approach and SFA at second stage to identify four factors that drive the efficiency which are size, profitability, solvency, and ownership form.

2.6 International Studies on Takaful Efficiency

In takaful industry, Abdul Kader, Adam & Hardwick (2010) examined the cost efficiency of takaful operators in 10 Islamic countries using DEA with a sample of 78 firm-years for the period from 2004 to 2006 comprising 26 takaful non-life insurance companies. This study attempted to investigate the relationship between cost efficiency and corporate governance by DEA approach. The findings showed that the mean overall cost efficiency score was higher in takaful sector. They also found there are no economies of scope were successful achieved by takaful insurers due to the cost efficiency emerged from specialized products.

Another study related to the takaful sector which was conducted by Khan & Noreen (2014) where they were compared the efficiency and productivity of Pakistan's takaful and conventional insurance companies. This study also used the DEA approach to estimate technical, allocative and cost efficiencies

over the period from 2006 to 2010. The results indicated that the overall insurance industry in the country as a whole is cost inefficient due to high allocative inefficiency. Results further prove that the takaful firms are more efficient as compared to conventional insurance firms however the conventional firms depicts growth due to improvement in technology, while takaful firms show deterioration in technology.

Recently, the most comprehensive cross country comparison of takaful was conducted by Kader, Adams, Hardwick & Kwon (2014). They employed the DEA method examines the link between cost efficiency and board composition in general takaful insurance firms operating in 17 Islamic countries using panel data from 2004 to 2007. They found an average level of cost efficiency in takaful insurance markets mirror the efficiency in well developed general insurance markets. This study is related to corporate governance systems found in the board of general takaful companies which can be complicated by various firm-specific factors, and would affected to the cost efficiency. The important finding such as the proportion of non-executive directors on the board depends on its interaction with board size. The results could have important influence to the commercial and policy implications that corporate governance structure would affected the efficiency.

2.7 Chapter Summary

The related finance theory related to this study which is agency cost theory that the principle paid a remuneration compensated and authority to the manager in running the organization, it should end up with the profitability

business back to the principle. Hence, to improve the efficiency, that inclusive of technical components that refer to the ability to avoid waste, either by producing as many outputs (revenue income) as technology and input usage (expenses) or by using as little input as required by technology and output production. International researchers have been actively investigating numerous efficiency comparisons in the conventional insurance sector however there were only little studies in the field of takaful sector. The latest study investigated the efficiency between conventional insurance and takaful in Malaysia as it just employed a panel data between until year 2009. Hence, there is a research gap likely to possess an untapped potential in the efficiency measurement with the latest panel data.

CHAPTER THREE

METHODOLOGY

3.0 Introduction

This chapter will explain and discuss the main methodology that have been developed for the purpose in measuring the firm efficiency. Moreover, the selected input and output variable also would be well defining and to support by recent literatures which have empirical studied before. By applying the basic production frontier efficiency technique, which measures the firms efficiency scores by assuming that a firm is operating with minimizing input to produce a specific output levels. The firm can optimize by choosing its level of combining the relationship of inputs and outputs by three efficiency results that is technical efficiency (TE), pure technical efficiency (PTE) and scale efficiency (SE). To extend the growth testing, a sophisticated method such as Malmquist Index would be apply for measuring total factor productivity change over the time.

3.1 Research Framework

The research is design on estimates between the efficiency level of input used and output performance in conventional insurance and takaful operators, it can be described by the following diagram.

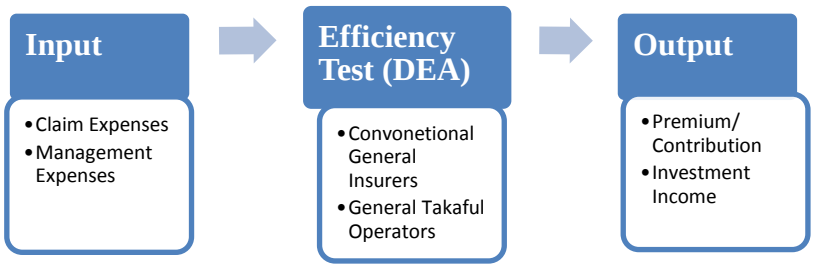


Figure 3.1: Research Framework

Since the main methodology of this study is to measure the performance benchmarking between the input variables to the output variables, requires of dependent and independent variable identified to measure on the relationship. The inputs selected into this study which is claim expenses and management expenses according to the financial statement of insurance firms, these two variables contribute to the major cost of overall general insurance and takaful business. On the other hand, the output chosen in this study are premium and contribution and investment income where both are also the main source of income to the industry. The approach that applies in this study on the efficiency test is Data Envelopment Analysis (DEA). The method provides an efficiency scores as a moderator that affect the strength or direction of outputs that affected by inputs.

3.2 Hypotheses/Propositions Development

With the development to the research question and the objective, in the lines of the shareholders insurance and takaful industry assigns company management and business agency will be given an authority in pricing and

underwriting. Following to this, the main expenses of inputs selected will be attempted to an efficiency test by comparing the outputs productivity performance of takaful industry and insurance industry in Malaysia. In this context, the following hypotheses were developed

H01 : There is a significant difference in the operational efficiency between conventional general insurers and general takaful operator in Malaysia.

H02 : There is more or less technical efficiency (TE), pure technical efficiency (PTE) and scale efficiency (SE) for conventional general insurers than general takaful operators in Malaysia.

H03 : There is a significant improvement of total factor productivity and efficiency for both conventional general insurers and general takaful operators in Malaysia over the sample period.

3.3 Research Design

This study focuses only on data envelopment analysis (DEA) to support selected conventional general insurance and general takaful firms as decision making units. DEA is a method of comparative efficiency measurement and there are many field has been successfully used. Likewise to the insurance industry, there are a lots of researches conducted over many years to measure the performance of any form of decision making units (Cummins & Weiss, 2013).

This study used the DEA model introduced by Charnes, Cooper and Rhodes (1981) which is based on the inputs oriented assumption and constant returns

to scale (CSR). The results of measurement was calculated a fractional linear estimation of efficiency into a mathematical linear programming format. A technology efficiency (TE) by a results that shows how much the firm achive their outputs given assumptions inputs constant. To extent the measurement of pure technical efficiency (PTE) and scale efficiency (SE), the model from Banker, Charnes and Cooper (1984) which showed the convexity constraint of outputs become difference and vary related to selected inputs. This approach ensures that the composite unit is of similar scale size as the unit being measured. The resulting efficiency of the model is always lesser or at least equal to one, meaning that DMUs selected with the lowest input or highest output levels are rated efficient. The BCC model allows are based on assumption variable returns to scale (VRS).

The investigation would be following applied the Malmquist Index approach based on extention of DEA approach in order to calculate conventional general insurers and general takaful operators any changes in total factor productivity (TFP), technology, and technical and scale efficiency over the selected sample year between year 2009 to year 2013.

3.4 Operational Definition

3.4.1 Data Envelopment Analysis (DEA)

Data Envelopment Analysis (DEA) is a non-parametric mathematic programming performance assessment methodology to measure and compare the efficiencies of organizational.

3.4.2 Decision Making unit (DMU)

The organizations and selected firms to measure the DEA result are called the decision-making units (DMU).

3.4.3 Constant Returns to Scale (CRS)

Constant returns to scale states when a change in the inputs causes an equally proportionate change in the outputs.

3.4.4 Variable Returns to Scale (VRS)

Variable returns to scale present while a proportional increase or decrease in the inputs causes a greater or lesser than proportionate increase or decrease to the outputs.

3.4.5 Technical Efficiency (TE)

A firm proficiency in operation that use minimum inputs to generate a constant output production under CRS model.

3.4.6 Pure Technical Efficiency (PTE)

A firm proficiency in operation that use minimum inputs to generate a variable output production under VRS model.

3.4.7 Scale Efficiency (SE)

Scale efficiency is a measure of how much the combination mix of inputs that a specific level of a DMU affected on its ability to achieve maximum productivity.

3.4.8 Malmquist Index

An index to measure of total factor productivity change by identifying various sources of productivity growth such as efficiency change (EFFCH), technical change (TECHCH), pure efficiency change (PECH) scale efficiency change (SECH) and total factor productivity change (TFPCH).

3.5 Measurement of Variables/Instrumentation

In many research in the insurance and takaful research conducted, efficiency is an input-output equation. The primary input is the group of people who create or manage the other inputs and relatively easy to devise in measuring effort in terms productions cost. Insurance and takaful operations consist of underwriting and accessing a new insurable risk, premium and contribution collection production, claim management and settlement, reinsurance/retakaful and investments into profitable return assets. At the same time, the management team also engage in daily operations, such as accounting, auditing, marketing of agencies and brokerage services, legal, loss surveyor, and etc. Managements expenses use as inputs as these involve of the company staff running everyday operations they should act as efficient as possible. (Rejda & McNamara, 2013).

The objective of insurers and takaful is to produce a profitable business and maximum shareholder wealth, for takaful includes of policyholders benefit as well. The underwriter of insurance and takaful constantly strives to select certain types of insurable risk application by proposal given by policyholders. However, they should reject others higher probability changes of losses so to

obtain a profitable portfolio of business, especially the higher claim ratio in the general insurance industry. Underwriting profit also able to gain higher yield by select prospective insured according to the company's underwriting standards and should be end up by low claim expenses (Rejda & McNamara, 2013). As result, there are two major inputs used in this study which is consisting of management expenses and claim expenses. This selected input are in accordance with Boonyasai, et al. (2002), Diacon, et al. (2002), Greene and Segal (2004), Leverty, et al. (2004), Hao & Chou (2005), Saad, et al. (2006), Klumpes (2007), Barros, et al. (2008), Davutyan, et al. (2008), Kader, et al. (2010) and Cummins, et al. (2010)

For outputs in an insurance industry, outcomes of profitability and productivity are measured by volume produced or sold and money earned after all costs are paid. There are a key term are used to classify output measures which process measure gauges the activities undertaken by the relevant inputs are capacity utilization and the ability to accomplishing outcomes over a period of time. In his study, premium collected or contribution and underwriting profit are chosen in this study. The premium or contribution is normally in cash or premium warranty term creates distortions in the reported underwriting results of an insurer (Vaughan, 2013).

On the other hand, the primary objective of insurers and takaful is to attain a positive investment income of premium collected. The insurance company and takaful operators collects premiums or contribution from policyholders, later should invests the fund collected normally in low risk investments assets. In case there there are any people facing losses during the period of cover, then reimburses this fund to the policyholders on the losses. However, for

takaful operators, the accumulation of large contribution collected for the payment of claims in the future and to manage on behalf of others to meet the shariah compliance. Due to the main reason of portion of their invested funds generated must go to meet future claims and possible losses, the primary investment strategic of insurance company and takaful investments is safety of principal. This selected output are in accordance with Boonyasai, et al. (2002), Diacon, et al. (2002), Greene and Segal (2004), Leverty, et al. (2004), Hirao & Inouue (2004), Saad, et al.(2006) Klumpes, (2007), Barros, et al. (2008), Kao & Hwang (2008), Davutyan, et al. (2008) and Kader, et al. (2014).

3.6 Data Collection

This study covers secondary data in the data collection. The data is able to collected from BNM insurance statistical report which collected from the webpage of the Bank Negara Malaysia (BNM). Moreover, this study also collects financial data and additional information from annual reports of the conventional insurance firms and takaful operators. This study also cited some of the data and information supported by various published journals, literatures of such related industries.

3.7 Sampling

This study would take into consideration sampling all the conventional general insurers and general takaful operators in Malaysia only. Below is the

table which show the sample of data which involves all the companies running conventional insurance and takaful for life/family and general business. These companies were the latest companies in year 2014 which approval license financial institution by BNM running business in Malaysia.

Table 3.1 : Conventional insurers combine life and general business

No.	Company
1	AIA Bhd
2	Etiqa Insurance Berhad
3	MCIS Insurance Berhad
4	Prudential Assurance Malaysia Berhad
5	Zurich Insurance Malaysia Berhad

Table 3.2 : Conventional insurers for general business only

No.	Company
1	ACE Jerneh Insurance Berhad
2	AIG Malaysia Insurance Berhad
3	AXA Affin General Insurance Berhad
4	Allianz General Insurance Company (Malaysia) Berhad
5	AmGeneral Insurance Berhad
6	Berjaya Sompo Insurance Berhad
7	Danajamin Nasional Berhad
8	Lonpac Insurance Berhad
9	MSIG Insurance (Malaysia) Bhd
10	Multi-Purpose Insurans Berhad
11	Overseas Assurance Corporation (Malaysia) Berhad
12	Pacific & Orient Insurance Co. Berhad
13	Pacific Insurance Berhad, The
14	Progressive Insurance Berhad
15	QBE Insurance (Malaysia) Berhad
16	RHB Insurance Berhad
17	Tokio Marine Insurans (Malaysia) Berhad
18	Tune Insurance Malaysia Berhad
19	Uni.Asia General Insurance Berhad

Table 3.3 : Takaful operators combine family and general business

No.	Name
1	Etiqa Takaful Berhad
2	HSBC Amanah Takaful (Malaysia) Berhad
3	Hong Leong MSIG Takaful Berhad
4	MAA Takaful Berhad
5	Prudential BSN Takaful Berhad
6	Sun Life Malaysia Takaful Berhad
7	Syarikat Takaful Malaysia Berhad
8	Takaful Ikhlas Berhad

Source: BNM

Table 3.4 : M&A in general insurance and takaful in Malaysia 2009-2013

Year	M&A in General Insurance Industry in Malaysia,
2010	BH Insurance aquire by AXA Affin General
	Tahan Insurance acquired by OAC
	Hong Leong Assurance Berhad was acquired by MSIG
	Pacific Insurance acquired by Canada's Fairfax Financial Holdings
2011	Jerneh Insurance Berhad merged with Ace Synergy Insurance
	Berjaya acquired by Japan's Sompo
	MAA acquired by Zurich Insurance Group
	Kurnia Insurans acquired AmG Insurance
2012	CIMB Aviva Assurance and CIMB Aviva Takaful acquire by Sun Life Financial Inc
	Oriental Capital Assurance Bhd (OCA) Aquired by Tune Ins Holdings
2013	ING's Malaysian purchase by AIA Group's
	Pacific & Orient Insurance Co. aquired by Sanlam Ltd

Source: Frost & Sullivan analysis

This sample of 39 firms comprised of 8 takaful operators, 31 conventional insurers are chosen for this study. The company financial and accounting data are extracting from the annual report including the company audited financial statements, Malaysia Insurance Institute (MII), Malaysia Takaful Association (MTA), and insurance statistical from BNM database. The study employed a time series data over the period 2009 to 2013. In the measurement, insurance

companies and takaful operators included as sample should at least a positive value for all inputs and output variables in order to running an efficiency test. For conventional insurance, the companies where includes general and life business should only consider their inputs and outputs based on general business only. The companies after merge should only take the inputs and outputs factors based on new acquire company structure. However, for the takaful sector, since this study employed only the variables of general takaful business, hence the inputs of the management expenses where the company's financial statements join report together with the family takaful business, it would be measure base the percentage weight of contribution collected between general and family business. Whereas the others variable such as contribution collected, investment income and claim expenses since the reporting are separately, hence not affected.

3.8 Data Collection Procedures

In consistent with all the literature, the data collection approach technique used is to access Bank Negara Malaysia (BNM) statistical data bank. All the samples of conventional insurers and takaful operator in Malaysia have been chosen and relative information and figure which publicly available download without charge. Furthermore, the study time span 2009-2012 which easily available in the BNM helps to account for the reliable data to examine the accurate efficiency test of the selected conventional insurance and takaful operators.

In compare the empirical studies by the latest financial information especially for year 2013 which yet to available from BNM. This study to use company's annual report to get the latest amount of inputs and outputs variables selected. To proxy in this data analysis will also access to selected sample companies homepages to download the latest available financial statement and exported into excel spreadsheets later.

3.9 Techniques of Data Analysis

The methodology employ in this study on estimating efficient frontiers of the insurance and takaful operator in Malaysia is called Data Envelopment Analysis (DEA) due to several advantages taking into the consideration. Firstly, the DEA is non-parametric; it therefore avoids the choice of a functional form that involved of the complicated relative to technical, cost, or revenue function. Moreover, it is not required to make any assumptions base on normal distribution and error term. Secondly, DEA is measuring base on each and every individual firm or decision making unit (DMU) performance basis that convenient for studying economies scope performance that related to productivity and efficiency comparison. Thirdly, the DEA provides a convenient way to decompose the relationship between inputs cost and outputs revenue efficiency into their technical, pure technical, and scale efficiency components in details. Finally, DEA can be applied in a meaningful way to situations where there are only a few decision making units, as low as such the divisions or departments of a firm, however

normally the regression of econometrics requires larger samples of data to generate statistical reliability (Cooper, et al. 2007).

The interpret result of the DEA approach is to get the most performance firm or most efficiency industry over the comparison sample are given to achieve a higher scores. The main important characteristic of DEA is its capability to capture the efficiency scores by test multiple inputs and outputs. The result of the estimation measurement of efficiency was first introduced by Farrell (1957). However, the assumption names the technical efficiency by the amount of waste and inefficiency of any input to produce a constant level of output. This was then distinguished by him from scale efficiencies as adapted from the literature of economics that meaning a lower cost per unit of output generated to produce certain level of production (Farrell 1957).

However, the use of the DEA model was first developed by Charnes, Cooper, and Rhodes (1981) which enhance development on the work of Farrell (1957). The fundamental of the theory were concerned with analyses of all organizational or decision making units (DMUs) allowed using input prices and quantities to be determined. It was used to measure the relative efficiencies of entire economy. The DEA model observe inputs used by the firms and outputs generated by DMU and constructs an line called efficient production frontier based on best practices and benchmarking comparison among DMUs. This approach related to mathematical linear programming techniques. Since its original development, DEA has expanded itself as main research methodology especially in management science. There are more than hundreds references on the subject related in finance, management

science and economics field being reported (Cooper, Seiford, and Tone, 2007).

3.9.1 The Constant Returns to Scale (CRS) Model

CRS approach related to the mathematical programming involves the selection of optimal weights that maximize the objective function of the ratio combination of outputs related to inputs. All of the DMUs participate in the input and outputs being evaluated. The constant returns to scale (CRS) DEA model is originally proposed by Charnes, Cooper and Rhodes (1981) can be measured by input oriented DEA model as formula below:

$$\min_{\theta,\lambda} \theta, \text{ subject to } \quad Y_{rj}\lambda_J \geq Y_{r0}$$
$$\theta X_{i0} - X_{ij}\lambda_j \geq 0$$
$$\lambda_j \geq 0$$

Where;

X_{ij} = the amount of the i[th] input (Management & Claim Expenses) at DMU_j, (Insurance & takaful companies)

Y_{rj} = the amount of r[th] output (Premium or Contribution & investment Income) from DMU_j, (Insurance & takaful companies)

θ = the input technical efficiency (TE) score,

λ_J = vector of weight which defines the linear combination of the peers of DMU_j (Insurance & takaful companies)

The value of θ gives efficiency score for a particular *DMU*, which satisfies $0 \leq \theta \leq 1$. The *DMUs* for which $\theta < 1$ are inefficient while for $\theta = 1$ are on frontiers and hence efficient.

3.9.2 The Variable Returns to Scale (VRS) DEA Model

The variable return to scale (VRS) applied to separate the measurement of scale efficiency (SE) from technical efficiency (TE). Using the non-parameter in linear programming, a convexity constraint *N1* incorporated in previous model can be enhancing into constant return to scale (CRS).

$$\min_{\theta,\lambda} \theta, \text{ subject to } \quad Y_{rj}\lambda_J \geq Y_{r0}$$
$$\theta X_{i0} - X_{ij}\lambda_j \geq 0$$
$$N1'\lambda = 1$$
$$\lambda_j \geq 0$$

Where;

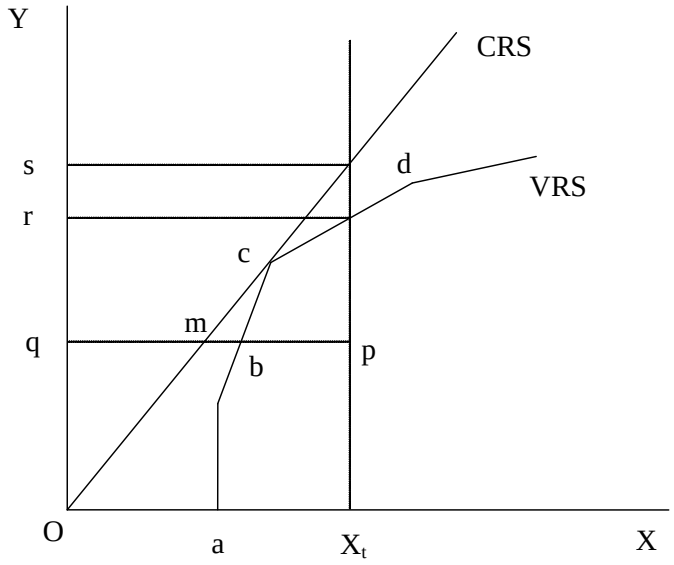
X_{ij} = the amount of the i[th] input (Management & Claim Expenses) at $DMU_{j,}$ (Insurance & takaful companies)
Y_{rj} = the amount of r[th] output (Premium or Contribution & investment Income) from $DMU_{j,}$ (Insurance & takaful companies)
θ = the input pure technical efficiency (PTE) score,
λ_J = vector of weight which defines the linear combination of the peers of DMU_j (Insurance & takaful companies)
N1 = an $I \times 1$ vector of ones

Similar to technical efficiency, the value of θ gives efficiency score for a particular *DMU*, which satisfies $0 \leq \theta \leq 1$. The *DMUs* for which $\theta < 1$ are inefficient while for $\theta = 1$ are on frontiers and hence efficient.

3.9.3 Technical Efficiency, Pure Technical Efficiency and Scale Efficiency

An imperfect competition amount the firms in the market may cause a DMU not to operate at optimal scale. Banker, Charnes and Cooper (1981) extended the original CRS model to account for technologies that show variable returns

to scale (VRS). The CRS technical efficiency scores can be decomposed breakdown into pure technical efficiency (PTE) and scale efficiency (SE). Figure 3.2 below illustrated the difference between CRS model and VRS model by assuming only one input (X) and one output (Y) used by the firm.



Source: Coelli, 1996

Figure 3.2 : CRS, VRS and Scale Efficiency

The inefficient DMU is represented by the point P in Figure 3.2. Under input orientation model, the technical inefficiency of DMU 'P' is *mp* in CRS and *bp* in VRS. The difference between these two measures is expressed as scale inefficiency (SE). In ratio form, technical efficiency (TE) in CRS is *qm/qp* and pure technical efficiency (PTE) in VRS it is *qb/qp*. Scale efficiency (SE) is *qm/qb*. The point such as 'm' and 'c' on the CRS frontier is technical efficient. The point such as 'b', 'c' and 'd' on the VRS frontier is pure technical efficient. The point 'c' on the frontier both CRS and VRS is scale

efficient or completely efficiency. By getting the value of technical efficiency (TE) and pure technical efficiency (PTE) from CRS and VRS model, then the two components would resulting the measurement of scale efficiency by $SE = TE_{VRS} / TE_{CRS}$. Theoretically, the scale of operation of the firm may not able to achieve optimal. In case the firms are too small to produce its outputs, it might fall within the increasing returns to scale part of the production function. Similarly, while a firm too large to produce its outputs may operate within the decreasing returns to scale. In both cases, efficiency of the firms may be improved by changing their scale of operation. The result of scale efficiency only given a score value that less or equal to one. If technical efficiency and pure technical efficiency of a DMU are with the same amount, then scale efficiency should be equal to one. This means that irrespective of scale, size has no impact on efficiency of firm achieve the full efficiency level.

3.9.4 Malmquist Index

While consider the case there are data on firms over time with output and input quantities for each firm over the time, t. We can use the Malmquist Index measures the total factor prodcution (TFP) change between two data points by calculating the ratio of the distances of each data point. Malmquist Index can be further decomposes the productivity change over the time by efficiency change (EFFCH) and technical efficiency change (TECHCH). Fare (1994) and specifies an output based Malmquist productivity change index as:

$$M_0(y_{t+1}, x_{t+1}, y_t, x_t) = \left[\frac{d_0^t(x_{t+1}, y_{t+1})}{d_0^t(x_t, y_t)} \times \frac{d_0^{t+1}(x_{t+1}, y_{t+1})}{d_0^{t+1}(x_t, y_t)} \right]^{1/2}$$

This formula represents the productivity of the production point (x_{t+1}, y_{t+1}) relative over the production point (x_t, y_t).Value greater than one will indicate positive TFP growth from period t to t+1. This index is the geometric mean of two output based Malmquist Index. The input thus employs distance functions from two different periods or technologies, $d_0^t(x_t, y_t)$ and $d_0^t(x_{t+1}, y_{t+1})$; and two pairs of input-output vectors, (x_t, y_t) and (x_{t+1}, y_{t+1}) (Caves, D. W., et al. 1982).

The Malmquist Index can be further breakdown into two major components which is technical efficiency change (EFFCH) and technical change (TECHCH) as show below:

$$M_0(y_{t+1}, x_{t+1}, y_t, x_t) = \frac{d_0^t(x_{t+1}, y_{t+1})}{d_0^t(x_t, y_t)} \times \left[\frac{d_0^t(x_{t+1}, y_{t+1})}{d_0^{t+1}(x_{t+1}, y_{t+1})} \times \frac{d_0^t(x_t, y_t)}{d_0^{t+1}(x_t, y_t)} \right]^{1/2}$$

Change in relative efficiency between period t and t+1.

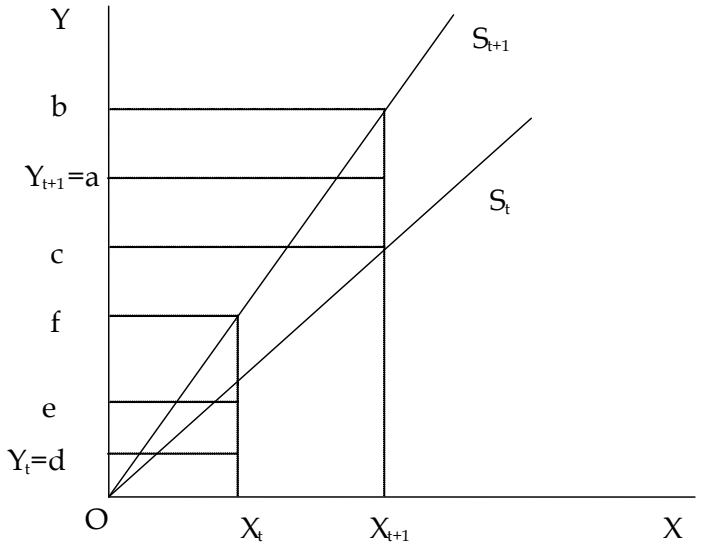
$$EFFCH = \frac{d_0^t(x_{t+1}, y_{t+1})}{d_0^t(x_t, y_t)}$$

Shift in technology between the period t and t+1

$$TECHCH = \left[\frac{d_0^t(x_{t+1}, y_{t+1})}{d_0^{t+1}(x_{t+1}, y_{t+1})} \times \frac{d_0^t(x_t, y_t)}{d_0^{t+1}(x_t, y_t)} \right]^{1/2}$$

The Malmquist Index describe in Figure 3.3 that shows S_t and S_{t+1} represent the technological move in period t and t+1 respectively. The input-output

vectors (x_t, y_t) and (x_{t+1}, y_{t+1}) are feasible in their own periods, but (x_{t+1}, y_{t+1}) does not belong to S_t. By assuming $d_0^t(x_{t+1}, y_{t+1})$ =Oa/Ob and $d_0^t(x_t, y_t)$ =Od/Oe. The interpretation of the Malmquist Index is greater than one, we say that there is growth in production and less than one shows decline compare to previous year.



Source: Hossain and Bhuyan (2002)

Figure 3.3 : Malmquist Index

3.9.5 Software application

The data analysis was carried out using DEAP 2.1 developed by Coelli (1996, 2010). The frontier software employed into this study was used to calculate efficiency scores among all DMUs, rank DMUs using the benchmark method and to compare the improvement of efficiency among the sample years.

To the knowledge until this study, this is the first study to compare and comprehensive efficiency analysis between conventional insurances and takaful operators in Malaysia with the latest comprehensive data available.

3.10 Chapter Summary

This chapter has introduced and discussed the choice and grounded theory methodology that applied into this study which relates to research framework. The inputs selected into this study which is claim and management expenses which according to the financial statement of insurance firms, this two variables major cost to the overall general insurance and takaful business. On the other hand, the outputs chosen in this study are premium contribution and investment income which both are also the main source of revenue to the industry. This study employed a sample inclusive of all general insurers and takaful operators who operating in the general insurance industry in Malaysia. The DEA model based on the inputs oriented assumption and constant returns to scale (CSR), and variable returns to scale (VRS) to measure the technical efficiency (TE), pure technical efficiency (PTE) and scale efficiency (SE) score. The chapter following the discussion on Malmquist Index approach based on extension of DEA in order to calculate the changes in total factor productivity (TFP) with the relevant software.

CHAPTER FOUR

RESULTS AND DISCUSSION

4.0 Introduction

The main focus in this chapter is to discuss all the results and finding based on the principal methodologies that have been employed into this study. At first this chapter would makes a comparison between the two sector s and later overview the demographic profile between conventional general insurer and general takaful operators. The DEA technique which is estimate and measures an efficiency score that assuming a firm is running its operation with minimum input use to produce a conditional output levels and result would be shows as efficiency score. The discussion also would show differently results between technical efficiency (TE), pure technical efficiency (PTE) and scale efficiency (SE). Malmquist Index would be applying for measuring total factor productivity of the insurers and takaful whether any change over the period of study 2009 to 2013.

4.1 Demographic Profile Analysis

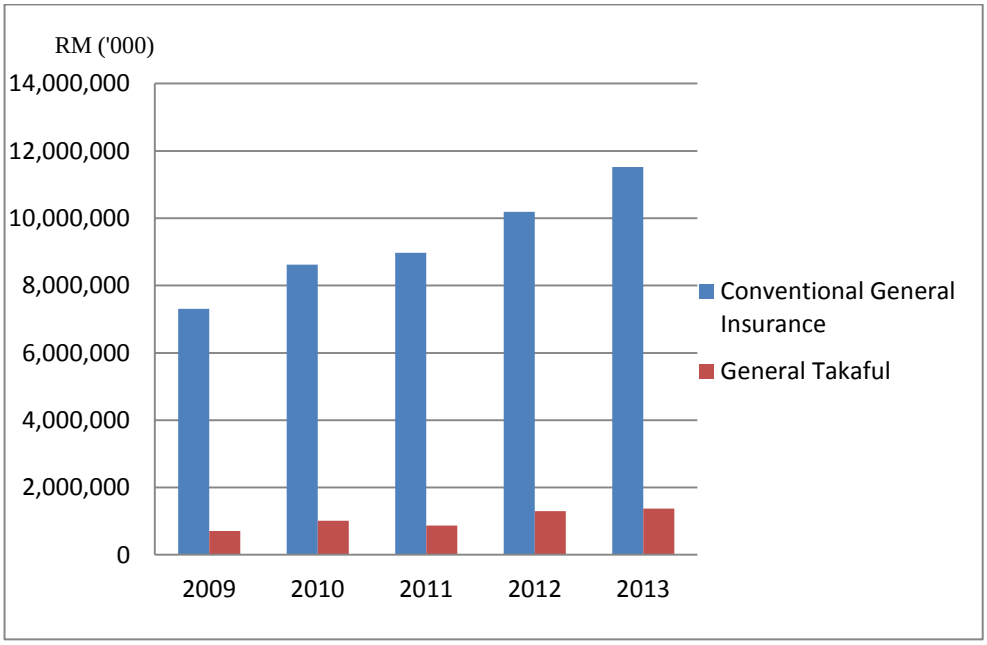


Figure 4.1 : Premium and contribution growth

As refer to the Figure 4.1, the premium and contribution received by both conventional and general takaful industry showing a dramatically growth over the period of study. However, the conventional insurance seems to be having a constant growth between year 2009 to 2013 compare to the takaful operators that facing deterioration in year 2011. The contribution of premium by takaful operators faced a slow growing compare to the conventional counterparts. Conventional general insurer achieve a highest premium collected of RM11.5 billion in year 2013 compare to RM7.3 billion in year 2009. However, the general takaful only record a contribution of RM1.376 billion compare to RM0.7 billion year 2009. The conventional general insurers only record a growth of premium over the past five year with 57.60% compare to general takaful with higher growth of 94.78% over the past five years.

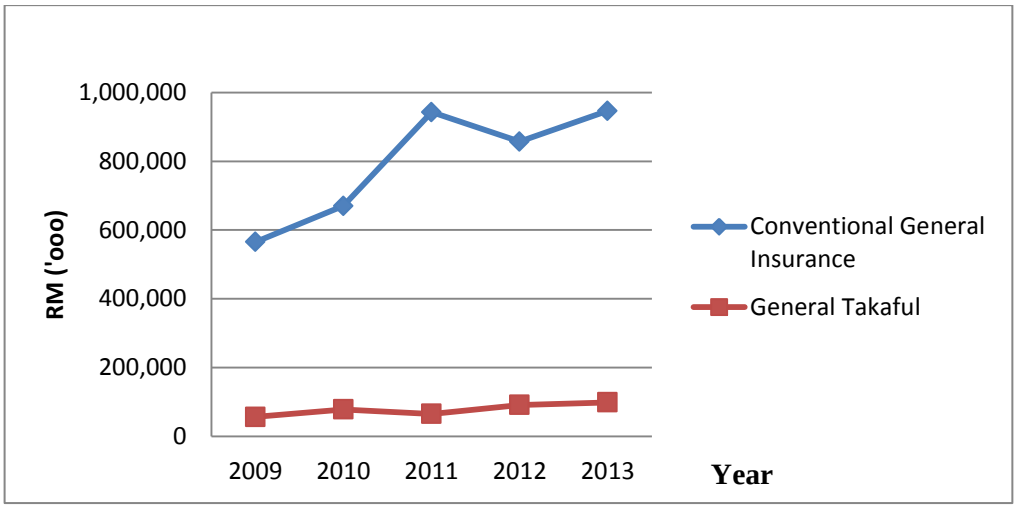


Figure 4.2 : Investment income growth

The growth of the premium and contribution results to the positive relationship to investment income as firm likely to generate invest return base the premium and contribution received. Similar to the premium growth, the conventional sector achieve a high increasing return growth of investment income compare to the takaful counterparts. The investment income of takaful drops in year 2011 which related to the deterioration of contribution received in year 2011. The growth of investment income in conventional sector was 67.41% however the takaful with 74.66%. This show the investment performance of takaful sector lower than their growth of premium contribution collected which is 94.78% over the past five years.

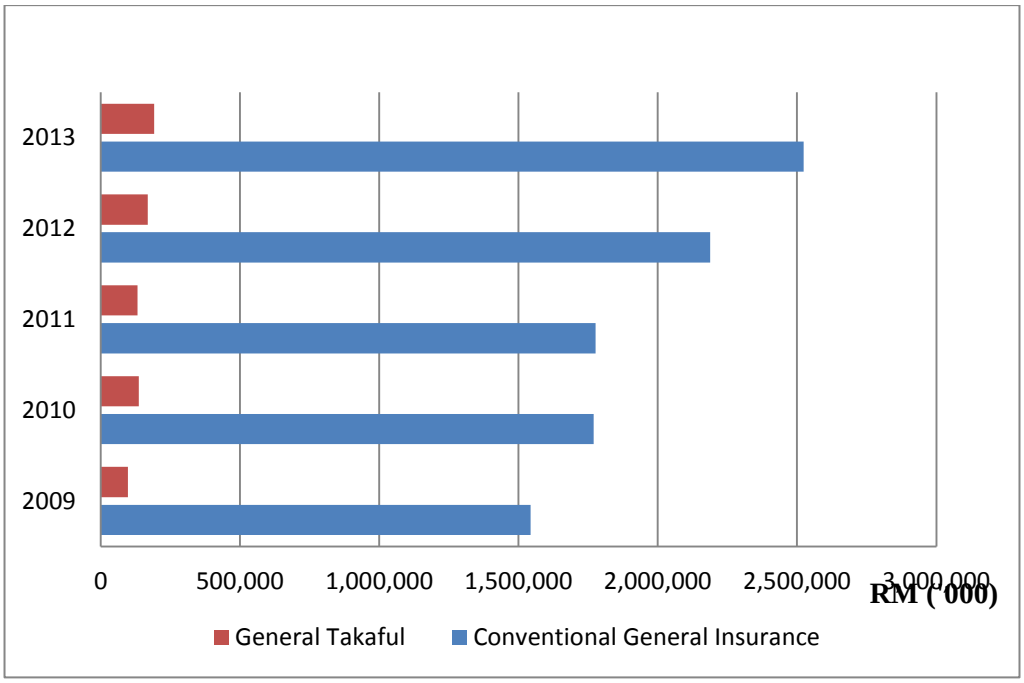
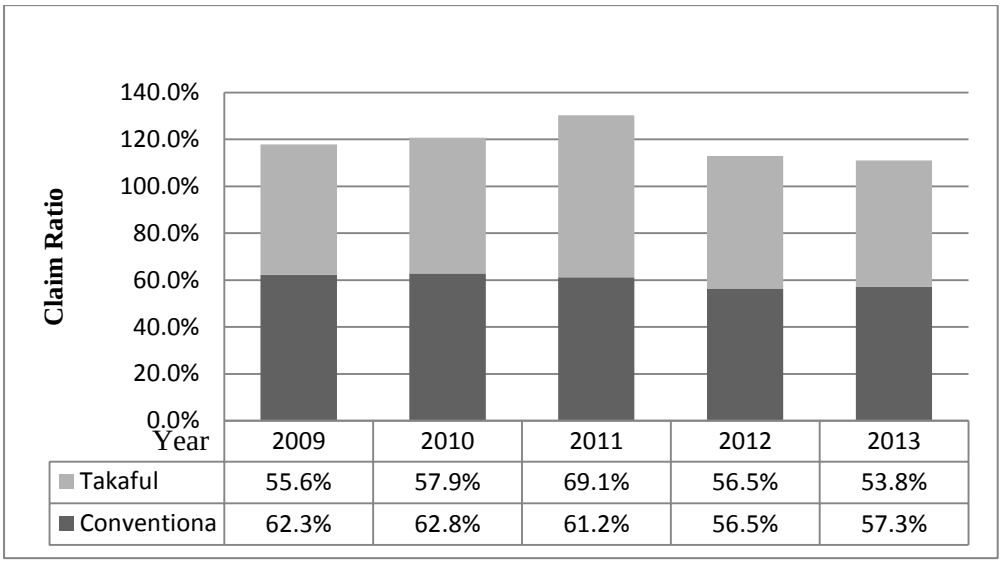


Figure 4.3 : Management expenses comparison

While the compare the management expenses to the premium and contribution received. The management expenses which also have a significant growth positive correlated to premium and contribution. Both sector also facing a increasing of its management expenses in related to the new business increasing annually. However, conventional sector showing an evident that their management expenses of 63.48% higher than growth of premium collected, 57.60%. The takaful sector manages to control their expenses 93.84% with almost the same incremental rate to contribution received, 94.78%.



Year	2009	2010	2011	2012	2013
Takaful	55.6%	57.9%	69.1%	56.5%	53.8%
Conventiona	62.3%	62.8%	61.2%	56.5%	57.3%

Figure 4.4 : Claim ratio comparison

Figure 4.4 shows the claim payout ratio of conventional and takaful sector in general insurance business. Compare to the year 2009, both sector shows an improvement on their operational efficiency that design an underwriting model that can minimize the claim losses payout, as well as eliminate the unnecessary cost expenses that associated with claim handling. However, both sectors record a high claim ratio in year 2011 which more than 60% but later able manage to reduce to 53.8% for general takaful and conventional general insurance 57.3% respectively in year 2013. Over the period to the study, conventional insurers averagely always have a higher claim ratio compare to takaful operators except year 2011.

Table 4.1 : Descriptive statistics comparison of inputs and outputs

	Output (RM million)		Input (RM million)	
Average Type	**Premium Contributions**	**Investment Income**	**Net Claims**	**Management Expenses**
Conventional	9,324	769	5,562	1,960
Takaful	1,054	78	612	145

On average, the amount of premium and net investment income within the period of study are RM9,324 million and RM769 million for conventional insurer and RM1,054 million and RM78 million respectively. Meanwhile, the average of net claims amount and management expenses are RM5,562 million and RM1,960 million for conventional sector compare to RM 612 and RM145 million respectively.

4.2 DEA Result Analysis

Table 4.2 : Technical efficiency scores 2009-2013

CONVENTIONAL COMPANIES	2009	2010	2011	2012	2013
ACE	1.0000	0.5875	0.5842	0.5473	0.7462
AGIC	0.6656	0.6015	0.7517	0.6755	0.8107
AIAB	0.6032	0.4910	0.7943	0.7432	0.8064
AMG	0.6968	0.5915	1.0000	0.7502	0.7432
AXA	0.5741	0.5375	0.6234	0.7016	0.7768
BERJAYA	0.5999	0.6033	0.7437	0.7263	0.7895
BH INSURANCE	0.6433	0.5330	*	*	*
CHARTIS	0.7602	0.4709	0.5332	0.4134	0.7096
ETIQA	0.6999	0.5435	0.6125	0.5292	0.6605
HONG LEONG	0.5961	0.5276	*	*	*
ING	0.5758	0.5449	0.7949	1.0000	*
JERNEH	0.5562	0.5699	0.5970	*	*
KURNIA	0.6765	0.5465	0.6445	0.6056	*
LONPAC	0.7330	0.7326	0.8135	0.7854	0.9372
MAA	0.6117	0.5561	*	*	*
MCIS ZURICH	0.6401	0.5692	0.6610	0.8231	0.8392
MSIG	0.6459	0.6395	0.7690	0.7206	0.8646
MUI CONTINENTAL	0.6945	0.6591	0.7175	*	*
MULTI-PURPOSE	0.5815	0.5591	0.6355	0.6077	0.7141
OAC	0.6358	0.6179	0.6512	0.6470	0.7595
OCA	0.6191	0.5710	0.7937	0.7841	0.7076
P & O	1.0000	0.6561	0.8553	0.6620	0.8390
PACIFIC	0.6562	0.4725	0.6275	0.5875	0.7296
PROGRESSIVE	0.6261	0.6577	0.5301	0.6002	0.6194
PRUDENTIAL	1.0000	0.7819	0.5897	1.0000	0.6979
QBE	0.8523	0.6016	0.6363	0.6221	0.7886
RHB	0.6253	0.6693	0.7035	0.6551	0.7694
TAHAN	1.0000	**	*	*	*
TOKIO MARINE	0.5743	0.5952	0.7397	0.6774	0.8177
UNI.ASIA GENERAL	0.4996	0.5161	0.5813	0.6064	0.7353
ZURICH	*	*	0.6373	0.5901	0.7957
Mean	0.6881	0.5863	0.6897	0.6824	0.7677
% to reduce input cost	31.19%	41.37%	31.03%	31.76%	23.23%
Variance	0.0200	0.0051	0.0118	0.0173	0.0049

TAKAFUL OPERATORS	2009	2010	2011	2012	2013
ETIQA TAKAFUL	1.0000	1.0000	1.0000	1.0000	1.0000
HSBC AMANAH TAKAFUL	*	0.9469	0.9631	0.9768	1.0000
HONG LEONG MSIG TAKAFUL	1.0000	0.5080	0.5075	0.4517	0.6080
MAA TAKAFUL	*	0.5415	0.7055	0.6522	0.7534
PRUDENTIAL BSN	0.9348	0.9781	1.0000	1.0000	1.0000
SUN LIFE MALAYSIA TAKAFUL	0.5196	1.0000	0.6047	**	1.0000
SYARIKAT TAKAFUL MALAYSIA	1.0000	0.6231	0.6449	0.8518	0.9745
TAKAFUL IKHLAS	0.6254	0.5932	0.7111	0.8365	0.9341
Mean	0.8466	0.7739	0.7671	0.8242	0.9087
% to reduce input cost	15.34%	22.61%	23.29%	17.58%	9.13%
Variance	0.0468	0.0506	0.0375	0.0424	0.0218

t-Test: Two-Sample Assuming Unequal Variances					
t Stat	-1.72229	-2.3266	-1.0818	-1.7248	-2.5992
P(T<=t) one-tail	0.067897	0.0264	0.1554	0.0641	0.0158
t Critical one-tail	1.94318	1.8946	1.8595	1.8946	1.8595
P(T<=t) two-tail	0.135794	0.0529	0.3109	0.1282	0.0317
t Critical two-tail	2.446912	2.3646	2.3060	2.3646	2.3060

*Companies taking place in M&A

**Companies show negative claim reserve

Under the CRS assumption, the average technical efficiency values for the year 2009 of conventional general and general takaful operator in Malaysia were as illustrated in Table 4.2. According to the finding, the mean of technical efficiency scores achieve by the conventional general insurance industry was 0.6881, this result indicate which the firms operates under the conventional business form not fully utilize all of its resource, or there is an inefficiency rate was 31.19%. With the reduce level of inputs used by 31.19%, the conventional able to achieve frontier efficiency output level. However, general takaful operators record an efficiency score of 0.7257 higher than their conventional counterpart this year. The takaful sector just required reduces 27.43% of inputs used to achieve frontier efficiency output level.

For the year 2010, the mean of technical efficiency scores of the conventional general insurance industry was 0.5863, the use of resources by conventional sector inefficiency of around 41.37%. With the same resources condition, those firms in the conventional sectors capable to achieve higher output. However, general takaful operators record better efficiency score of 0.7739 this year or reduce only 22.61% of input used in order to achieve frontier efficiency output level .

For the year 2011, the average technical efficiency value of the conventional general insurance industry was 0.6897, evidence of resources were not fully used by around 31.03%. In the same time, general takaful operators record an improvement efficiency score of 0.7671 this year or just need to reduce inputs used of 23.29%.

For the year 2012, the mean technical efficiency scores of the conventional general insurance industry were 0.6824 and inefficiency rate exist of 31.76%. Greater outputs are attainable from conventional sector with the same inputs employed compare to takaful operators. The general takaful operators record a higher efficiency score of 0.8242 this year or just 17.58% to achieve frontier efficiency output level.

For the year 2013, the mean technical efficiency value of the conventional general insurance industry was 0.7677, compare to takaful operators of highest average of 0.9087. With the same resource used, the takaful operators overall makes almost fully utilized of the inputs close to the frontier efficiency output level.

Table 4.3 : Technical efficiency scores base on size 2009-2013

CONVENTIONAL COMPANIES	2009	2010	2011	2012	2013	Average
Large Size	0.6583	0.5985	0.7443	0.6807	0.8015	0.6967
Medium Size	0.6823	0.5704	0.6651	0.6198	0.7665	0.6608
Small Size	0.7156	0.5942	0.6688	0.6771	0.6260	0.6564
TAKAFUL OPERATORS	**2009**	**2010**	**2011**	**2012**	**2013**	**Average**
Large Size	1.0000	0.8116	0.8225	0.9259	0.9872	0.9094
Medium Size	0.6254	0.5932	0.7111	0.8365	0.9341	0.7401
Small Size	0.8181	0.7949	0.7562	0.7702	0.8723	0.8023

With the comparisons to the size, the mean technical efficiency scores of the conventional general insurance industry were 0.6967 of large size, 0.6608 for medium size and small size firms only with 0.6564. Overall, the large size firms in conventional sector relative efficient than medium and small size firm. The general takaful operators record a higher efficiency score of 0.9094 of large size firms and follow to small size. Medium size firms are relatively inefficient for takaful sector.

Table 4.4 : Technical efficiency scores base on foreign and local firm 2009-2013

CONVENTIONAL COMPANIES	2009	2010	2011	2012	2013	Average
Foreign JV	0.7108	0.5795	0.6952	0.6911	0.7176	0.6788
Local	0.6708	0.5919	0.6838	0.6714	0.7611	0.6758
TAKAFUL OPERATORS	**2009**	**2010**	**2011**	**2012**	**2013**	**Average**
Foreign JV	0.8751	0.6895	0.7654	0.8351	0.9155	0.8161
Local	0.8181	0.8582	0.7688	0.6071	0.9020	0.7909

With the comparisons to joint venture with foreign firms and local firms, the mean technical efficiency scores of the conventional general insurance almost the same efficient level which is 0.6788 and 0.6758 respectively. However, the general takaful operators record a higher efficiency score of 0.8161 of joint venture with foreign firms compare to local firm only 0.7909. The result shows evident that insurance and takaful joint venture with foreign firms relatively more efficient in term of utilize of inputs.

Table 4.5 : Pure technical efficiency scores 2009-2013

CONVENTIONAL COMPANIES	2009	2010	2011	2012	2013
ACE	1.0000	1.0000	0.9679	1.0000	1.0000
AGIC	1.0000	1.0000	1.0000	1.0000	1.0000
AIAB	0.7813	0.6645	0.9227	0.8829	1.0000
AMG	0.8078	0.7768	1.0000	0.8847	1.0000
AXA	0.7073	0.6931	0.7613	0.9020	0.8220
BERJAYA	0.7597	0.7856	0.8215	0.8912	0.8149
BH INSURANCE	0.7664	0.7454	*	*	*
CHARTIS	1.0000	1.0000	0.7995	0.7136	0.9280
ETIQA	1.0000	1.0000	0.7637	0.8543	0.8012
HONG LEONG	0.7035	0.6262	*	*	*
ING	0.5995	0.7633	1.0000	1.0000	*
JERNEH	0.6299	0.8457	0.8401	*	*
KURNIA	1.0000	1.0000	0.8058	1.0000	*
LONPAC	1.0000	1.0000	1.0000	1.0000	1.0000
MAA	0.7281	0.7629	*	*	*
MCIS ZURICH	0.6551	0.7709	0.7534	0.8950	1.0000
MSIG	1.0000	1.0000	1.0000	1.0000	1.0000
MUI CONTINENTAL	0.7535	0.6926	0.7933	*	*
MULTI-PURPOSE	0.6998	0.8594	0.7669	0.7771	0.7535
OAC	0.7753	0.8835	0.9411	0.8470	0.7954
OCA	0.6320	0.7152	0.8521	0.8659	0.8160
P & O	1.0000	0.7625	0.9724	0.8025	0.8593
PACIFIC	0.6825	0.6902	0.7231	0.7530	0.7462
PROGRESSIVE	0.7485	1.0000	0.5661	0.6959	0.7432
PRUDENTIAL	1.0000	0.7835	0.6030	1.0000	0.9069
QBE	0.8628	0.9413	0.7948	0.8840	0.9068
RHB	0.7793	0.8660	0.8401	0.8893	0.8248
TAHAN	1.0000	**	*	*	*
TOKIO MARINE	0.9447	0.8551	0.9238	0.9120	0.9067
UNI.ASIA GENERAL	0.6473	0.6887	0.7155	0.7926	0.7708
ZURICH	*	*	0.7597	1.0000	1.0000
Mean	0.8221	0.8335	0.8403	0.8897	0.8868
% to reduce input cost	17.79%	16.65%	15.97%	11.03%	11.32%
Variance	0.0210	0.0157	0.0148	0.0091	0.0096

TAKAFUL OPERATORS	2009	2010	2011	2012	2013
ETIQA TAKAFUL	1.0000	1.0000	1.0000	1.0000	1.0000
HSBC AMANAH TAKAFUL	*	1.0000	1.0000	1.0000	1.0000
HONG LEONG MSIG TAKAFUL	1.0000	0.5080	0.5184	0.4578	0.6088
MAA TAKAFUL	*	0.5415	0.7406	0.8398	0.7595
PRUDENTIAL BSN	1.0000	0.9781	1.0000	1.0000	1.0000
SUN LIFE MALAYSIA TAKAFUL	0.6305	1.0000	0.6369	**	1.0000
SYARIKAT TAKAFUL MALAYSIA	1.0000	0.9614	0.7504	1.0000	1.0000
TAKAFUL IKHLAS	0.7778	0.6603	0.7792	1.0000	0.9747
Mean	0.9014	0.8312	0.8032	0.8997	0.9179
% to reduce input cost	9.86%	16.88%	19.68%	10.03%	8.21%
Variance	0.0255	0.0488	0.0332	0.0415	0.0225

t-Test: Two-Sample Assuming Unequal Variances					
t Stat	-1.1265	0.0292	0.5413	-0.1251	-0.5473
P(T<=t) one-tail	0.1486	0.4887	0.3007	0.4520	0.2987
t Critical one-tail	1.8946	1.8595	1.8331	1.8946	1.8331
P(T<=t) two-tail	0.2971	0.9775	0.6014	0.9039	0.5975
t Critical two-tail	2.3646	2.3060	2.2622	2.3646	2.2622

*Companies taking place in M&A

**Companies show negative claim reserve

The average pure technical efficiency values for the year 2009 of conventional general and general takaful operator in Malaysia were as illustrated in Table 4.5 under the variable return to scale (VRS) assumption,. According to the finding, the mean of technical efficiency scores achieve by the conventional general insurance industry was 0.8221, this result indicate which the firms operates under the conventional business form not fully utilize all of its resource, or there is an inefficiency rate was 17.79%. With the reduce level of inputs used by 17.79%, the conventional able to achieve frontier efficiency output level under VRS model. However, general takaful operators record an efficiency score of 0.9014 higher than their conventional counterpart this year. The takaful sector just required reduces 9.86% of inputs used to achieve frontier efficiency output level.

For the year 2010, the mean of pure technical efficiency scores of the conventional general insurance industry was 0.8335, the use of resources by conventional sector inefficiency of around 16.65%. With the same resources condition, those firms in the conventional sectors capable to achieve higher output. However, general takaful operators record almost the same efficiency score which is 0.8312 this year or reduce only 16.88% of input used in order to achieve frontier efficiency output level .

For the year 2011, the average pure technical efficiency value of the conventional general insurance industry was 0.8403, evidence of resources were not fully used by around 15.97%. In the same time, general takaful operators record a lower efficiency score of 0.9032 this year or need to reduce inputs used of 19.68% in order to reach frontier efficacy output level.

For the year 2012, the mean pure technical efficiency scores of the conventional general insurance industry were 0.8897 and inefficiency rate exist of 11.03%. Greater outputs are attainable from conventional sector with the same inputs employed compare to takaful operators. The general takaful operators record a higher efficiency score of 0.8997 this year or just 10.03% to achieve frontier efficiency output level.

For the year 2013, the mean pure technical efficiency value of the conventional general insurance industry was 0.8866, compare to takaful operators of highest average of 0.9179. With the same resource used, the takaful operators consider almost fully utilized of the inputs achieve to the frontier efficiency output level that only 8.21% reduce of its inputs used. However, the conventional sector needs to reduce 11.32% in order to meet the same level of frontier efficiency target.

Table 4.6 : Pure technical efficiency scores base on size 2009-2013

CONVENTIONAL COMPANIES	2009	2010	2011	2012	2013	Average
Large Size	0.9325	0.9156	0.9068	0.9441	0.9328	0.9264
Medium Size	0.8209	0.8256	0.8507	0.8596	0.8747	0.8463
Small Size	0.7496	0.7811	0.7695	0.8706	0.8532	0.8048
TAKAFUL OPERATORS	**2009**	**2010**	**2011**	**2012**	**2013**	**Average**
Large Size	1.0000	0.9807	0.8752	1.0000	1.0000	0.9712
Medium Size	0.7778	0.6603	0.7792	1.0000	0.9747	0.8384
Small Size	0.8768	0.8055	0.7792	0.8244	0.8737	0.8319

Under the variable return to scale (VRS) assumption, the mean of pure technical efficiency scores of the conventional general insurance industry were 0.9264 of large size, 0.8463 for medium size and small size firms only with 0.8084. Overall, the large size firms in conventional sector relative

efficient than medium and small size firm in utilized of their inputs. The general takaful operators with the same ranking that large size firms record a higher efficiency score of 0.9712 follow by medium size 0.8384 and small size firms are relatively inefficient.

Table 4.7 : Pure technical efficiency scores base on foreign and local firm 2009-2013

CONVENTIONAL COMPANIES	2009	2010	2011	2012	2013	Average
Foreign JV	0.8585	0.8501	0.8712	0.9128	0.9240	0.8833
Local	0.7943	0.8201	0.8070	0.8603	0.8384	0.8240
TAKAFUL OPERATORS	**2009**	**2010**	**2011**	**2012**	**2013**	**Average**
Foreign JV	0.9076	0.8972	0.8311	0.8644	0.9218	0.8844
Local	0.8889	0.7210	0.7568	0.9466	0.9114	0.8449

The mean of pure technical efficiency scores of joint venture with foreign firms in conventional and takaful sector achieve higher efficiency level compare to local firms. The conventional sector records a result of 0.8833 acompare to local 0.8240. Besides, the takaful sector record an efficiency score of 0.8844 of joint venture with foreign firms compare to local firm only 0.8449. The result indicated that insurance and takaful sector with business model joint venture with foreign firms relatively more efficient in term of utilize of inputs under the VRS assumption.

Table 4.8 : Scale efficiency scores 2009-2013

CONVENTIONAL COMPANIES	2009	2010	2011	2012	2013
ACE	1.0000	0.5875	0.6035	0.5473	0.7462
AGIC	0.6656	0.6015	0.7517	0.6755	0.8107
AIAB	0.7721	0.7390	0.8608	0.8418	0.8064
AMG	0.8626	0.7615	1.0000	0.8480	0.7432
AXA	0.8116	0.7755	0.8188	0.7778	0.9450
BERJAYA	0.7897	0.7680	0.9053	0.8149	0.9688
BH INSURANCE	0.8394	0.7150	*	*	*
CHARTIS	0.7602	0.4709	0.6669	0.5793	0.7646
ETIQA	0.6999	0.5435	0.8020	0.6195	0.8243
HONG LEONG	0.8473	0.8425	*	*	*
ING	0.9604	0.7139	0.7949	1.0000	*
JERNEH	0.8830	0.6739	0.7106	*	*
KURNIA	0.6765	0.5465	0.7997	0.6056	*
LONPAC	0.7330	0.7326	0.8135	0.7854	0.9372
MAA	0.8401	0.7289	*	*	*
MCIS ZURICH	0.9772	0.7384	0.8774	0.9196	0.8392
MSIG	0.6459	0.6395	0.7690	0.7206	0.8646
MUI CONTINENTAL	0.9218	0.9516	0.9044	*	*
MULTI-PURPOSE	0.8310	0.6505	0.8286	0.7820	0.9477
OAC	0.8200	0.6993	0.6920	0.7638	0.9549
OCA	0.9795	0.7985	0.9315	0.9055	0.8672
P & O	1.0000	0.8605	0.8796	0.8249	0.9764
PACIFIC	0.9613	0.6846	0.8678	0.7802	0.9777
PROGRESSIVE	0.8364	0.6577	0.9364	0.8625	0.8334
PRUDENTIAL	1.0000	0.9980	0.9779	1.0000	0.7696
QBE	0.9879	0.6391	0.8005	0.7037	0.8696
RHB	0.8024	0.7728	0.8374	0.7367	0.9329
TAHAN	1.0000	**	*	*	*
TOKIO MARINE	0.6080	0.6960	0.8008	0.7427	0.9019
UNI.ASIA GENERAL	0.7718	0.7494	0.8124	0.7651	0.9539
ZURICH	*	*	0.8389	0.5901	0.7957
Mean	0.8428	0.7151	0.8253	0.7677	0.8709
% to achive optimal scale	15.72%	28.49%	17.47%	23.23%	12.91%
Variance	0.0138	0.0130	0.0083	0.0149	0.0063

TAKAFUL OPERATORS	2009	2010	2011	2012	2013
ETIQA TAKAFUL	1.0000	1.0000	1.0000	1.0000	1.0000
HSBC AMANAH TAKAFUL	*	0.9469	0.9631	0.9768	1.0000
HONG LEONG MSIG TAKAFUL	1.0000	1.0000	0.9790	0.9867	0.9986
MAA TAKAFUL	*	1.0000	0.9526	0.7766	0.9919
PRUDENTIAL BSN	0.9348	1.0000	1.0000	1.0000	1.0000
SUN LIFE MALAYSIA TAKAFUL	0.8240	1.0000	0.9494	**	1.0000
SYARIKAT TAKAFUL MALAYSIA	1.0000	0.6482	0.8594	0.8518	0.9745
TAKAFUL IKHLAS	0.8041	0.8985	0.9126	0.8365	0.9583
Mean	0.9272	0.9367	0.9520	0.9184	0.9904
% to achive optimal scale	7.28%	6.33%	4.80%	8.16%	0.96%
Variance	0.0084	0.0150	0.0022	0.0088	0.0002

t-Test: Two-Sample Assuming Unequal Variances					
t Stat	-1.9590	-4.6008	-5.2323	-3.5034	-6.8560
P(T<=t) one-tail	0.0409	0.0004	0.0000	0.0022	0.0000
t Critical one-tail	1.8331	1.7959	1.7139	1.7823	1.7056
P(T<=t) two-tail	0.0818	0.0008	0.0000	0.0044	0.0000

*Companies taking place in M&A

**Companies show negative claim reserve

As discussed in the methodology, scale efficiency (SE) is calculated by the ratio between technical efficiency (TE) under constant returns to scale (CRS) and pure technical efficiency (PTE) under variable returns to scale (VRS), which indicates how the insurance or takaful firms achieve to the optimal scale. In this study, scale efficiencies were found relative higher for takaful sector compare to conventional sector over the period 2009 to 2013. Conventional sector operated at below optimal scale that more than 10% over the past five year if they had reached an optimal scale. This can be interpreted the companies in conventional sector were operated under or over sized in producing their output. However, compared conventional sector, the takaful sector found to be relatively stable and higher scale efficiency score which more than 0.9 over the period 2009 to 2013. The percentage scale efficiency to reach optimal scale, which is below 10%, indicated that the takaful sector considering had reached an optimal scale over the sample period.

Table 4.9 : Scale efficiency scores base on size 2009-2013

CONVENTIONAL COMPANIES	2009	2010	2011	2012	2013	Average
Large Size	0.9325	0.9156	0.9068	0.9441	0.9328	0.9264
Medium Size	0.8209	0.8256	0.8507	0.8596	0.8747	0.8463
Small Size	0.7496	0.7811	0.7695	0.8706	0.8532	0.8048
TAKAFUL OPERATORS	**2009**	**2010**	**2011**	**2012**	**2013**	**Average**
Large Size	1.0000	0.8241	0.9297	0.9259	0.9872	0.9334
Medium Size	0.8041	0.8985	0.9126	0.8365	0.9583	0.8820
Small Size	0.9196	0.9894	0.9688	0.9350	0.9981	0.9622

The mean scale efficiency scores of the conventional general insurance industry were 0.9264 of large size, 0.8463 for medium size and small size firms only with 0.8048. Result indicated that the large size firms in conventional sector relative efficient than medium and small size firm. However, the general takaful operators record a higher efficiency score of

0.9622 of small size firms and follow to large size firms, 0.9334. Medium size firms are relatively inefficient for takaful sector which only 0.8820.

Table 4.10 : Scale efficiency scores base on foreign and local firm 2009-2013

CONVENTIONAL COMPANIES	2009	2010	2011	2012	2013	Average
Foreign JV	0.8585	0.8501	0.8712	0.9128	0.9240	0.8833
Local	0.7943	0.8201	0.8070	0.8603	0.8384	0.8240
TAKAFUL OPERATORS	**2009**	**2010**	**2011**	**2012**	**2013**	**Average**
Foreign JV	0.9397	0.9894	0.9783	0.9909	0.9997	0.9796
Local	0.9020	0.8489	0.9082	0.8217	0.9749	0.8911

The mean scale efficiency scores of joint venture with foreign firms in the conventional and takaful sector always higher than the local firms. Insurance and takaful sector which joint venture with foreign firms record a higher efficiency score of 0.833 and 0.9799 respectively compare to local firms only 0.8240 and 0.8991. Companies that joint venture with foreign firm relative able to achieve an output level that close to optimal scale.

4.3 Performance of Total Productivity Change

Table 4.11 : Malmquist Index summary of annual means

YEAR	EFFCH	TECHCH	PECH	SECH	TFPCH
2009-2010	1.0210	0.9620	1.0000	1.0210	0.9830
2010-2011	1.0360	0.9840	1.0000	1.0360	1.0200
2011-2012	1.0000	1.0380	1.0000	1.0000	1.0380
2012-2013	1.0000	0.9820	1.0000	1.0000	0.9820
MEAN	1.0140	0.9910	1.0000	1.0140	1.0060
Productivity Change in %	1.40%	-0.90%	0.00%	1.40%	0.60%

Table 4.12 : Malmquist Index summary of firms means

YEAR	EFFCH	TECHCH	PECH	SECH	TFPCH
CONVENTIONAL	1.0290	0.9920	1.0000	1.0290	1.0210
TAKAFUL	1.0000	0.9910	1.0000	1.0000	0.9910
MEAN	1.0140	0.9910	1.0000	1.0140	1.0060
Productivity Change in %	1.40%	-0.90%	0.00%	1.40%	0.60%

* ** EFFCH = Efficiency Change

TECHCH = Technological Efficiency Change

PECH= Pure Technical Efficiency Change

SECH = Scale Efficiency Change

TFPCH = Total Factor Productivity Change

Regarding the changes in productivity of conventional general insurer and takaful operators in the industry, the average change trend was as shown in Table 4.11 and Table 4.12 based on the results estimation from Malmquist index. The 2009-2013 average of total factor productivity (TFP) was 1.0060, indicating the average growth of the industry productivity was increase by only 0.6%. The major source of productivity changes are the technical efficiency changes with an average reduce in growth rate at 0.9% however the efficiency change record a increasing rate in changes with an average growth rate at 1.40%. There is no growth of pure technical efficiency however the scale efficiency records average annual growth rates of 1.4% over the sample period.

In terms of yearly differences, the changes in TFP were more apparent. TFP values between 2010-2011 and 2011-2012 were all above 1, indicating that productivity of the general insurance sector has a significant improved, with the growth rate between the year 2010-2011 the highest at 2%, and the

growth rate between 2011-2012 was 3.8%. The TFP values between 2009-2010 and 2012-2013 were less than one indicated that the industry facing deterioration in productivity. The industry experienced significance deterioration in productivity by 1.7% and 1.8% respectively for the year 2009-2010 and 2012-2013.

In terms of sector differences, TFP values of convention al sector relatively facing positive growth in productivity of 2.1% however the takaful sector experience deterioration in productivity of 0.9%. It was figured that majority of the takaful firms were operating at inappropriate improvement in their productive level in utilize their inputs even their efficiency level outpaced the conventional sector.

4.4 Chapter Summary

In this chapter, we analysed the overall performance of technical efficiency (TE), pure technical efficiency (PTE) and also the scale efficiency (SE) for each conventional insurer and takaful operators for the sample period of 2009 to 2013. It was observed, out of the 31 conventional and 8 takaful operators in the study there was four conventional and three takaful were found completely efficient (TE, PTE and SE at the best frontier) as derived from overall technical efficiency scores in year 2009 which is ACE, P&O, Prudential and Tahan from conventional sector and Etiqa, Hong Leong MSIG and Syarikat Takaful Malaysia achieve completely efficient from takaful sector. Only two takaful operators were found completely efficient as derived from overall efficiency scores in year 2010 which is Etiqa and Sun Life

Malaysia Takaful. Only one conventional which is Am General insurance and two takaful which is Etiqa and Prudential BSN were found completely efficient as derived from overall efficiency scores in year 2011. In year 2012, there are two conventional which are ING and Prudential, and two takaful which is Etiqa and Prudential BSN were found completely efficiency. Finally, there are no conventional but there are four takaful were found completely efficient as derived from overall technical efficiency scores in year 2013 which is Etiqa, HSBC Amanah Takaful, Prudential BSN and Sun Life Malaysia Takaful.

The results showing that the general takaful operators overall were employing their inputs effectively in producing the existing level of output. While on the other hand, conventional general insurers were reported as inefficient as overall they were operating below the efficient frontier. It highlighted the issue of inappropriate management and control of the inputs such as management expenses and claims expenses control. The Etiqa takaful was the only company that achieve completely efficiency over the past five years however the same company running in the conventional business unable to achieve such efficiency level in the given period of study.

Moreover, there is also an evidence indicated that large size firm relative more efficient compare to medium and small size firm under CRS and VRS assumption for both conventional and takaful sector. On the other hand, conventional insurers and takaful that joint venture with foreign firms were found relatively more efficient than local firms.

The investigation of the sample firms employed a two-tail test that tow sample mean are inequality variance. lf t stat < -t critical two-tail or t stat > t critical two-tail which at critical significant value of 0.05, we reject the null hypothesis. In this study, almost all the running test of technical efficiency (TE), pure technical efficiency (PTE) and scale efficiency (SE) which within the range. Therefore, we rejected the null hypothesis. The observed difference between the sample means is convincing enough to say that the average efficiency scores are no difference of variance.

CHAPTER FIVE

CONCLUSION AND RECOMENDATION

5.0 Introduction

This chapter will summarize and conclude all the results and finding based on the empirical findings those principal methodologies that have been employed into this study. The DEA technique which shows as efficiency score in the previous chapter would be conclude the overall results. The discussion also provide some recommendations where the efficiency level of the insurance and taaful industry where facing deterioration. Moreover, this chapter do discuss the limitation of the study and the related theoretical and practical contribution of the study. Finally, the researcher suggest and recommendations for future Research where related to this field.

5.1 Finding on Efficiency

This study investigates the efficiency result of conventional general insurer and general takaful operators in Malaysia over the period 2009 to 2013. The input and output data employed into this study consisting of a panel of conventional general insurers and takaful operators. DEA approach is the main method used in analyzed the efficiency of these sample firms. Compare to the literature earlier (Ismail, et al., 2011, Saad 2012), this study found that the in the general insurance business, takaful operators in Malaysia which are relatively more efficiency in their operation compare to the conventional insurance since 2011. On the other hand, the conventional sector records a

lower growth rate not running at the efficiency level compare to their takaful counterparts. Efficiency of takaful operators is important especially for the country like Malaysian consist of dual financial system with conventional and Islamic finance. Results of the study showing the takaful operators are operating in outpaced with their conventional counterparts and indicates a positive sight that the Islamic financial sector strengthening their operation in the same time making profitable business. This also a sign indicate that the Malaysia government ambitions to become a regional hub of Islamic finance in the world were at the right trend. Overall, the efficiency of the takaful companies is found to be higher to their conventional counterparts for the period of study except year 2009 and 2010.

Moreover, the results also showing that large size firm relative more efficient compare to medium and small size firm for both conventional and takaful sector. Conventional insurers and takaful that business model with joint venture together with foreign firms were found relatively more efficient than local firms.

The total factor productivity performances of the both industry has been record only a small improvement in overall productivity growth. However, result showing one of the general takaful operator namely Etiqa takaful achieve a completely efficiency during the period of this study although the Etiqa under the conventional business unable to record full efficiency. The results provide a significant evidence for the insurance and takaful companies in Malaysia which the takaful operators who running its business model joint operation with family takaful business able to gain more efficiency level.

During the sample period, the Malaysian takaful and insurance industry experienced a small improvement of total factor productivity, mainly due to deterioration in technical efficiency. This study also found that eventually the general and takaful industry small percentage of positive growth in efficiency overall due the technical efficiency. This result indicates that the Malaysia's takaful and insurance in general insurance business required to improve its total factor productivity mainly focus in technical component, such as improving or enhancing the information technology and provide training to human resource that able to reduce the management expenses and be more caution while underwrite and accessing insurance risk portfolio.

5.2 Theoretical and Practical Contribution

This study contributed to the finance theory agency cost theory in the insurance industry where the agency cost conceptual to use the claim expenses as an input to the general insurance industry as the manager of the general insurance play a important role on the risk selected to underwrite before accept any coverage to the firm. Moreover, this study also advances of knowledge of productivity and efficiency test by employed an empirical investigate to cover all the sample data of general insurer and general takaful in Malaysia with latest data which will draw contribute to scholarly literatures and provides a comprehensive evidence.

5.3 Recommendations for Future Research

Further comprehensive studies related to the efficiency test of the conventional life insurer and family takaful operators, reinsurance and retakaful sector, or insurance and takaful broker field are needed since there is still a research gap in this area with the latest data employed and potential fresh exploratory field.

5.4 Conclusion

The main findings of this research is the takaful sector achieved a higher growth in term of contribution premium compare to conventional sector in general insurance business from the year 2009 to 2013. Moreover, the takaful sector also experienced a higher efficient level that outpaced the conventional counterpart. Large size firms relative more efficient compare to medium and small size firms for both conventional and takaful sector. Conventional insurers and takaful that business model with joint venture together with foreign firms were found relatively more efficient than local firms. The industry experienced an increasing of productivity during the sample period. Moreover, this research suggests the use of technology in insurance and takaful industry to reduce inputs cost such management and claim expenses. These findings might be field the research gap and informative for future researches.

REFERENCE

Abdul Kader, Adams & Hardwick (2010). The cost efficiency of takaful insurance companies. *Geneva Paper on Risk and Insurance*: Issues & Practice, 1, 161.

Andersen, P., & Petersen, N. C. (1993). A procedure for ranking efficient units in data envelopment analysis. *Management science*, 39(10), 1261-1264.

Archer, S., Karim, R. A. A., & Nienhaus, V. (2011). *Takaful Islamic Insurance: Concepts and Regulatory Issues* (Vol. 764): John Wiley & Sons. Hoboken.

Arrow, K.J. (1965). Aspects of the Theory of Risk-Bearing, *Yrjo Johnsson Lectures*, Saatio, Helsinki Y.J.

Bakar, M. D. (2009). Shari'ah Principles Governing Takaful Models. *Takaful Islamic Insurance: Concepts and Regulatory*, Issues, 31-45.

Banker, R. D. (1984). Estimating most productive scale size using data envelopment analysis. *European Journal of Operational Research*, 17(1), 35-44.

Barros, C. P., Ibiwoye, A., & Managi, S. (2008). Productivity Change of Nigerian Insurance Companies: 1994–2005. *African Development Review*, 20(3), 505-528. doi: 10.1111/j.1467-8268.2008.00196.x

Barros, Carlos Pestana, Milton Nektarios, and A. Assaf. "Efficiency in the Greek insurance industry." *European Journal of Operational Research* 205.2 (2010): 431-436.

Bhatty, A. (2010). The growing importance of Takaful insurance. *Paper presented at the Asia regional seminar, OCED and bank of Negara*, Kuala Lumpure.

Biener, C., & Eling, M. (2012). Organization and efficiency in the international insurance industry: A cross-frontier analysis. *European Journal of Operational Research*, 221(2), 454-468.

Bikker, J. A., & Van Leuvensteijn, M. (2008). Competition and efficiency in the Dutch life insurance industry. *Applied Economics*, 40(16), 2063-2084.

BNM. (2014). Annual insurance and takaful statistic. Retrieved from Bank Negara Malaysia: http://www.bnm.gov.my/index.php?ch=statistic&lang=en

Boonyasai, T., Grace, M.F., & H.D. Skipper (2002). The Effect of Liberalization and Deregulation on Life Insurer Efficiency, Center for Risk Management and Insurance Research Georgia StateUniversity Atlanta, GA Working Paper No. 02-2.

Caves, D. W., et al. (1982). "Multilateral Comparisons of Output, Input, and Productivity Using Superlative Index Numbers." *The Economic Journal* 92(365): 73-86.

Chaffai, M., & Ouertani, M. (2002). Technical efficiency in the Tunisian insurance industry: A comparison of parametric and non parametric time variant models: *Working Paper, Research Unit on Production Econometrics*, Sfax University, Sfax.

Charnes, A., Cooper, W. W., Golany, B., Seiford, L., & Stutz, J. (1985). Foundations of data envelopment analysis for Pareto-Koopmans efficient empirical production functions. *Journal of Econometrics*, 30(1), 91-107.

Charnes, A., Cooper, W. W., & Rhodes, E. (1981). Evaluating program and managerial efficiency: an application of data envelopment analysis to program follow through. *Management science*, 27(6), 668-697.

Chen, F.-C., Liu, Z., & Kweh, Q. L. (2014). Intellectual capital and productivity of Malaysian general insurers. *Economic Modelling*, 36, 413-420.

Choi, B. P., & Weiss, M. A. (2005). An Empirical Investigation of Market Structure, Efficiency, and Performance in Property and Liability Insurance. *Journal of Risk and Insurance*, 72(4), 635-673.

Chou & Hau (2005). The estimation of efficiency for life insurance industry: The case in Taiwan. *Journal of Asian Economics*, 16, 847-860.

Coelli, T. (1996). A Guide to DEAP 2.1: A Data Envelopment Analysis Program. *University of New England*, Armidale.

Coelli, T. (2010). DEAP 2.1: *Centre for Efficiency and Productivity Analysis (CEPA)*. University of New England, Armidale.

Coelli, T. J., Prasada Rao, D., O'Donnell, C. J., & Battese, G. E. (2005). *Data Envelopment Analysis*. An Introduction to Efficiency and Productivity Analysis, 161-181.

Cooper, W. W., Seiford, L. M., & Tone, K. (2007). *Data envelopment analysis: A comprehensive text with models, applications, references and DEA-Solver Software. Second editions*. Springer, ISBN, 387452818, 490.

Cooper, W. W., Seiford, L. M., & Zhu, J. (2011). *Handbook on data envelopment analysis* (Vol. 164): Springer.

Cummins, J.D., Grace, M.F. & Phillips, R.D. (1999). Regulatory solvency prediction in property-liability insurance: risk-based capital, audit ratios, and cash flow simulation. *Journal of Risk and Insurance*, 66, 417-458.

Cummins, J.D. & Nini, G. (2002). Optimal capital utilization by financial firms: evidence from the property-liability insurance industry. *Journal of Financial Services Research*,21, 15-53.

Cummins, J.D. & Outreville, F.(1987). An international analysis of underwriting cycles. *Journal of Risk and Insurance* 54, 246-262.

Cummins, J. D., Rubio-Misas, M., & Zi, H. (2004). The effect of organizational structure on efficiency: Evidence from the Spanish insurance industry. *Journal of Banking & Finance*, 28(12), 3113-3150.

Cummins J.D., S. Tennyson and M.A. Weiss (1999). "Consolidation and Efficiency in the US Life Insurance Industry." *Journal of Banking and Finance*, 23(2-4): 325-357.

Cummins, J. D., & Weiss, M. A. (2000). The global market for reinsurance: Consolidation, capacity, and efficiency. *Brookings-Wharton Papers on Financial Services*, 3(2000), 159-209.

Cummins, J. D., & Weiss, M. A. (2013). Analyzing firm performance in the insurance industry using frontier efficiency and productivity methods. *Handbook of insurance* (pp. 795-861): Springer.

Cummins, J. D., & Xie, X. (2013). Efficiency, productivity, and scale economies in the US property-liability insurance industry. *Journal of Productivity Analysis*, 39(2), 141-164.

Cummins, Weiss, Xie & Zi (2010). Economies of scope in financial services: A DEA efficiency analysis of the U.S insurance industry. *Journal of Banking and Finance*, 34, 1525-1539.

Daraio, C., & Simar, L. (2007). *Advanced robust and nonparametric methods in efficiency analysis: Methodology and applications* (Vol. 4): Springer.

Davutyan, N., & Klumpes, P. J. (2008). Consolidation and efficiency in the major European insurance markets: a non discretionary inputs approach: *Working Paper, Imperial College London*.

Debreu, G. (1951). The coefficient of resource utilisation. *Econometrica*, 19, 273-292.

Diacon, S. R., Starkey, K., & O'Brien, C. (2002). Size and efficiency in European long-term insurance companies: an international comparison. *Geneva Papers on Risk and Insurance*. Issues and Practice, 444-466.

Diboky, F., & Ubl, E. (2007). Ownership and efficiency in the German life insurance market: a DEA bootstrap approach. *Paper presented at the 34 the Seminar of the European Group of Risk and Insurance Economics*, University of Cologne, September.

Eling, M., & Luhnen, M. (2010a). Efficiency in the international insurance industry: a cross-country comparison. *Journal of Banking & Finance*, 34(7), 1497-1509.

Eling, M., & Luhnen, M. (2010b). Frontier efficiency methodologies to measure performance in the insurance industry: overview, systematization, and recent developments. *The Geneva Papers on Risk and Insurance-Issues and Practice*, 35(2), 217-265.

Ernst & Young (2012) "Industry Growth and Preparing for Regulatory Change: *The World Takaful Report 2012*," Dubai, UAE

Fenn, P., Vencappa, D., Diacon, S., Klumpes, P., & O'Brien, C. (2008). Market structure and the efficiency of European insurance companies: a stochastic frontier analysis. *Journal of Banking & Finance*, 32(1), 86-100.

Farrel, M.J. (1957). The measurement of productive efficiency. *Journal of Royal Statistical Society* ,(A) 120, 253-81.

Greene, W. H., & Segal, D. (2004). Profitability and efficiency in the US life insurance industry. *Journal of Productivity Analysis*, 21(3), 229-247.

Fetcher, Perelman & Pestieau (1993). Productive performance of the French insurance industry. *Journal of Productivity Analysis* 4,(1-2), 77-93.

Hao, J. C., & Chou, L.-Y. (2005). The estimation of efficiency for life insurance industry: The case in Taiwan. *Journal of Asian Economics*, 16(5), 847-860.

Hardy, C. O. (1922). *Journal of Political Economy*, 30(5), 717. doi: 10.2307/1822743

Hou, H., Cheng, S.-Y., & Yu, C.-P. (2012). Life Insurance and Euro Zone's Economic Growth. *Procedia - Social and Behavioral Sciences*, 57(0), 126-131. doi: http://dx.doi.org/10.1016/j.sbspro.2012.09.1165

Htay, S. N. N., Arif, M., & Soualhi, Y. (2012). *Accounting, Auditing and Governance for Takaful Operations*. Somerset, NJ, USA: John Wiley & Sons.

Huang, L. Y., Lai, G. C., McNamara, M., & Wang, J. (2011). Corporate governance and efficiency: evidence from US property–liability insurance industry. *Journal of Risk and Insurance*, 78(3), 519-550.

Huang, W., & Eling, M. (2013). An efficiency comparison of the non-life insurance industry in the BRIC countries. *European Journal of Operational Research*, 226(3), 577-591. doi: http://dx.doi.org/10.1016/j.ejor.2012.11.008

Hussain, M. M., & Pasha, A. T. (2011). Conceptual and operational differences between general takaful and conventional insurance. *Australian Journal of Business and Management Research*, 1(8), 23-28.

Insurance Info. (2014). Your guide on fundamentals of Insurance and takaful. Retrieved from *http://www.insuranceinfo.com.my*

Islamic Finance : Instruments and Markets. (2010). Huntingdon, GBR: *Bloomsbury Information Ltd. Malaysia Insurance Report* - Q4 2012. (2012) (pp. 1-97). London: Business Monitor International.

Ismail, N., Alhabshi, D. S. O., & Bacha, O. (2011). Organizational form and efficiency: The coexistence of family Takaful and life insurance in Malaysia. *Journal of Global Business and Economics*.

Jeng, V., & Lai, G. C. (2005). Ownership structure, agency costs, specialization, and efficiency: analysis of Keiretsu and independent insurers in the Japanese nonlife insurance industry. *Journal of Risk and Insurance*, 72(1), 105-158.

Jensen, M. C., & Meckling, W. H. (1979). *Theory of the firm: Managerial behavior, agency costs, and ownership structure* (pp. 163-231). Springer Netherlands.

Kader, Adam, Hardwick & Kwon. (2014). Cost efficiency and board composition under different takaful insurance business models. *International Review of Financial Analysis* 32(0): 60-70.

Kao, C., & Hwang, S.-N. (2008). Efficiency decomposition in two-stage data envelopment analysis: An application to non-life insurance companies in Taiwan. *European Journal of Operational Research*, 185(1), 418-429.

Khan, A. & Noreen, U. (2014). Efficiency Measure of Insurance v/s Takful Firms Using DEA Approach: A Case of Pakistan. *Islamic Economic Studies*, 22(1), 139-158.

Klumpes, P. J. (2007). Consolidation and efficiency in the major European insurance markets. *Working Pa-per, Imperial College, London*.

Knight, F. H. (2005). Risk, Uncertainty and Profit: *Cosimo Classics*.

Koopsmans, T.C. (1951). Efficient Allocation of Resources. *Journal of the Econometric Society*, 19 (4).

Leverty, J. T., & Grace, M. F. (2010). The robustness of output measures in property-liability insurance efficiency studies. *Journal of Banking & Finance*, 34(7), 1510-1524. doi: http://dx.doi.org/10.1016/j.jbankfin.2009.08.015

Leverty, T., Lin, Y., & Zhou, H. (2004). *Firm performance in the Chinese insurance industry*. Unpublished Dissertation, Georgia State University.

Luhnen, M. (2009). Determinants of efficiency and productivity in German property-liability insurance: evidence for 1995–2006. *The Geneva Papers on Risk and Insurance-Issues and Practice*, 34(3), 483-505.

Mahmoud, H.(2008). Insurance: Takaful Gaining Ground, *The Actuary*

Mansor, S. A., Radam, A., (2000). Productivity and Efficiency Performance of the Malaysian Life InsuranceIndustry. *Jurnal Ekonomi Malaysia*, 34, 93 – 105.

Muller, W. (1995). Informations produkte (Informational products). *Zeitschrift fur Betriebs-wirtschaft*, 65, 1017–1044.

Murdick, R. G., Render, B., & Russell, R. S. (1990). *Service operations management. Boston*, Massachusetts: Allyn and Bacon.

Obaidullah, M. (2005). *Islamic Financial Services*. Scientific Publishing Centre, King Abdulaziz University.

Othman, M. S., & Abdul Hamid, M. (2009). A study on the level of knowledge and understanding among muslims towards the concepts, arabic and shariah terms in Islamic insurance (Takaful). *European Journal of social sciences*, 10(3), 468-478.

Parker, M. (2010). Bank Negara Malaysia reviews new guidelines for Takaful products, McClatchy - *Tribune Business News*. Retrieved from http://eserv.uum.edu.my/docview/756154067?accountid=42599

Redzuan, H., Rahman, Z. A., & Aidid, S. (2009). Economic determinants of family takaful consumption: Evidence from Malaysia. *International Review of Business Research Papers*, 5(5), 193-211.

Rejda, G., & McNamara, M. (2013). *Principles of Risk Management and Insurance*: Pearson Education.

Saad, N. M., Majid, M. S. A., Yusof, R. M., Duasa, J., & Rahman, A. (2006). Measuring Efficiency of Insurance and Takaful Companies in Malaysia Using Data Envelopment Analysis (DEA). *Review of Islamic Economics*, 10(2), 5.

Saad, N. M. (2012). An analysis on the efficiency of takaful and insurance companies in malaysia: a non-parametric approach. *Review of Integrative Business & Economics Research*, 1(1), 33-56.

Sealey, C., Lindley, J. (1977). Inputs, outputs, and a theory of production and cost at depository financial institutions. *Journal of Finance* 32, 1251-1266.

Sekaran, U., & Bougie, R. (2010). *Research Methods for Business: A Skill Building Approach*: John Wiley & Sons.

Trigo Gamarra, Lucinda. (2008). The effects of liberalization and deregulation on the performance of financial institutions: The case of the German life insurance market, *Thuenen-Series of Applied Economic Theory*, University of Rostock, Institute of Economics.

Vaughan, E. J., & Vaughan, T. M. (2013). *Fundamentals of Risk and Insurance*: Wiley.

Wahab, A. R. A., Lewis, M. K., & Hassan, M. K. (2007). Islamic takaful: Business models, Shariah concerns, and proposed solutions. *Thunderbird International Business Review*, 49(3), 371-396.

Wang, J. L., Jeng, V., & Peng, J. L. (2007). The Impact of Corporate Governance Structure on the Efficiency Performance of Insurance Companies in Taiwan*. *The Geneva Papers on Risk and Insurance-Issues and Practice*, 32(2), 264-282.

Yang, Z. (2006). A two-stage DEA model to evaluate the overall performance of Canadian life and health insurance companies. *Mathematical and Computer Modelling*, 43(7–8), 910-919. doi: http://dx.doi.org/10.1016/j.mcm.2005.12.011

Yazid, A. S., Arifin, J., Hussin, M. R., & Daud, W. N. W. (2012). Determinants of Family Takaful (Islamic Life Insurance) Demand: A Conceptual Framework for a Malaysian Study. *International Journal of Business and Management*, 7(6), 115-127.

Yusof, M. F., Ismail, W. Z. W., & Abdullah, A. K. M. N. (2011). *Fundamentals of Takaful*. Kuala Lumpur: IBFIM.

Zhu, J. (2003). *Quantitative models for performance evaluation and benchmarking: data envelopment analysis with spreadsheets and DEA excel solver* (Vol. 51): Springer.