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Risk management efficiency of conventional life insurers and Takaful operators

Abstract

The dynamically change in a wide range of risk have exposed some challenges in risk management nowadays. By handling these risk efficiently, life insurers and Takaful operators would guarantee the long lasting of their businesses, as well as warranty the favourable return to the shareholders, guarantee the ability to compensate the policy holders as the covered losses should be occurred and finally assured the solvency requirement by the regulators. For this reason, this study will investigate the efficiency of risk management of life insurers and Takaful operators in this competitive environment of the insurance industry in Malaysia. There are very limited studies focusing on the risk management efficiency of life insurers and combining such study on both life insurers and Takaful operators. This study will use the data envelopment analysis (DEA) model, i.e., range adjusted measure (RAM), to determine the efficiency score of risk management activity for each company. This measure is units invariant and monotonic which seems very compatible to the data in this study. The results show that the efficiency score of both type of companies is relatively high and the standard deviations indicate a decreasing trend. Besides, it is hard to confirm the interaction between the firm size and the risk management efficiency but, however, it is quite apparent that there is a linkages between the organizational forms (stock vs mutual) and the risk management efficiency. The findings of this study may offer some opportunities to the insurance and Takaful companies in their effort to improve and enhance their risk management in order to satisfy their stakeholders.

Keywords: risk management, efficiency, life insurance, Takaful.

Introduction

The dynamic developments in technology, consumer preferences, marketing techniques and also rapid changes in interest rate have significantly alter the risk portfolio of life insurers and Takaful operators. The risk management is a mechanism or process to manage those risks that lead to the likelihood of a reduction in the economic value of a firm (Skipper and Kwon, 2007). They also emphasize that one should recognize how surrounding expected cash flows affects firm value in order to obtain the most favourable risk management program. In addition, Romzie (2008) states: "The effective management of risks is crucial to any financial institution's performance." Furthermore, the financial institutions that can handle their risk efficiently are most likely to succeed and remain in the business (Akkizidis and Khandelwal, 2008). They also concluded that risk management is among the important elements in favouring the shareholders in terms of better returns.

The life insurers and Takaful operators have three main concerns. First and perhaps the most important concern is the solvency requirements for satisfying regulators and policyholders, second is the claimability payment for their policyholders and finally is to increase the shareholder value by providing maximum returns. The safety and security of the policyholder in obtaining the indemnity, subject to the covered losses from the insurers, is the main concern of the regulator. Although the insolvency cases are not recorded yet in Malaysia, this could not take for granted. Insurers have to preserve the solvency environment in ensuring their obligations to policyholder. Consequently, the insurers must have the proper framework to balance the risk-return trade-off, as well as sound and prudent asset-liability matching.

Today, insurers have to diversify their book of business according to consumer preferences products rather than profit oriented products. The rapid growth of competition among the other insurers in the industry and non-insurance institutions such as banks, mutual fund companies and others, as well as dynamic changes in technology force the insurers to modify their product in order to gain the competitive advantage. The policyholder preferences for low-cost insurance policies and the need for the safety of policyholder claims while maintaining the required profit have created inherent tension in the risk management of the insurer. Given the conflicting objectives from different stakeholders (policyholder, regulator, shareholder), life insurers have been urged towards the need to strengthen the efficiency and effectiveness of risk management.

How does a firm know if it manages the firm's risk profile very well? How does a firm know if it can balance the risk-return trade-off even better? How does a firm know if it has increased the shareholder value? These questions lead to the assessment of the risk management. According to Santomero and Oldfield (1997), for those risks that firm chooses to assume, it must be managed efficiently. Broadly speaking, it can be said that the changes of the risk portfolio leads to the improvement of risk management

efficiency of insurers. Based on the above motivations, the main objective of this study is to evaluate and investigate the efficiency of risk management, practiced by life insurers and Takaful operators in Malaysia in order to know the relative (risk management) efficiency among the players in the industry.

Most studies on efficiency among insurance firms have only been carried out to measure the overall efficiency of the firm as well as cost, technical, allocative and revenue efficiency. It is obvious that the findings from these studies provide many firm performance enhancements. Nevertheless, it is reasonably difficult for an inefficient firm to recognize which of its operations is contributing most to inefficiency. Thus, the first contribution of this study is to examine the efficiency of risk management of life insurers and Takaful operators in order to provide information to firms about their weaknesses, particularly, operations.

Far too little attention has been given to the performance or efficiency of takaful operators itself, yet to its risk management efficiency. Takaful is the term for Islamic insurance and as Kwon (2007) states: "The contract must be of certainty; that is the length of the policy period is finite, and the amount of exchange – the premium and the benefit – is known ex-ante." Moreover, the contract practices the concept of sharing in relevant to losses and investment income between the participant (insured) and the operator (insurer) base on a predetermined ratio (Kwon, 2007). The firm that is responsible to manage the operation of Takaful is called Takaful operators which is similar to insurer term in convention (non-Islamic) insurance. With reference to Takaful operators, they are under Syariah Law and governed by the Takaful Act 1984. It is noticeable that a Takaful operation must comply with Syariah in each and every respect. For example, Takaful operators have to evade interest bearing and prohibited investments: stated differently, all investments have to be Islamic financial instruments. In addition, there are some policy options not applicable under takaful products such as policy loans and guaranteed benefits. In order to survive in the highly competitive market, Takaful operators must be able to provide a wide spectrum of products to the public. Tied to the rigid regulation requirements similar to the conventional life insurers and the challenges in complying with Syariah Law, it is constructive to analyze the performance of Takaful operators in respect of the core element (risk management) in their operations. This is the final contribution of the study.

1. Literature review

There is a large amount of literature concerning the overall efficiency of life insurance firms which is still growing. These employed different frontier efficiency techniques such as DEA, deterministic frontier analysis (DFA) and stochastic frontier analysis (SFA) as well as different models of DEA-CCR that is data envelopment analysis (Charnes-Cooper-Rhodes) and DEA-BCC that is data envelopment analysis (Banker-Charnes-Cooper), additive and slack-based measure (SBM) or range adjusted measure (RAM) to evaluate the efficiency. Recently, studies on specific insurance operations such as risk and investment management performance can be found in Ren (2007), Wu et al. (2007), Yang (2006) and Hsiao and Su (2006). However, studies on the efficiency of the risk management itself are very rare.

Risk management has become increasingly important, especially in the insurance business. This is due to the change of risk profile faced by the insurance firms. Deregulation, privatisation, international competition, volatility of the capital market and insolvency of insurance firms are believed to have increased the importance of risk over the past few decades[1]. Based on these reasons, Cummins et al. (2008) investigated whether risk management was a potential determinant of firm efficiency. In addition, they also examined whether the role of the insurer as a financial intermediary is efficiency enhancing through cost reduction. This study used a so-called "shadow prices" for risk management and financial intermediation services prices and treated them as intermediate outputs in a parametric cost function. The empirical results from U.S. property and liability insurers indicate that both activities in insurers' operation, i.e. risk management and financial intermediary, play a significant role in enhancing a firm's efficiency. Quite similar to Cummins et al. (2008), Lin and Wen (2008) proved that risk management mechanisms can increase the cost efficiency of property and liability insurers. However, the results show a significant heterogeneity in cost efficiency over different risk management tools adopted by the insurers. Lin and Wen conclude: "...the use of financial derivatives to manage investment risks contributes to the enhancement of the mean of the cost efficiency, while the use of reinsurance to manage underwriting risks does not." Both of these studies, however, make no attempt to analyze the risk management efficiency of insurers itself.

Risk management efficiency can be measured by frontier analysis, that is, by treating it the same as measuring the overall performance of the company (Cummins, 1999). Ren (2007) computed a risk management performance index (RMPI) to reflect the performance of risk management for property-liability insurers. Adopting the same methodology as Brockett et al. (2004), the DEA-RAM model was used to produce performance scoring for each firm thereby constructing a RMPI. There is still limited

[1] For details, see Doff (2007)

literature studied the important of risk management on the efficiency of the insurance firms as well as the efficiency of the risk management itself. Most of the past studies had focused on the efficiency of the insurance company as a whole, i.e., not the efficiency of a single activity in the insurance company's operation. The study by Cummins (1999) truly provided important information and an outlook of U.S. life insurance industry efficiency. He concluded that the life insurance industry indicated relatively low efficiency scores compared to other financial institutions, such as property-liability insurance and banking sectors. However, he states: "... most types of efficiency, particularly cost and technical efficiency, have risen dramatically over the past several years." In the final part of his paper, he posits: "This research can be viewed as a search for both best practices that other firms might adopt and worst practices that other firms should avoid." He also concluded that competition, technology and distribution systems are among the main causal factors of the efficiency patterns in U.S. life insurance firms. His conclusions might have been more convincing if he had adopted statistical analysis concerning the effect of these factors on efficiency.

Subsequent researchers came out with the empirical studies of the effect of various factors such as business strategies, distribution channels, deregulation, merger and acquisition (M&A) on the firm efficiency. Klumpes (2004) provided evidence of the relationship between insurance firm performance and distribution channels. The relationship between firm efficiency and the distribution channel was extended by Gamarra (2007). Gamarra investigated the German life insurance industry across different distribution channels including direct, independent and multi-channel insurers, which were not observed by earlier researchers. He concludes: "Thus, the distribution of life insurance products via multiple channels seems to be superior to specialized single distribution channels, as none of the specialized insurers show comparative performance advantage." Furthermore, Gamarra also provides a material insight into the cost and profit efficiency level of German life insurance firms, as well as scale economies in the country by employing DEA methodology. Several attempts have been made to study the effect of deregulation on insurance firm efficiency (Ennsfellner et al., 2004; Fenn et al., 2008; Barros et al., 2010). Their study was due to the increasing activity in merger and acquisitions in the U.S. insurance industry. Cummins et al. (1999) conclude that efficiency gains were enjoyed by the acquired firms but not for firms that had not taken part in mergers or acquisition transactions. Cummins and Weiss (2004) state: "For targets, both cross-border and within-border transactions (M&A) led to significant value-creation." The same issue was studied by Cummins and Rubio-Misas (2006) for the Spanish insurance industry.

Although there is a considerable amount of literature published concerning the efficiency of the insurance industry in other countries, very few studies have been found for the Malaysian insurance sector. Shazali and Alias (2000) analyzed the productivity growth of the Malaysian life insurance industry. The Malmquist index indicates that technical efficiency, technical change and productivity have shown growth during the observed period, although there was a large gap in productivity growth between firms. However, the study concluded that the productivity growth of life insurance firms in Malaysia is still far below the gross national product (GNP) growth. A more recent study can be found in Tan et al. (2009) who examined the effect of Malaysian insurance expenditure on efficiency. They employed DEA methodology to estimate the efficiency scores for each life insurance firm and then compared the computed efficiency score with the number of insurance policies in force, which represents the demand for life insurance. In conclusion, they observed that the higher the demand for life insurance the higher the efficiency of the firms. One major drawback of this approach is that the relationship between efficiency and the demand for life insurance is not empirically tested.

2. Methodology

2.1. Data collection and sources. The players in life insurance market consists of direct insurers (composite and life) constituted in and outside Malaysia, professional life reinsurers constituted in and outside Malaysia and Takaful operators. Based on the Annual Insurance Report and Annual Takaful Report from Bank Negara Malaysia, for the period of 2003-2007, there are twenty two players that consistently remain in the industry[1]. However, for the purpose of this study, the selection of the firms is restricted to direct insurers (composite and life) constituted in Malaysia and Takaful operators. The study excludes direct insurers and the professional life reinsurers, which are constituted outside of Malaysia. The former classes have to be excluded because of data difficulties, while the latter is due to the difference in the nature of business. Moreover, data for this study is limited to life and family Takaful business, as well as unit-linked business. For the composite insurers, which offer general and life products, the data is segregated between the two lines of business and can be obtained from the companies' financial report. The study also totally excluded the new entrants during the study periods but maintained the firms involved in merger and acquisition (M&A) activities. Finally, this leaves a sample of 17 firms (15

[1] The proportion is fifteen direct insurers constituted in Malaysia, one player for each direct insurer constituted outside Malaysia, professional life reinsurer constituted in Malaysia and professional life reinsurer constituted outside Malaysia, and 4 Takaful operators.

conventional life insurers and 2 Takaful operators), which represents about eighty six percent of the total players for the study period. The sample also accounts for approximately more than two-thirds of the total assets of life insurance fund assets and family Takaful fund assets in the overall life insurance industry. Data on the financial statement of the firms is adopted from the companies commission of Malaysia. The firms under observation according to the type of business are depicted in Table 1.

2.2. Selections of inputs and outputs. Defining and determining inputs and outputs is crucial in service industries such as insurance. As Cummins and Weiss (2000) state: "This problem is especially acute in the service sector, where many outputs are intangible and many prices are implicit." The results can be misleading or meaningless if these quantities are poorly defined. Thus, the quality and the appropriateness of data used in any adopted techniques are just as important as the techniques themselves (Coelli et al., 2005). Generally, input refers to the resources that decision-making units (DMUs) utilize to produce output.

In order to accomplish their promise to policyholders and provide strong creditworthiness, the insurers must be solvent and, therefore, insurance firms must be very careful about their risk profiles and address them in their management control framework. As Doff (2007) states: "In particular, the way in which insurance companies handle risks is an area of performance improvement." One of the reasons why insurers manage risk is the cost of financial distress. Financial risk management can reduce the propensity of a firm facing financial distress or insolvency risk by reducing the volatility of firm value. Hence, risk management reduces the costs the firm would encounter if it met with financial distress (Smith, 1993). At a minimum, the function of risk management is to secure the right of a policyholder for the receipt of their proceeds. However, at the same time, the party that provides the capital and bears the risk, that is, the shareholder must be rewarded too. Value added from bearing risk via return on equity (ROE) or dividends can only be provided by profitable businesses. As Black and Skipper (2000) mention: "For most life insurers, the key control variables are solvency and profitability. At a minimum, life insurers should establish risk management constraints designed to avoid regulatory intervention due to statutory insolvency and the forced sale of assets or need to assume debt obligations to meet cash flow solvency requirements." On top of that, the life insurance firms grant a range of services such as financial planning, claims settlement, policy selection counselling for individuals and businesses. Against this backdrop, it is apparent that risk management activities serve the three main functions of insurance firms, i.e., risk bearing/risk pooling, intermediation and real services.

In performing these functions, the insurance firms are likely could not avoid the asset risk, insurance risk, interest rate risk and business risk. The success of these functions depends on how efficient the insurance firms can manage the related risk. Hence, all the inputs and outputs should have reflected the type of risk that is managed by risk management of life insurance firms and Takaful operators in this study. Based on the study by Ren (2007), the risk faced by the insurance firms are proxied by variance of investment return, variance of loss ratio and the ratio of total liabilities to total assets. Nevertheless, the non-financial risk has to be excluded since this category is not measurable and is beyond the scope of this study. In addition, the loss ratio had to be changed to financial leverage based on the appropriateness in life insurance accounting. Financial leverage is measured by the ratio of premium to surplus. Thus, this study employs variance of investment return, financial leverage and the ratio of total liabilities to total assets as inputs. On the other hand, following prior researches with value-added approach such as Cummins and Zi (1997), Eling and Luhnen (2009) and Laverty and Grace (2009), net incurred benefits and reserve is treated as output for the risk management activity in this study. The input and output variables of risk management are summarized in Table 2.

Table 1. The list of firms under observation 2003-2007

#	Name of firm	Type of business
1	Hong Leong Assurance Berhad (Hong Leong)	Composite
2	MCIS Zurich Insurance Berhad (MCIS Zurich)	Composite
3	Malaysian National Insurance Berhad (MNI)	Composite
4	Malaysian Assurance Alliance Berhad (MAA)	Composite
5	Takaful Nasional Berhad (TN)	Composite
6	Maybank Takaful Berhad (Mayban Takaful)	Composite
7	Prudential Assurance Malaysia Berhad (Prudential)	Composite
8	ING Insurance berhad (ING)	Composite
9	AXA Affin Life Insurance Berhad (Tahan/AXA)	Life
10	Amlife Insurance Berhad (Amassurance)	Life
11	Allianz Life Insurance Berhad (Allianz)	Life
12	Uni Asia Life Assurance Berhad (Uni Asia)	Life
13	Manulife Insurance Berhad (Manulife)	Life
14	TM Asia Life (M) Berhad (Asia Life)	Life
15	Mayban Life Assurance Berhad (Mayban Life)	Life
16	Great Eastern Life Assurance (Malaysia) Berhad	Life
17	CIMB Aviva Assurance Berhad (Commerce Life)	Life

Table 2. Input and output variables and measurements of risk management

	Variable
Inputs	Variance of investment return Financial leverage (premium/surplus) Total liabilities/total assets
Outputs	Net incurred benefit Reserve

2.3. Model specification – data envelopment analysis (DEA). The risk management efficiency is adopted from the concept of economic efficiency. The economic efficiency concept can be explained from the basic concept of production frontier which is come from the microeconomic theory of the firm (Cummins and Weiss, 2000). Economic efficiency theory states that firms should organize their output to attain the lowest possible cost per unit produced. From another perspective, economic efficiency relates to the way existing resources are allocated. The production frontier is used to define the relationship between the input and the output. The frontier also depicts the maximum output that can be produced from each level of input. Thus, it reflects the current state of technology in the industry (Coelli et al., 2005).

Following Leverty and Grace (2009), Ren (2007) and Brockett et al. (2005; 2004), this study will employ the range adjusted measure RAM-DEA as a frontier efficiency technique in assessing the efficiency of risk management for each DMUs. In contrast with this study, all the above studies focused on the property-liability insurance firms and the overall performance of the insurers. The RAM model is a variant of the additive DEA model, which was first presented by Charnes et al. (1985). Later, Cooper et al. (1999) discussed this methodology in detail. As in the additive model, the RAM differs from the CCR and BCC model as it combines both orientations in a single model, i.e., input-oriented model and output-oriented model. RAM focuses on maximizing the non-zero slacks in the optimal objective. The slacks give the estimate of input excess and output deficits that could be improved without worsening any other input and output. Compared to other DEA models, RAM offers some nice properties. The advantages of RAM-DEA are as follows:

1. In the optimal objective of the RAM model, the slacks are normalized by the range of inputs and outputs, summed and the average is taken. Thus, giving a dimensionless measure of inefficiency (Brockett et al., 2005). This implies that this measure is independent (invariant) to changes in location and scale of input and output and has a uniform set of weights.
2. One of the drawbacks of the CCR and BBC models is that they only estimate the relative performance of the decision-making unit (DMU) and not absolute performance (Ren, 2007). As Brockett et al. (2004) claims: "... DMU_1 may achieve an efficiency value of $\theta^* = 8$ from its evaluation by reference set A. This does not, however, mean that DMU_2 with an efficiency rating of $\theta^* = 9$ relative to a reference set B, is more efficient than DMU_1 because these values refer to the performance relative to different peer groups." According to Cooper et al. (1999), it is also strongly monotonic, thus, it can be used for ranking of DMUs by efficiency.
3. Moreover, this RAM has other properties that are also attractive. The efficiency measure of RAM, that is, invariance to linear transformations, allows the negative values in the DEA model.

The RAM-DEA model will be used to obtain the efficiency score of risk management of each firm under observation. Throughout this study the DMUs refer to the risk management activity of the life insurance firms and Takaful operators. According to Cooper et al. (1999), for each DMU_j (j = 1,…, n) and amount of input x_{ij} (i = 1,…, m) used by DMU_j and amount of output y_{rj} (r = 1,…, s) yielded by DMU_j, the RAM-DEA model is formulated as follows:

$$\max_{\lambda_j s_i^- s_r^+} \frac{\sum_{i=1}^{m}\left(\frac{s_i^-}{R_i^-}\right)+\sum_{r=1}^{s}\left(\frac{s_r^+}{R_r^+}\right)}{m+s}, \qquad (1)$$

subject to

$$x_{i_0} = \sum_{j=1}^{n} x_{ij}\lambda_j + s_i^-, \quad i = 1,\ldots, m$$

$$y_{r_0} = \sum_{j=1}^{n} y_{rj}\lambda_j + s_r^+, \; j = 1,\ldots, s$$

$$\sum_{j=1}^{n} \lambda_j = 1$$

$$0 \le \lambda_j, s_i^-, s_r^+, alli, j, r$$

where, x_{i_0}, y_{r_0} represent the corresponding input and output values for DMU_0, the DMU whose efficiency is to be evaluated. The optimization in equation (1) is over the variables $0 \le \lambda_j, s_i^-, s_r^+$.

$$R_i^- = \overline{x_{ij}} - \underline{x_{ij}}, \quad i = 1,\ldots, m,$$

$$R_r^+ = \overline{y_{rj}} - \underline{x_{rj}}, r = 1,\ldots, s,$$

R_i^- and R_r^+ are the range of the slack variables with $\overline{x_{ij}}$, $\overline{y_{rj}}$ denoting the highest $\underline{x_{ij}}$, $\underline{y_{rj}}$ the lowest of the j = 1,…, n in row i and r, respectively. By dividing each slack variables with R_i^- and R_r^+, the measure of inefficiency is unit invariance because all the slacks have the same scale with its range and the ratio of these two measures eliminate the scale of each input and output variable. This feature according to Brockett et al. (2005) is a "dimensionless" measure of RAM inefficiency. Referring to equation (1), the objective of equation (1) is to maximize the slack values that en-

sure that all such inefficiencies are identified. Consequently, DMU_0 is said to be fully efficient if and only if all slacks are zero at optimum equation (1). This implies that for this DMU_0 no other DMU (or combination of DMUs) can produce the same output with smaller amounts of inputs, or can use the same set of inputs to produce more output.

Since $\sum_j^n \lambda_j = 1$ as given in equation (1), it can be shown that:

$$0 \le \frac{\sum_{i=1}^{m}\left(\frac{s_i^-}{R_i^-}\right)+\sum_{r=1}^{s}\left(\frac{s_r^+}{R_r^+}\right)}{m+s} \le 1. \qquad (2)$$

Equation (2) can be used as a measure of inefficiency for DMU_0. According to Cooper et al. (1999), by taking its compliment, a measure of RAM-DEA efficiency can be obtained, that is:

$$0 \le \Gamma = 1 - \frac{\sum_{i=1}^{m}\left(\frac{s_i^-}{R_i^-}\right)+\sum_{r=1}^{s}\left(\frac{s_r^+}{R_r^+}\right)}{m+s} \le 1. \qquad (3)$$

So, the efficiency of DMU_0 can be detected through the value of Γ, in which a lower bound of this measure ($\Gamma = 0$) can be achieved when the measure of inefficiency is equal to one and this is only when $s_i^{-*} = R_i^{-*}$ for all $i = 1,\ldots, m$ and $s_r^+ = R_r^+$ for all $r = 1,\ldots, s$. This means that DMU_0 is not efficient. On the other hand, the DMU_0 is fully efficient when the $\Gamma = 1$. This can be achieved when the value of all slack variables is equal to zero. Both measures in equation (2) and (3) are strongly monotonic, hence, it can be used for rankings of DMUs (Cooper et al., 1999). Brockett et al. (2004) state: "Ranking of evaluated entities according to their efficiency is a frequent managerial desire and use of DEA, and useful for subsequent statistical analysis." In addition, the invariance to linear transformation gives a way to deal with negative values.

In adopting DEA as a technique to measure efficiency, as a rule of thumb, for five inputs and five outputs, at least twenty five or so units will appear efficient and, thus, the data set needs to be greater than twenty five for any discrimination (Talluri, 2000). Another guideline is provided by DEA convention, where the minimum number of DMUs is greater than three times the number of inputs plus outputs (Barros et al., 2010). In the case of this study, the summation of input and output variables used in risk management is five. Thus, there are 17 firms for the five years time spans, which is consistent with the benchmark by Talluri (2000) and DEA convention. Several previous researchers such as Shazali and Alias (2000), Wang et al. (2007) and Abdul Kader et al. (2010) perform insurance firm's efficiency studies using DEA on small data sets ranging from twelve to twenty six firms. Furthermore, the number of DMU used in this study is larger than that used in some previous insurance efficiency studies.

3. Results

The average risk management efficiencies of conventional life insurers and Takaful operators for the period of 2003-2007 are presented in Table 3.

Table 3. Risk management efficiency score

Year	Efficiency
Averages:	
2003	0.76961
2004	0.84073
2005	0.78476
2006	0.80237
2007	0.87452
Standard deviations:	
2003	0.19741
2004	0.16126
2005	0.20130
2006	0.20051
2007	0.13995
Min (Max):	
2003	0.48770
2004	0.50898
2005	0.43098
2006	0.44628
2007	0.60360

The top panel of the table shows risk management efficiency averages while the middle panel shows the standard deviations. On top of that the lower panel shows the minimum and maximum values of the efficiency score. The risk management efficiency is relatively high as for five consecutive years, the values are above 0.5. This also indicates that the average firm could improve their risk management performance by the value less than 50%. For example, the average risk management efficiency in 2003 is 0.76961 or 77%, implying the average firm could reduce their input usage by 23% in order to operate on the efficient frontier. In 2004-2007, the average risk management efficiency are 0.84073, 0.78476, 0.80237 and 0.87452, respectively.

The standard deviation explains the heterogeneity of efficiency score across firms in the industry. The higher the standard deviation value, the greater the dispersion of efficiency scores among the firms (Cummins, 1999). It can be seen from the middle panel of Table 1, the dispersion of efficiency score declined during the sample period, reflecting the enhancement of risk management practice done by the firms toward best practices. It is apparent from the lower panel of the Table 3 above, the firm should reduce their input usage by 40% to 57% at most if it were to be efficient. Manulife, Tahan/AXA and MAA are the firms with the minimum value during the sample period.

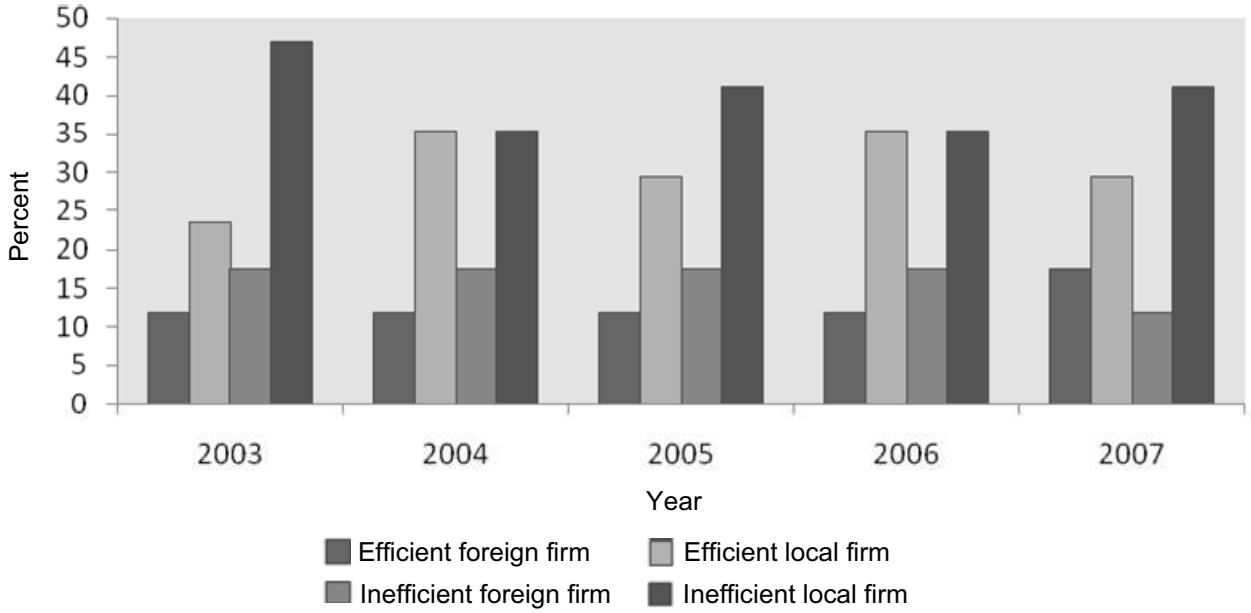

Fig. 1. Distribution of risk management efficiency score

From the bar chart in Figure 1, the percentage of the firm having the efficient risk management for 2003-2007 are 35%, 47%, 41%, 47% and 47%, respectively. It also compares the percentage of the firms having efficient and inefficient risk management between foreign and local firms. During the sample period, the percentage of the foreign firms having the efficient risk management is 13% on average, while it is 30% on average for the local firms. In addition, the percentage of the foreign firms having inefficient risk management is around 17% which is lower than the percentage of local firms having inefficient risk management which account about 40%. However, based on the status (foreign/local) of the firm, it is found that the percentage of the foreign firms having efficient risk management are relatively greater than the local firms in 2003 and 2007. For instant, in 2007, there are three out of five foreign firms having the efficient risk management which accounts for 60%, whereas there are only five out of 12 local firms having the efficient risk management which account for 42%. In 2003, 40% of the foreign firms having efficient risk management, while 33% of the local firms having the efficient risk management. In reverse, for another period, i.e., 2004-2006, the percentage of foreign firms having efficient risk management is relatively lower compare to the percentage of local firms to the ratio of 40%:50%, 40%:42%, 40%:50%, respectively.

From Table 4, the most striking result to emerge from the data is that Great Eastern, Mayban Life and Mayban Takaful are consistently having the efficient risk management during the sample period with the efficiency score equal to one. Besides, there are a few firms such as MNI, TN and Allianz have been unsuccessful to manage their risk efficiently once during five years time span. Interestingly, Tahan/AXA is having efficient risk management in 2006 and 2007 after being unsuccessful in previous years. On the other hand, Manulife and Amassurance consistently performed relatively poor during 2003-2007. The rest, including Prudential, MCIS Zurich, ING, Asia Life, Uni Asia, Hong Leong, Commerce Life and MAA behaved relatively inconsistent within the sample years. All these are most likely can be explained by the new regulation, policy changes, new management team, product development, merger and acquisition, investment strategies and unexpected claims that could be occurred in the firms. For example, Tahan/AXA had been in the last three ranking in 2003, second last in 2004 and finally in the last ranking in 2005 with the efficiency score equal to 0.51066, 0.61885 and 0.43098, respectively. This is most likely due to the fact that Tahan/AXA had been experiencing low and negative surplus for three consecutive years from 2003-2005. However, in 30 June 2006, the disposal of Tahan's life insurance fund was completed and thus all the asset and liabilities of life insurance fund and business had been transfer to AXA Affin Life Insurance Berhad. Hence, the acquisition activity could be the cause of the enhancement of risk management of Tahan/AXA in 2006 and 2007. The result is summarized in Figure 2.

From the operation point of view, the conventional life insurance firms in Malaysia are categorized as stock insurers, whereas Takaful operators as mutual insurers. It is obvious from Table 4 and Figure 2 that Mayban Takaful and TN are having efficient risk management within the sample period. On the contrary, most of the conventional life insurance firms operated in the state of inefficiency, although there are a few conventional life insurance firms such as

Great Eastern, Allianz, Mayban Life, Hong Leong and MNI achieve the state of efficiency at least for one year. According to Brockett et al. (2005), the organizational form (stock vs mutual) of the insurers do matter in determining the efficiency of the insurance firms. However, there are not so many studies concerning the effect of organizational forms on the risk management efficiency.

The results show that there is no clear trend between size of the firm and the efficiency of risk management throughout the sample period. The Great Eastern which is the largest life insurance firm with assets amounted at 20-33 billion during the sample period achieved the perfect score of efficiency across five consecutive years. At the same time, Mayban Takaful with the smallest amount of assets ranging from 18 to 257 million also attained the efficiency score equal to one. Tahan also experience the same situation as Mayban Takaful for the year of 2007. However, ING as the second largest firm never achieve the perfect score of efficiency across the 2003-2007. The rest, the relationship between the size of the firm and the risk management efficiency also could not be explained.

Table 4. Relative risk management efficiency score by life insurance firm (2003-2007)

#	Insurance firm	2003	2004	2005	2006	2007
1	Allianz	1	0.70499	1	1	1
2	Amassurance	0.48972	0.69670	0.54756	0.50949	0.64465
3	Asia Life	0.79978	1	0.70816	0.70011	0.84987
4	Commerce Life	1	0.74212	0.57591	1	0.86385
5	Great Eastern	1	1	1	1	1
6	Hong Leong	0.77736	1	0.78612	0.67936	0.73542
7	ING	0.80120	0.78418	0.71349	0.71118	0.82979
8	MAA	0.7456	0.773442	0.72366	0.59462	0.60360
9	Manulife	0.48769	0.50898	0.46748	0.44628	0.64979
10	Mayban Life	1	1	1	1	1
11	MCIS Zurich	0.67699	0.76503	0.63216	0.55788	0.78829
12	MNI	0.56099	1	1	1	1
13	Prudential	0.71088	0.73717	0.75534	0.78496	1
14	Tahan/AXA	0.51066	0.61885	0.43098	1	1
15	TN	1	1	1	0.65641	1
16	Uni Asia	0.52246	1	1	1	0.90151
17	Mayban Takaful	1	1	1	1	1

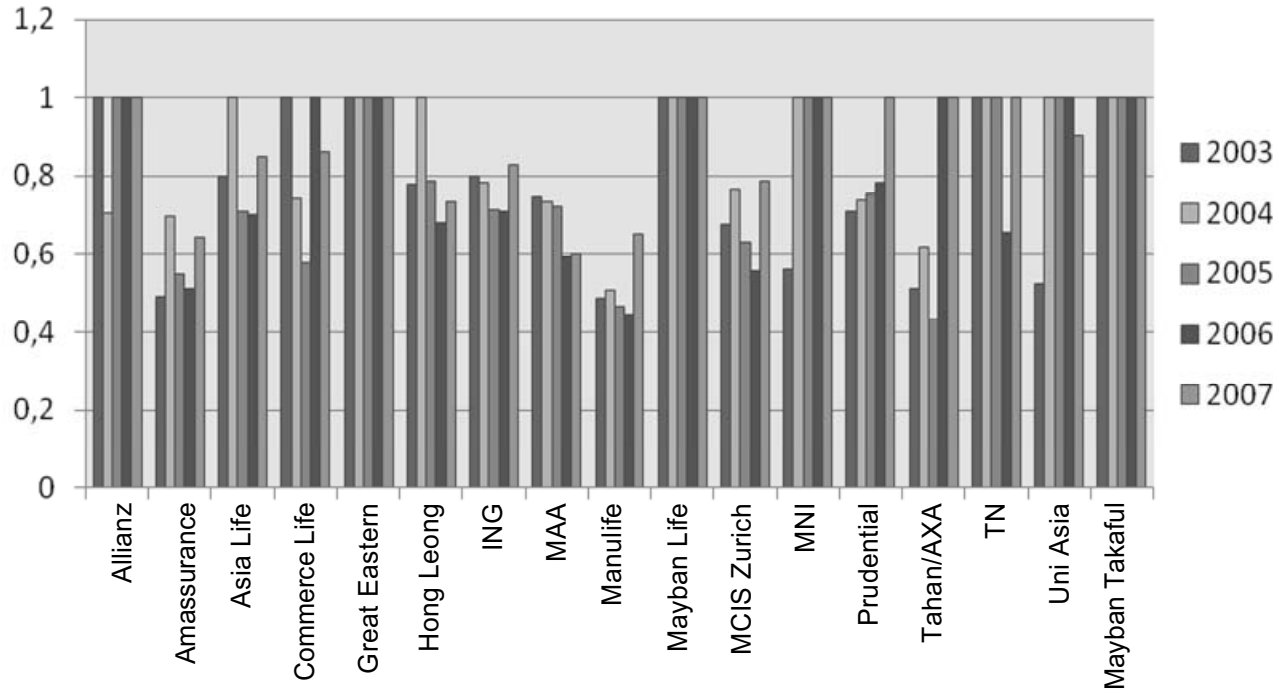

Fig. 2. Distribution of risk management efficiency across insurance firm

Conclusion

Inadequate risk management practices (Babbel and Santomero 1999) can result in losses on assets investment, mispricing of insurance policies, insolvencies among the reinsurers, market misconduct of insurance agent and noncompliance with insurance regulations. Cummins and Lamm-Tennant (1993) state: "To succeed in today's business environment, insurers must use financial techniques such as asset-liability management, financial hedging, futures, and options. They also must be increasingly precise in measuring the tradeoffs between risk and return in both their assets and product portfolios." This view is supported by Black and Skipper (2000) who wrote that it is obvious that good financial management can give a competitive advantage between life insurers rather than a good experience of mortality and morbidity rate.

In response to this, insurers almost universally have embarked upon an upgrading of their financial risk management and control systems to reduce their exposure to risk and better manage the amount they accept. In short, the industry has turned to financial risk management techniques as a way to improve performance (Santomero and Babbel, 1997). The risk management efficiency of the life insurers and Takaful operators is the main concern of shareholders, policyholders and regulators. This is because the prudent risk management can warranty the favourable return to the shareholders, guarantee the ability to compensate the policy holders as the covered losses should be occurred and finally assured the solvency requirement by the regulators. The dynamically change in the interest rate risk, investment risk, solvency risk as well as consumer preferences have exposed some challenges in risk management nowadays. Thus, it is important to have the overview of the risk management practices among the life insurance firms and Takaful operators since these are two main players in the life insurance industry.

From the result, it is found that the efficiency score is relatively high and the standard deviations indicate a decreasing trend. For life insurers, the solvency requirement is the first to be achieved before claim-ability payment for their policyholders and increase the shareholder value by providing maximum returns. Being a much regulated institution, Bank Negara Malaysia had practiced stringent action towards the insurance firms that had been recognized as having problems. The insurance firms have no choice but must provide solvent business environment in order to fulfil the obligation to the policyholder, as this is the primary liability category of life insurers. Thus, by providing effective risk management, the firm can assure the solvency environment and enhance the faith of its policyholders towards the company's creditworthiness. This is also encourage the insurance firms toward the best practices in risk management. The result also indicates that most of the firms performed relatively inconsistent during the sample period. This is most probably can be explained by the changes happening in the firms concerning regulations, policy, strategy and development. Finally, this study found that it is hard to confirm that the foreign firms can manage their risk more efficient than the local firms. Besides, it could not be said that there is a positive or negative relationship between the size and the risk management efficiency of the firm. However, it is quite apparent that there is a linkages between the organizational forms (stock vs mutual) and the risk management efficiency.

As extension for future research, it is essential to determine the relationship between the factors such as organizational forms, status of the firm (foreign vs local) and size and the risk management efficiency empirically. This is supposed to be able to add significantly to the enhancement of risk management practices.

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