Management Studies and Economic Systems (MSES), 2 (2), 129-144, Autumn 2015

Measuring Efficiency of Conventional Life Insurance Companies in Bangladesh and Takaful Life Insurance Companies in Malaysia: A Non-Parametric Approach

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Received 6 March 2015, Accepted 4 May 2015

ABSTRACT:
This study is conducted to measure the actual efficiency comparison of life insurance company between Bangladesh and Malaysia. Total 15 life insurance companies' were selected for the study where 10 conventional life insurance companies' from Bangladesh and 5 Takaful life insurance companies' from Malaysia**.** Authors tried to indicate the problems and way to get exact solutions by using Data Envelopment Analysis (DEA) & Malmquist index to differentiate the contributions of technical change, efficiency change, the pure and scale changes to total factor productivity growth. And some others different way: like their constant return to scale, variable return to scale and operating efficiencies and attempt to show PECH & SECH and in ending of analysis summary of the total life insurances company. Later we used some graph figure to make the study clear and try to evaluate the market position by measuring the efficiencies. This work will help to understand and rethink about life insurances companies of both countries.

Keywords: *Data Envelopment Analysis (DEA); Malmquist index; Insurance efficiency; Bangladesh and Malaysia*

INTRODUCTION

This study indicates the efficiency of the 10 life insurance companies in Bangladesh and 5 Takaful Life insurance companies in Malaysia. The primary function of insurance is to act as a risk transfer mechanism to provide peace of mind and protect against losses (Sabbir, 2002). Insurance schemes utilize the combination method by persuading a large number of individuals to pool their risks into a large group to minimize overall risk (Ali, 2000). In the developed world, insurance is part of society such that some forms of cover are required by law. In developing countries, the need for such a safety net is much greater, particularly at the poorest levels where vulnerability to risks is much greater and there are fewer opportunities available to recover from a large loss. Therefore, in the developing countries which are characterized as having low-income levels, and lacking access to social security systems, healthcare, and education, sanitation, and employment opportunities, the need for insurance as a risk transfer mechanism is even more imperative. This study also shows the whole work to seek the comparative potentiality of this sector. This work indicates the efficiency

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of Life Insurance Companies in Bangladesh and Malaysia. That is why it feels interest to study in this industry.

Data Envelopment Analysis (DEA) is used to explore the contributions of technical and efficiency change to the growth of productivity in the Bangladeshi Life insurance and Malaysian Takaful Life insurance industries by applying the generalized output-oriented Malmquist index for the year 2009 to 2011. The output-input data consists of 10 life insurance firms in Bangladesh and 5 Takaful Life insurance companies in Malaysia that were chosen as the sample of the study. This study used two inputs and two outputs, namely, commission and management as well as premium and net investment income, accordingly. In the DEA technique, efficiency is measured by the Malmquist index. The Malmquist efficiency measures are decomposed into two components: the efficiency change and technical change index. Efficiency change is again decomposed into pure efficiency and scale efficiency. It is found that, on average, the TFP of the life insurance industry is mainly due to both efficiency and technical changes where the main source of the efficiency change is scale efficiency rather than pure efficiency.

Literature Review

Almost 4,500 years ago**,** in the ancient land of Babylonia, traders used to bear risk of the caravan trade by giving loans that had to be later repaid with interest when the goods arrived safely. In 2100 BC, the Code of Hammurabi granted legal status to the practice that, perhaps, was how insurance made its beginning Life insurance had its origins in ancient Rome, where citizens formed burial clubs that would meet the funeral expenses of its members as well as help survivors by making some payments. As European civilization progressed, its social institutions and welfare practices also got more and more refined. With the discovery of new lands, sea routes and the consequent growth in trade, medieval guilds took it upon themselves to protect their member traders from loss on account of fire, shipwrecks and the like. Since most of the trade took place by sea, there was also the fear of pirates. So these guilds even offered ransom for members held captive by pirates. Burial expenses and support in times of sickness and poverty were other services offered. Essentially, all these revolved around the concept of insurance or risk coverage. That's how old these concepts are, really. In 1347, in Genoa, European maritime nations entered into the earliest known insurance contract and decided to accept marine insurance as a practice.

Data Envelopment Analysis (DEA) or the mathematical programming approach was introduced by Charnes et al. (1978) and draws upon the efficiency concept in Farrell (1957). According to Charnes et al. (1978), DEA estimates efficiency under the assumption of constant returns to scale, while Banker et al. (1984) assumed variable returns to scale. This approach constructs the frontier of the observed input-output ratios by linear programming. It assumes that linear substitution is possible between observed input combinations on an isoquant. In other words, DEA is a model that combines all the input and output information on the firm into a single measure of productive efficiency that lies between zero (i.e. a completely inefficient firm) and unity (i.e. a completely efficient firm). In addition, the DEA effectively estimates the frontier by finding a set of linear estimates that bound (envelop) the observed data (Leong et al., 2003). Thus, this technique is a benchmarking technique in the sense that the 'best practice' firms lie on the frontier and 'envelop' other inefficient firms (Neal, 2004). Previous studies on the insurance industry's efficiency using DEA provided evidence to understand the performance of the insurance sector in certain countries, e.g. those studies which analyze insurance in national markets such as the case in the United States done by Berger et al. (1997), Cummins et al. (1999), Meador et al. (2000), Gardner and Grace (2002), and Cummins and Weiss (2002), Cummins et al. (2010) and the insurance industries in other countries like in Japan, Italy, United Kingdom, Australia, Spain, and Germany have been studied by Fukuyama (1997), Cummins et al. (1996), Diacon (2001), Worthington and Hurley (2002), Cummins and Rubio-Misas (2001), and Mahlberg and Url (2010) respectively. Besides that, there are also studies that conduct analyses of the insurance industry in multi-markets such as Rees and Kessner (2000) and Diacon et al. (2002) where

they have conducted studies by internationally comparing the efficiency of insurance companies in Europe.

According to a survey conducted by Berger and Humphrey (1997) on 130 past studies that apply frontier efficiency analysis to financial institutions in 21 countries, there are various methods used to measure efficiency. These methods are divided into two approaches namely parametric and non-parametric. The most commonly used parametric approaches are the Stochastic Frontier Approach (composed error), Distribution Free Approach (different composed error) and the Thick Frontier Approach. For non-parametric approaches, the most commonly used are the Data Envelopment Analysis and the Free Disposable Hull [Cummins and Zi (1998); Cummins et al. (1999)]. Among the methods, the two main ones that have been widely used in the literature to measure the efficiency of the insurance industry are Stochastic Frontier Analysis (SFA) and Data Envelopment Analysis (DEA). The SFA which is also known as the Econometric Frontier Approach was developed by Aigner et al. (1977). This approach specifies a functional form for cost, profit or production relationship among inputs, outputs, and environmental factors and allows for random error (Berger and Humphrey, 1997). The functions are used to estimate the distance that a firm is from the optimizing envelope (Seale, 2000).

A prior study on the efficiency of the Malaysian insurance industry by Abu Mansor and Radam (2000) was conducted by using the non-parametric Malmquist Index approach to measure the productivity of the life insurance industry in Malaysia. In measuring the efficiency performance, they evaluated the Malmquist Index of a sample of 12 Malaysian insurance companies over the 1987 to 1997 period. Abu Mansor and Radam found that the overall productivity growth of the insurance industry in Malaysia was contributed by both technical efficiency and technical progress. A more recent empirical study on the efficiency of Malaysian insurance companies as well as other insurance companies around the world was conducted by Eling and Luhnen (2010). In this study Eling and Luhnen (2010) examined the efficiency of 3,831 companies from 91 countries using DEA and SFA techniques. Their sample includes 28 firm-years of life insurance companies and 113 firm-years of non-life insurance companies from Malaysia.

In addition, considering the Malaysian dual financial system environment where the Takaful operators are operating in parallel with their conventional counterparts, another study was undertaken by Md. Saad et al. (2007) to analyze the sources of efficiency and technical changes of all the life insurance companies and compare the performance results with that of the Takaful operators in Malaysia. Using a sample of 13 Malaysian insurance companies over a period of 2002 to 2005, they used a non-parametric approach of DEA together with the Malmquist Index to isolate the contributions of technical change, efficiency change, the pure and scale changes to the total factor productivity growth of different life insurance companies and the Takaful operators. On the basis of the findings, the authors found that on average, the total factor productivity growth of the insurance industry in Malaysia is mainly due to technical change while efficiency change contributed a negative change. While Takaful presents a below average in total factor productivity but slightly above average for technical change as well as an equal to industry average in scale efficiency. However, this result is still inconclusive on the Takaful industry as a whole since only one Takaful company is included in the study.

Against this backdrop, the motivation of our paper is to investigate the efficiency of the general or non-life Takaful and insurance industry in Malaysia using the nonparametric approach. We also hope to shed some light on the performance of the Takaful operators (whose operations are based on profit-sharing basis) as compared to the conventional insurance companies during the period of analysis. Fukuyama (1997) investigated productive efficiency and productivity changes of Japanese life insurance companies by focusing primarily on the ownership structures (mutual and stock) and economic conditions (expansion and recession) where he found that productive efficiency and productivity performances differ from time to time across the two ownership types under different economic conditions. Fukuyama (1997) found that stock and mutual life insurers in Japan have approximately equal technical efficiency scores. For the sample

period 1989-1992, Fukuyama (1997) found the average technical efficiency in the Japanese life insurance industry to be about 0.91 (Cummins et al., 1996) and a total factor productivity gains of about 19 percent. While studies of efficiency of the insurance industries in the United States and European countries are quite numerous, only few studies could be found in the case of Asian countries. Dutta and Sengupta (2010) conducted a study to investigate the impact of technological innovation on the efficiency of Indian insurance industry. Dutta and Sengupta (2010) examined whether increasing investment on IT-infrastructure which is resulting a technological innovation in business operation of the private companies has positive impact on efficiency changes or not. They used a panel data set of 12 life insurance companies over the period 2006-2009 to evaluate their efficiency scores by applying Data Envelopment Analysis and calculating the scale efficiency. The study concluded that increasing investment on IT-infrastructure has a positive impact on scale and technical efficiency change under constant and variable returns to scale assumptions.

Another study on the effect of deregulation and consolidation on financial services markets by analyzing the Spanish insurance industry was done by Cummins and Rubio-Misas (2001). They analyzed a sample consisting of nearly all insurers reporting to the Spanish regulatory authority over the period 1989-1998 by estimating the "best practice" production and cost frontiers using the data envelopment analysis (DEA), while total factor productivity growth was analyzed using the Malmquist index methodology to draw inferences about the relationship between consolidation and productivity gains or losses in the industry. They found that cost efficiency was relatively low in the Spanish insurance market, averaging only 22.7 percent in 1998 which was primarily caused by allocative inefficiency, i.e. the failure to choose the optimal mix of inputs. Average allocative efficiency in 1998 was only 41.2 percent, whereas pure technical efficiency averaged 60 percent. Thus, Spanish firms on average are more successful in employing technology than in choosing optimal inputs. In addition, the Malmquist analysis showed that Spanish insurers experienced average total factor productivity growth over the sample period ranging from 0.6 to 2.6 percent per year, while the change in total factor productivity was attributable primarily to the technical efficiency growth rather than favorable technical change. Thus, the authors conclude that consolidation had improved efficiency in the Spanish insurance market, but on average, firms have not succeeded in achieving technical improvements.

Objective of the Study

There are huge possibilities of success in life insurance in Bangladesh and Takaful Life industry in Malaysia. So this study prepared to evaluate the efficiency. The efficiency of financial institutions has been widely and extensively studied in the last few decades. For financial institutions, efficiency implies improved profitability, greater amount of funds channeled in, better prices and services quality for consumers and greater safety in terms of improved capital buffer in absorbing risk (Berger et al., 1993). As there have sound possibilities of improvement, so why existing Life insurance companies in Bangladesh and Takaful Life insurance in Malaysia cannot reach their ultimate target. To find these matters this works have sought. This study measures the actual productivity of life insurance in Bangladesh and Takaful Life industries in Malaysia. And also try to search the efficiency comparison between Bangladesh and Malaysia. How this inefficiency may reduce from this industries.

This work will help to understand and rethink about life insurances companies in Bangladesh and Takaful Life industries in Malaysia. People will be keen to use life insurance very soon. In various researches are seen that financially developed countries accustom with life insurance in their practical life like; study of their children's, health insurance is mandatory and so on. But interestingly here in Bangladesh is not. It's also tried to identify the relationship with financial literacy. The government may help them to improve their performance. Are there any problems in insurance companies themselves? Which insurance sector is doing well and which are not? .The reasons behind this statement how they are correlated and the difference in their actions. By doing this work, we have tried to

indicate the problems and way to get exact solutions.

Scopes of the Study

This study prepares to compare the performance of Life insurance in Bangladesh and *Takaful Life* operators in Malaysia. In this context, the objective of this study is to analyze the sources of efficiency and technical changes in both the Life insurance in Bangladesh and Takaful Life companies in Malaysia. By using the non-parametric approach of Data Envelopment Analysis (DEA) together with Malmquist Index, we differentiate the contributions of technical change, efficiency change, the pure and scale changes to total factor productivity growth of different Life insurance in Bangladesh and *Takaful Life* operators in Malaysia. As Bangladesh is a least developing country where there lot of potentiality especially in life insurance. Due to requiring steps both govt. and non-govt. organizations they cannot show her productivity. That is why this study focuses on life insurances. It may assist the concerned department to rethink about life insurance. Emphasis is given to bring the actual potentiality of this field. Furthermore, the Bangladeshi financial system has undergone major structural changes in the era of globalization with various liberalization measures being introduced during the last decade. These factors are expected to have an impact on the efficiency of the life insurance industry.

This study, therefore, focuses on two aspects of Takaful Life industry in Malaysia. Firstly, it aims to extend the established an individual sector by investigating the efficiency of the whole Takaful operators for the period 2009 to 2011. Secondly, it seeks to compare the performance of Life insurance in Bangladesh and *Takaful* operators in Malaysia.

Conceptual Framework

Life Insurance: It is protection against the loss of income that would result if the insured passed away. The named beneficiary receives the proceeds and is thereby safeguarded from the financial impact of the death of the insured. Life insurance is a contract between an insured insurance policy holder and an insurer or assurer, where the insurer promises to pay a designated beneficiary a sum of money (the "benefits") upon the death of the insured person. Depending on the contract, other events such as terminal illness or critical illness may also trigger payment. The policy holder typically pays a premium, either regularly or as a lump sum. Other expenses (such as funeral expenses) are also sometimes included in the benefits.

Takaful Life Insurances: Takaful is based on the concept of social solidarity, cooperation and mutual indemnification. It is a pact amongst a group that agrees to donate contributions to a fund that is used to jointly indemnify covered losses incurred by the members. While the concept of Takaful revolves around mutuality and is founded on non-commercial basis, the operations and the fund are commonly managed by a Takaful operator on commercial basis (World Takaful Report, 2012).

RESEARCH METHOD

This study indicates to measure the comparative efficiency between Life insurance in Bangladesh and Takaful life operators in Malaysia. There are 02 public insurance companies these are Jibon Bima Corporation and Sadaron Bima Corporation both are established in1973.There were no insurance company except these two till 1985.There are now 43 privately owned general companies and 17 life insurers in Bangladesh among them we have made our investigation on 10 Life insurance companies, we did not get the 4 insurance companies annual report and 3 are foreign companies .So we did not take it on the account because of our study limitations. Among the life insurances, 10 were available for our efficiency analysis. Authors used two inputs and outputs in this study. The inputs are commission and management expenses and the outputs are premium and net investment income. The ten (10) conventional life Insurance Operators in Bangladesh, namely- National Life Insurance Limited, Delta Life Insurance Limited, Baira Life Insurance Limited, Meghna Life Insurance Limited, Popular Life Insurance Limited, Pragoti Life Insurance Limited , Progressive Life Insurance Limited , Rupali Life Insurance Limited, Sandhani Life Insurance Limited , Sunlife Insurance Limited. Inputs and outputs data are collected from the period of 2009 to 2011. The data are gathered from the respective Life insurance annual reports and websites.

On the other hand, we worked on 5 Takaful Life insurance companies in Malaysia from the secondary sources such as the respective annual report of the companies. Namely CIMB Aviva Takaful Berhad, Etiqa Takaful Berhad, Hong Leong MSIG Takaful Berhad, Takaful Ikhlas Sdn.Bhd, Prudential BSN Takaful Berhad. Inputs and outputs data are collected from the period of 2009 to 2011. The data are gathered from the respective Life insurance annual reports and websites.

To examine the contributions of technical and efficiency change to the growth of productivity in the both life and non-life Takaful industries the generalized output-oriented Malmquist index, developed by Fare et al. (1989) is adopted in this study. The Malmquist indexes are constructed using the Data Envelopment Approach (DEA) and estimated using Coelli's (1996) DEAP version 2.1. Malmquist index was chosen as there are a number of desirable features for this particular study. The DEA does not only require input prices or output prices in their construction, which make the method particularly useful in situations in which prices are not available publicly or non-existent, but it also does not require a behavioral assumption such as cost minimization or profit maximization in the case where the producers‟ objectives differ, unknown or unachieved. This is first demonstrated by Fare et al. (1989) using the geometric mean formulation of the Malmquist index. Following this, Forsund (1991) derived the decomposition of the simple version of the Malmquist productivity index into technical change and efficiency change. Following Fare et al. (1989), the Malmquist index of total factor productivity growth is written as follows:

Where, denoted the distance from the period $t+1$ observation to the period t technology. The first part of the right-hand side of equation (1) measures the change in firm's relative efficiency (i.e., distance between the observed productions from maximum potential production) between year t and $t+1$. On the other hand, second parts of this equation within the brackets (geometric mean of the two ratios) shows the firms' relative change in technology (i.e., movements of the frontier function itself) between the two periods evaluated at x^t and x^{t+1}. Basically, the change in relative efficiency measures how well the production process converts input into outputs (catching up to the frontier) and the later reflects enhancement in technology. According to Fare et al. (1994a), improvements in productivity yield Malmquist index values greater than unity. Deterioration in performance over time is associated with a Malmquist index less than unity. The same interpretation applies to the values taken by the components of the overall TFP index. The positive change in the efficiency component yielded index values greater than one and is considered to be evidence of catching up (to the frontier). Values of the technical change component greater than one are considered to be evidence of technological progress.

Following Fare et al. (1994), this study uses an enhanced decomposition of the Malmquist index by decomposing the efficiency change component calculated relative to the constant returns to scale technology into a pure efficiency component (calculated relative to the VRS technology) and a scale efficiency change component which captures changes in the deviation between the VRS and CRS technology. The subset of pure efficiency change measures the relative ability of operators to converts inputs into outputs while scale efficiency measures to what extent the operators can take advantage of returns to scale by altering its size toward optimal scale.

RESULTS AND ANALYSIS

Measures of some Descriptive Statistics

The table provides information about the descriptive statistics comparison between efficiency of Life insurance in Bangladesh and Takaful Life insurance in Malaysia to evaluate some descriptive statistics such as mean, median, Standard Deviation, minimum and maximum before run data envelopment analysis.

Table 1 shows the descriptive statistics of the outputs and inputs of all(10) the Life Insurance in Bangladesh and (5)Takaful Life Insurance companies in Malaysia during the study period before run data envelopment analysis. From the Bangladesh Life insurance scenario of total inputs and outputs during the period of analysis, Popular and Sunlife have occupied the highest and lowest rank respectively. The average premium and net investment income are Tk.14031.2 and Tk.2113.87million BDT, respectively.

Table 1: Descriptive statistics, 2009-2011

Types Of Insurance	Statistics	Inputs		Outputs	
		Commission (In million BDT)	Management Expenses (In million BDT)	Premium (In million BDT)	Investment Income (In million BDT)
Life Insurance in Bangladesh	Mean	3266.99	3030.37	14031.2	2113.87
	Median	884.87	842.59	5110.57	1168.96
	SD	4343.19	3672.68	17376.51	2743.25
	Minimum	197.04	85.83	586.27	15.73
	Maximum	14206	13218	60488	9353
Takaful Insurance in Malaysia	Mean	1597.294	1586.395	15962.74	1658.69
	Median	1149.45	1758.37	10294.54	372.81
	SD	1263.0482	951.4328	17067.22	2631.906
	Minimum	66.02	174.48	1619.62	105.07
	Maximum	3764	3225.87	53767.97	7842.19

Source: Yearly Reports of respective insurance firms

While, the average commission and management expenses are Tk. 3266.99 and Tk.3030.37millions BDT during the study period 2009-2011 accordingly.

On the other hand, from the Malaysian Takaful Life insurance scenario of total inputs and outputs during the period of analysis, Etiqa and Hong Leong have occupied the highest and lowest rank respectively. The average premium and net investment income are Tk. 15962.74 and Tk. 1658.69million BDT, respectively. While, the average commission and management expenses are Tk. 1597.294 and Tk.1586.395millions BDT, respectively during the study period 2009-2011.

Production Frontier and Efficiency

The initial aim of this section is to outline a number of commonly used efficiency measures and to discuss how they calculated relative to an efficient technology, which is generally represented by some form of the frontier function. Tables 2 and 3, reports efficiency change for the Takaful companies from 2009-2011 under constant returns to scale (CRS) and variable returns to scale (VRS) respectively, since the basic component of the Malmquist productivity index is related to measures of efficiency.

For the values of unity, the firm is implied to be on the industry frontier in the related year, while the values that are less than unity imply that the firm is below the frontier or technically inefficient. For the years reported in tables 2 and 3, majority Bangladeshi Life insurance companies are consistently inefficient under constant returns to scale (CRS) except National, Delta and Progressive between 2009 and 2011. To formulate this view, under constant returns to scale (CRS) in 2010 Pragoti produced 29.2% but Baira produced 25.8% while in 2011, Pragati produced 38.8% but Baira produced 24.9 % respectively. However, under variable returns to scale (VRS) all the Bangladeshi Life insurance companies are consistently efficient except Pragati (2009-2011), Baira (2010-2011 inefficient) but not in 2009 in contrast, Rupali (2009-2010 efficient) but not in 2011. For explaining this view, under variable returns to scale (VRS) interestingly in 2010 Pragoti produced 29.2% but Baira produced 29.6% successively. On the other hand, in 2011 Pragoti produced 40% but Baira produced 27.4% only. Interestingly, Pragati are consistently inefficient both under CRS and also under VRS whereas, Delta, National, and Progressive are the most efficient firm for both CRS and VRS versions at their maximum potential output which were 100% accordingly.

Table 2: Efficiency of the insurance companies constant returns to scale, 2009 – 2011

Types of Insurance	Name of the Insurance Company	2009	2010	2011
Life Insurance in Bangladesh	National Life Insurance Company Ltd.	1.000	1.000	1.000
	Delta Life Insurance Bangladesh Ltd.	1.000	1.000	1.000
	Baira Life Insurance Ltd.	0.175	0.258	0.249
	Meghna Life Insurance Company Ltd.	0.644	0.797	0.781
	Popular Life Insurance Company Ltd.	1.000	0.800	0.722
	Pragoti Life Insurance Company Ltd.	0.285	0.292	0.388
	Progressive Life Insurance Company Ltd.	1.000	1.000	1.000
	Rupali Life Insurance Company Ltd.	0.795	0.961	0.906
	Sandhani Life insurance Company Ltd.	0.936	0.824	0.724
	Sunlife Insurance Company Ltd.	1.000	0.98	0.933
	Mean	0.783	0.791	0.77
Takaful Insurance in Malaysia	CIMB Aviva Takaful Berhad	0.287	0.260	0.605
	Etiqa Takaful Berhad	1.000	1.000	1.000
	Hong Leong MSIG Takaful Berhad	0.815	1.000	1.000
	Takaful Ikhlas Sdn.Bhd.	0.425	0.294	0.512
	Prudential BSN Takaful Berhad	0.265	0.204	0.284
	Mean	0.558	0.552	0.680

Source: Yearly Reports of respective insurance firms

Table 3: Efficiency of the insurance companies, 2009-2011 (variable returns to scale)

Types of Insurance	Name of the Insurance Company	2009	2010	2011
Life Insurance in Bangladesh	National Life Insurance Company Ltd.	1.000	1.000	1.000
	Delta Life Insurance Bangladesh Ltd.	1.000	1.000	1.000
	Baira Life Insurance Ltd.	1.000	0.296	0.274
	Meghna Life Insurance Company Ltd.	1.000	1.000	1.000
	Popular Life Insurance Company Ltd.	1.000	1.000	1.000
	Pragoti Life Insurance Company Ltd.	0.629	0.292	0.400
	Progressive Life Insurance Company Ltd.	1.000	1.000	1.000
	Rupali Life Insurance Company Ltd.	1.000	1.000	0.922
	Sandhani Life insurance Company Ltd.	1.000	1.000	1.000
	Sunlife Insurance Company Ltd.	1.000	1.000	1.000
	Mean	0.963	0.859	0.860
Takaful Insurance in Malaysia	CIMB Aviva Takaful Berhad	0.287	0.260	0.605
	Etiqa Takaful Berhad	1.000	1.000	1.000
	Hong Leong MSIG Takaful Berhad	1.000	1.000	1.000
	Takaful Ikhlas Sdn.Bhd.	0.425	0.294	0.512
	Prudential BSN Takaful Berhad	0.265	0.204	0.284
	Mean	0.595	0.552	0.680

Source: Yearly Reports of respective insurance firms

However, tables 2 and 3, also show that Malaysian Takaful insurance companies are consistently inefficient, both under constant returns to scale (CRS) and variable returns to scale (VRS) except Etiqa. Hong Leong is consistently efficient under VRS but not under CRS. Moreover, the Etiqa is the most efficient firm for both CRS and VRS versions accordingly. While, In Malaysia, The values in tables 2 and 3 show the percentage of the realized output level compared to the highest potential output level at the given input mix. For example, in 2009, Takaful Ikhlas produced 42.5% and Hong Leong produced 81.5 % of its potential output under CRS. Under VRS in the same year, interestingly the Takaful Ikhlas produced as same as 42.5% whereas, Hong Leong produced at their maximum potential output, which was at 100 % accordingly. In 2010, Takaful Ikhlas produced 29.4 % which is less than 2009 and increased in 2011. Similarly, under VRS in the same year, the Takaful Ikhlas produced as same as 29.4 % whereas, Hong Leong produced at their maximum potential output in 2011 which was 100% successively.

Productivity Performance of the Individual Company

As we know, Malmquist TFP index to measure productivity change and to decompose these productivity change into technical change and technical efficiency change.

Tables 4 to 5 report the performance of the firms between 2009 and 2011 in terms of TFP change and its two subcomponents which are technical change and efficiency change accordingly. It formulates that a value of the Malmquist TFP productivity index and its components of greater than one (1>) display improvements of productivity in the relevant fields, while values less than one (<1) describe a deterioration in productivity. Subtracting 1 (-1) from the number showed in the table provides an average improvement or decrease annually for the years and relevant performance calculation. These measures also capture the performance relative to the best practice in the relevant performance or relative to the best practice in the sample for both Bangladesh and Malaysia.

Table 4: Insurance companies relative Malmquist TFP change between time period t and t + 1, 2009 - 2011

Types of Insurance	Name of the Insurance Company	2009-2010	2010-2011	Mean
Life Insurance in Bangladesh	National Life Insurance Company Ltd.	0.995	0.984	0.9895
	Delta Life Insurance Bangladesh Ltd.	1.182	0.799	0.9905
	Baira Life Insurance Ltd.	0.996	1.019	1.0075
	Meghna Life Insurance Company Ltd.	1.007	1.018	1.0125
	Popular Life Insurance Company Ltd.	0.848	0.950	0.899
	Pragoti Life Insurance Company Ltd.	0.773	1.400	1.0865
	Progressive Life Insurance Company Ltd.	1.109	1.090	1.0995
	Rupali Life Insurance Company Ltd.	1.165	0.872	1.0185
	Sandhani Life insurance Company Ltd.	0.875	0.841	0.858
	Sunlife Insurance Company Ltd.	0.922	0.881	0.9015
	Mean	0.979	0.970	0.9745
Takaful Insurance in Malaysia	CIMB Aviva Takaful Berhad	1.074	0.844	0.959
	Etiqa Takaful Berhad	1.233	0.628	0.9305
	Hong Leong MSIG Takaful Berhad	0.482	0.873	0.6775
	Takaful Ikhlas Sdn.Bhd.	0.781	1.244	1.0125
	Prudential BSN Takaful Berhad	0.897	1.024	0.9605
	Mean	0.851	0.900	0.8755

Source: Yearly Reports of respective insurance firms

Table 5: Insurance firms relative technical change, 2009 – 2011

Types of Insurance	Name of the Insurance Company	2009-2010	2010-2011	Mean
Life Insurance in Bangladesh	National Life Insurance Company Ltd.	0.995	0.984	0.9895
	Delta Life Insurance Bangladesh Ltd.	1.182	0.799	0.9905
	Baira Life Insurance Ltd.	0.998	1.053	1.0255
	Meghna Life Insurance Company Ltd.	1.028	1.036	1.032
	Popular Life Insurance Company Ltd.	0.985	1.052	1.0185
	Pragoti Life Insurance Company Ltd.	1.007	1.054	1.0305
	Progressive Life Insurance Company Ltd.	1.109	1.090	1.0995
	Rupali Life Insurance Company Ltd.	0.964	0.926	0.9450
	Sandhani Life insurance Company Ltd.	0.994	0.926	0.9600
	Sunlife Insurance Company Ltd.	0.941	0.926	0.9335
	Mean	1.018	0.981	0.9995
Takaful Insurance in Malaysia	CIMB Aviva Takaful Berhad	1.344	0.517	0.9305
	Etiqa Takaful Berhad	1.233	0.628	0.9305
	Hong Leong MSIG Takaful Berhad	1.453	0.598	1.0255
	Takaful Ikhlas Sdn.Bhd.	1.207	0.692	0.9495
	Prudential BSN Takaful Berhad	1.207	0.692	0.9495
	Mean	1.2888	0.6254	0.9571

Source: Yearly Reports of respective insurance firms

Table 4 describes Malmquist-based Total Factor Productivity (TFP) index calculated changes. As displayed in the table, Meghna has positive productivity changes from 2009 to 2011. On the other hand, Progressive and Delta have positive productivity between 2009 and 2010, but they faced deterioration in productivity in 2010-2011. In contrast, there is a record improvement among Meghna and Pragati. Moreover, National, Sandhani and Sunlife are the most unproductive company these firms have no positive improvement from 2009-2010 to 2010-2011 in Bangladesh Life insurance industry. Furthermore, on an average Progressive takes the highest position of 10.9% from 2009 to 2010 in Bangladesh. Moreover, from 2009 to 2010 Delta takes the first position of 18.2% whereas in 2010-2011 Pragati takes the highest rank of 40.0 % accordingly.

On the other side, table 4 also displays calculated changes in the Malmquist-based Total Factor Productivity index. For example, from 2010 to 2011 Takaful Ikhlas and Prudential have positive productivity but not between 2009 and 2010. In contrary, Aviva and Etiqa have positive productivity changes from 2009 to 2010, but they faced deterioration in productivity change between 2010 and 2011. Moreover, Hong Leong is the most unproductive company which has negative rank in Malaysian Takaful Life insurance industry which was 48.2% in 2009-2010 and 87.3% in 2010-2011. In addition, both of Takaful Ikhlas and Prudential take the highest positive positions which were 24.4% and 02.4% respectively from 2010 to 2011.

The Malmquist TFP index is further decomposed into its two components, technical change and efficiency change. The results of technical change and efficiency change are displayed in Tables 5 and 6. Table 5 displays the index values of technical progress or retreat as measured by average shifts in the best-practice frontier between t and $t+1$. According to the results, all the firms experienced both technical progress and retreat. In addition, on an average Progressive takes the first position of 10.9 %. Moreover, from 2009 to 2010 Delta takes the highest rank of 18.2 % but in 2010-2011 Pragati takes first rank with the annual rate of 05.4% successively.

In contrary in Malaysia, all the companies are experienced technical progress between 2009 and 2010 but all are experienced technical regress form 2010 to 2011. On an average during the years of 2009-2010 Hong Leong takes the first position of 45.3 % but in 2010-2011 both of Takaful Ikhlas and prudential take the highest rank of 69.2 % accordingly.

Table 6 provides information about the changes in relative efficiency for every single firm. The results describe considerable variation across insurance firms and time. It is very good to see that three companies have been found to be consistently efficient 2009 to 2011 During the entire period of study in Bangladesh the Conventional Life insurance companies, the results indicate that, on an average, the insurance firm under study. For example, National, Delta and Progressive are experienced in the highest efficiency change, while Baira, Meghna, and Sunlife these are experience the efficiency decline by (-1.7%), (-1.9%) and (-3.4%) accordingly. Overall, the result shows that an improvement has been seen in relative efficiency from 2009-2010 to 2010-2011 with the minor deterioration at (- 2.5%) successively.

Similarly, in Malaysian Takaful Life insurance industry describes the changes in relative efficiency for each individual company. The results indicate considerable variation across companies and time. It is very good to see that all the Takaful companies have been found to be consistently efficient 2010 to 2011 but not in previous time period except Etiqa. During the entire period of study, the results indicate that, on an average, the only Islamic insurance firm under study. For explaining this view, Takaful Ikhlas is experienced the highest efficiency change with 22.4 percent while only Hong Leong that experienced efficiency decline by (-10.4%) accordingly. Finally, it can be seen that an improvement has been also seen in relative efficiency from 2009-2010 to 2010-2011 at 5.45% successively.

Table 6: Below indicates information about changes in operators relative efficiency, between conventional life insurance in Bangladesh and Takaful life insurance in Malaysia between 2009 and 2011

Types of Insurance	Name of the Insurance Company	2009-2010	2010-2011	Mean
Life Insurance in Bangladesh	National Life Insurance Company Ltd.	1.000	1.000	1.000
	Delta Life Insurance Bangladesh Ltd.	1.000	1.000	1.000
	Baira Life Insurance Ltd.	0.998	0.968	0.983
	Meghna Life Insurance Company Ltd.	0.979	0.983	0.981
	Popular Life Insurance Company Ltd.	0.861	0.903	0.882
	Pragoti Life Insurance Company Ltd.	0.768	1.328	1.048
	Progressive Life Insurance Company Ltd.	1.000	1.000	1.000
	Rupali Life Insurance Company Ltd.	1.209	0.942	1.0755
	Sandhani Life insurance Company Ltd.	0.880	0.879	0.8795
	Sunlife Insurance Company Ltd.	0.980	0.952	0.966
	Mean	0.961	0.989	0.975
Takaful Insurance in Malaysia	CIMB Aviva Takaful Berhad	0.799	1.631	1.215
	Etiqa Takaful Berhad	1.000	1.000	1
	Hong Leong MSIG Takaful Berhad	0.332	1.460	0.896
	Takaful Ikhlas Sdn.Bhd.	0.648	1.799	1.2235
	Prudential BSN Takaful Berhad	0.744	1.481	1.1125
	Mean	0.662	1.447	1.0545

Source: Yearly Reports of respective insurance firms

Table 7: Below illustrates the information about changes in efficiency components by firms between time period t and t + 1, conventional life insurance in Bangladesh and Takaful life insurance in Malaysia over the period of 2009 to 2011

Types of Insurance	Name of the Insurance Company	2009-2010		2010-2011	
		PECH	SECH	PECH	SECH
Life Insurance in Bangladesh	National Life Insurance Company Ltd.	1.000	1.000	1.000	1.000
	Delta Life Insurance Bangladesh Ltd.	1.000	1.000	1.000	1.000
	Baira Life Insurance Ltd.	0.296	3.375	0.927	1.043
	Meghna Life Insurance Company Ltd.	1.000	0.979	1.000	0.983
	Popular Life Insurance Company Ltd.	1.000	0.861	1.000	0.903
	Pragoti Life Insurance Company Ltd.	0.464	1.654	1.370	0.970
	Progressive Life Insurance Company Ltd.	1.000	1.000	1.000	1.000
	Rupali Life Insurance Company Ltd.	1.000	1.209	0.922	1.021
	Sandhani Life insurance Company Ltd.	1.000	0.880	1.000	0.879
	Sunlife Insurance Company Ltd.	1.000	0.980	1.000	0.952
	Mean	0.820	1.172	1.016	0.974
Takaful Insurance in Malaysia	CIMB Aviva Takaful Berhad	0.908	0.881	2.323	0.702
	Etiqa Takaful Berhad	1.000	1.000	1.000	1.000
	Hong Leong MSIG Takaful Berhad	1.000	0.332	1.000	1.460
	Takaful Ikhlas Sdn.Bhd.	0.691	0.937	1.740	1.034
	Prudential BSN Takaful Berhad	0.770	0.966	1.394	1.062
	Mean	0.865	0.766	1.413	1.024

Note: PECH = Pure Efficiency Change, and SECH = Scale Efficiency Change

According to table 7, to examine a change in scale efficiency, the efficiency change is further decomposed into two subcomponents, namely pure efficiency change and scale efficiency change. The results illustrate that the pure efficiency and scale efficiency appear to be an equally important source of growth to efficiency change. From 2009 to 2011, relative to other insurance companies, Baira have attained the highest deterioration and the highest growth of scale efficiency 37.5% and 4.3% accordingly. National, Delta and Progressive have taken the highest growth position during the study period through 2009-2011 in Bangladesh. On the contrary, in terms of pure efficiency, Sandhani and Sunlife have occupied the highest growth position between 2009 and 2011 in Bangladesh.

However in Malaysia table7 indicates, all the Takaful Life companies recorded changes in annual growth for the scale efficiency, except Etiqa during the period 2009 to 2011. Relative to other insurance companies, Prudential has attained the highest deterioration (-3.4%) and 6.2% and Etiqa has taken the highest growth position during the study period through 2009-2011 accordingly. On the other hand, in terms of pure efficiency, Etiqa and Hong Leong have achieved the highest growth position from 2009 to 2011 in Malaysia.

Productivity Performance of the Industry

Table 8 reveals the performance of the Malmquist productivity index of the whole industry in Bangladesh and Malaysia during the year 2009 and 2011.

Table 8: Shows the information about summary of the Malmquist productivity index of insurance operators, conventional life insurance in Bangladesh and Takaful Life insurance in Malaysia over the three years period

Types of Insurance	Name of the Insurance Company	EFFCH	TECHCH	PECH	SECH	TFPCH
Life Insurance in Bangladesh	National Life Insurance Ltd.	1.000	0.990	1.000	1.000	0.990
	Delta Life Insurance Ltd.	1.000	0.972	1.000	1.000	0.972
	Baira Life Insurance Ltd.	0.983	1.025	0.524	1.877	1.007
	Meghna Life Insurance Ltd.	0.981	1.032	1.000	0.981	1.012
	Popular Life Insurance Ltd.	1.010	1.018	1.000	0.882	0.889
	Pragoti Life Insurance Ltd.	1.000	1.030	0.797	1.266	1.041
	Progressive Life Insurance Ltd.	1.000	1.099	1.000	1.000	1.099
	Rupali Life Insurance Ltd.	1.067	0.944	0.960	1.111	1.008
	Sandhani Life insurance Ltd.	0.880	0.959	1.000	0.880	0.844
	Sunlife Insurance Ltd.	0.966	0.933	1.000	0.966	0.901
	Mean	0.975	0.999	0.913	1.069	0.974
Takaful Insurance in Malaysia	CIMB Aviva Takaful Berhad	1.142	0.834	1.452	0.786	0.952
	Etiqa Takaful Berhad	1.000	0.880	1.000	1.000	0.880
	Hong Leong MSIG Takaful Berhad	0.696	0.932	1.000	0.696	0.648
	Takaful Ikhlas Sdn.Bhd.	1.079	0.913	1.097	0.984	0.986
	Prudential BSN Takaful Berhad	1.049	0.913	1.036	1.013	0.958
	Mean	0.979	0.894	1.105	0.886	0.875

Note: TFPCH = Total Productivity Change; EFFCH = Efficiency Change; TECHCH = Technical Change; PECH = Pure Efficiency Change; and SECH = Scale Efficiency Change.
Source: Yearly Reports of respective insurance firms.

On an average, Progressive recorded the highest growth in TFP and technical changes with (9.9%), no efficiency change. In contrast, Sandhani has shown the lowest growth in TFP with (8.4%) on the other hand Sunlife has shown the lowest growth in technical change with (9.3%) respectively. Moreover, the efficiency change is largely contributed by scale efficiency rather than pure efficiency. Also, it can be seen that, the insurance firms were found to be experiencing a minor technical progress in Bangladesh. Even though there was no improvement in efficiency change, the subcomponent of this efficiency change, namely pure efficiency, shows a negative change but an improvement (6.9%) in scale change. The overall TFP for these firms within the period of study is maintained at a value slightly lower than 1 (reflected by the mean 0.974 of TFP change) in Bangladesh.

On the contrary, in Malaysia on an average, Takaful Ikhlas Sdn.Bhd. recorded the highest growth in TFP with (9.8%) whereas Hong Leong has shown the result the lowest growth in TFP (6.4%) successively. Interestingly, Takaful Ikhlas Sdn.Bhd and Prudential BSN Takaful Berhad have shown constant technical changes at (9.1%). In addition, the efficiency change is largely contributed by pure efficiency rather than scale efficiency. The subcomponent of this efficiency change, namely pure efficiency, shows a positive change (10.5%) however a negative change in scale efficiency can be seen between 2009 and 2011.Takaful Life industry of Malaysia have faced negative impact of efficiency and technical changes, the overall TFP for these firms within the period of study is maintained at a value slightly lower than 1 (reflected by the mean 0.875 of TFP change).

CONCLUSION

In the final analysis, the efficiency measures of Life insurance operators are comparatively measured where it is found on the point of efficiency, the TFP of the Life insurance industry in Bangladesh is near about efficient due to improvement in technical changes rather deterioration in efficiency change respectively. Furthermore, the efficiency change is contributed by the pure efficiency rather than scale efficiency. This indicates that the size of the companies has a very limited influence in affecting efficiency changes. However, this study also found that there were diminutive significant growths in technical components and no improvement in efficiency change which suggest that TFP in the Life insurance industry is due to the less innovation in technical components coupled with an insignificant improvement on the aspect of efficiency. On average, the insurance firms are found to be experiencing a technical progress. Hence, this finding indicates in the Life insurance industry of Bangladesh that the smaller the size of the companies, the higher the probability for the companies to be more efficient in utilizing their inputs to generate more outputs. This result indicates that Life insurance industries have a great potential to further increase their TFP through improvements in both efficiency and technical component such as enhancing the use of information and communication technology in order to provide good services to customers.

In spite of having some lacking in policy coverage that is different policies issued by it should be increased. The overall performance of the company also confirms its glorious future prospect. To ensure, steady and long-term growth as well as to sharpen its competitive edge in an ever-changing and challenging business environment. As a leading insurance company in Malaysia, Life Insurance Company Ltd. shouldn't allow their client to get dissatisfied with their service. They have their competitors who actively striving to take the advantages in every side.

RECOMMENDATIONS

For getting the achievement and to deliver quality service, top management ought to practice and modify the services.

- ✓ Delta Life Insurance, National Life Insurance, Homeland Life Insurance, Popular Life Insurance, Progressive Life Insurance and all other insurance companies are emerging rivals of Life Insurance Company Ltd. They should continuously endeavor and try to lead new ideas to please their present customers.
- ✓ To convey better services to their honorable customers, Life Insurance Company Ltd. should afford more employees.
- ✓ As we have scanned the origin it signifies that day-to-day customer operation is growing and individual employees having to deal with several types of jobs. So misunderstanding by the personnel could lead to inconveniences for the customer. At times, it also conflicts with the customer's satisfaction and the employee's motivation.
- ✓ Life Insurance Company Ltd. should concentrate on their promotional actions.
- ✓ Also, they ought to focus on the marketing influences to let customers recognize about their commodity, contributions, and more development should be given to attracting new customer.
- ✓ As Life Insurance Company Ltd. principal is establishing service for the institution; it should research consumer demands, desires, capacity and services as per the claims of the customers.
- ✓ The operation of technical knowledge, dedicated persons, and market progress can lead the organization for achieving the goal, an insurance firm must stable and maintain satisfactory requirements, sufficient property, fund and the consideration paid for a contract of insurance.
- ✓ Life Insurance Company Ltd. should always watch the function of its rivals in the operating related to other nations practice.

Limitation of the Study

We have faced some problems to collect Bangladeshi Life insurance companies' annual reports. Because only some of them have published their annual report; some have said about the internal conflict for which they don't provide required data and some have the unaudited annual report. For these reasons, it has to avoid some companies to measure their efficiency. Beside this, it has some confines like- we couldn't measure the productivity of each

and every ingredient of life insurances rather it worked with some elements. It could make this work more acceptable. In this work, authors tried to find the efficiency of life insurances Company of Bangladesh in the perspective of Malaysia. There might be some lacking, but this study attempts our best to make this study fruitful. Further research can be done by considering these facts.

ACKNOWLEDGEMENT

Authors like to express sincere gratitude to Md. Azizur Rahman for his support, patience and enlightening guidance. His in-depth discussion about various research problems helps authors to accomplish this research.

ACRONYMS

DEA= Data Envelopment Analysis; ASEAN = (Association of Southeast Asian Nations); DMU = Decision-making unit; SFA = Stochastic Frontier Analysis, FID= Financial Institutions Division; CRS= Constant Returns to Scale; VRS = Variable Returns to Scale; PEch = Pure Efficiency Change; and SEch = Scale Efficiency Change; TFP = Total Productivity Change; EFFch = Efficiency Change; TECch = Technical Change

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