IME The 16th International Congress on
2012 Insurance: Mathematics and Economics
June 28-30, 2012   Hong Kong

Muhamad Abduh (+85265925853)

Programme and Abstracts

Session 42: **Applications – Chair: Qihe Tang** ✓ **103**

16:00 – 16:20 *Measuring the Performance of Insurance Industry in Malaysia: Islamic vis-à-vis Conventional Insurance*
Muhamad Abduh, Mohd Azmi Omar and Raudhah Mohd Tarmizi

16:20 – 16:40 *Country Risks and Insurance Demand: Some International Evidence*
Chien-Chiang Lee, Yi-Bin Chiu and Chi-Hung Chang

16:40 – 17:00 *Asymmetric Information in Motor Insurance Market in China: Differences in Lines and Regions*
Ying Liu and Yanyan Ren

17:00 – 17:20 *Quantifying the Impact of Partial Information on Sharpe Ratio Optimization*
Lin Zhao and Lihong Zhang

19:00 – 22:00 *Banquet* at City Hall Maxim's Palace, Low Block 2/F, Central, Hong Kong
大會堂美心皇宮，低座二樓，中環
Assemble for transportation at 18:00 at Rayson Huang Theatre (RHT) .

Measuring the Performance of Insurance Industry in Malaysia: Islamic vis-à-vis Conventional Insurance

Muhamad Abduh[1], Mohd Azmi Omar[1] and Raudhah Mohd Tarmizi[2]

[1]*IIUM Institute of Islamic Banking and Finance, International Islamic University Malaysia, Malaysia*
[2]*Department of Finance, International Islamic University Malaysia, Malaysia*

The development of Islamic financial institutions is growing tremendously since the last three decades. However, many studies conducted are focused more on the development and performance of banking and financial markets sectors and almost neglecting another specific and important sector which is insurance. Thus, this study aims to measure the performance of Islamic insurance industry in Malaysia and compares them with their conventional counterpart. This study covers three years period i.e. 2008 to 2010, and employs ratio analysis and data envelopment analysis to measure both industries performance.

On Some Properties of the Haezendonck-Goovaerts Risk Measures and Orlicz Quantiles

Jae Youn Ahn, Ralph P. Russo and Nariankadu D. Shyamalkumar

Department of Statistics and Actuarial Science, University of Iowa, USA

Haezendonck-Goovaerts risk measure, which includes T-VaR as its member, is a recently introduced class of risk measures by Goovaerts et al. (2004). Haezendonck-Goovaerts risk measures are defined as the minimum value of an implicitly defined function. They are further studied and shown to be coherent by Bellini and Gianin (2008). Recently there also has been some interest in the minimizer set of this implicitly defined function and infimum of this minimizer set is called Orlicz quantile. Orlicz quantile includes VaR as its member. In this project we provide some inequalities for Orlicz quantiles and Haezendonck-Goovaerts risk measures. Especially we show that VaR is the maximal member of Orlicz quantiles. We also also provide the lower bound of Haezendonck-Goovaerts risk measures, which is the generalization of Corollary 3.1 in Goovaerts et al. (2004).

A Simulation Model for Calculating Solvency Capital Requirements for a Non-life Insurance Company

Jonas Alm

Department of Mathematical Sciences, Chalmers University of Technology, Sweden

To stay solvent, an insurance company must have enough assets to cover its liabilities towards its policyholders. In this paper we develop a general technique for constructing a simulation model that is able to generate a solvency capital requirement (SCR) value for a non-life insurance company. The only input to the model are assumptions about the distributions of payment patterns and ultimate claim amounts. These assumptions should ideally be based on findings in empirical data studies.

Measuring the Performance of Insurance Industry in Malaysia: Islamic vis-à-vis Conventional Insurance

Muhamad Abduh[1]
Assistant Professor
IIUM Institute of Islamic Banking and Finance
International Islamic University Malaysia

Mohd Azmi Omar
Professor
Department of Finance, Kulliyah of Economics and Management Sciences
International Islamic University Malaysia

Raudhah Mohd Tarmizi
Postgraduate Student
Department of Finance, Kulliyah of Economics and Management Sciences
International Islamic University Malaysia

Abstract
The development of Islamic financial institutions is growing tremendously since the last three decades. However, many studies are focused more on the development and performance of banking and other financial markets and almost neglecting another specific and important sector, which is insurance. Thus, this study aims to measure the performance of Islamic insurance industry in Malaysia and compares them with their conventional counterpart. This study covers a three-year period, i.e. 2008 to 2010 and employs ratio analysis and data envelopment analysis to measure the performance of both industries. The findings show that insurance industry is more efficient than Takaful industry in both ratio analysis and data envelopment analysis.

Keywords: Insurance, takaful, performance, data envelopment analysis, ratio analysis

1. Introduction

The main way for businesses and individuals to reduce the financial impact of a risk occurring is through insurance. Thus, it is a form of risk management primarily used by firms or individuals to protect their financial assets. Today, there are two types of insurance operated in some countries, particularly in Malaysia, which are conventional insurance and Islamic insurance (takaful). Malaysia introduced the first takaful as an alternative to conventional insurance in the year of 1984. However, Malaysia is not the first country in contributing to the establishment of Takaful industry because Sudan and Saudi Arabia introduced the takaful industry in the late 1970s.

The origin of takaful comes from the ancient Arab tribes, which was interpreted as

---

[1] Corresponding author. Fax: 00-60-03-2094-7728. Email: abduh.iium@gmail.com

a pooled liability that obliged those who committed offences against members of a different tribe to pay compensation to the victims or their heirs. Later on, this principle is extended over many parts of life, including sea trade, in which participants contributed to a fund to cover anyone in a group who suffered misfortune on sea voyages.

Takaful operation today is under the cooperative principle and the principle of separation between the funds and operations of shareholders. Hence, it is passing the ownership of the Takaful fund and operations to the policyholders. The policyholders are joint investors with the insurance vendor (Takaful operator), who acts as a mudarib–a manager or an entrepreneurial agent for the policyholders. The policyholders share among them the investment pool's profits as well as its losses. A positive return on policies is not legally guaranteed, as any fixed profit guarantee would be akin to receiving interest and offend the prohibition against riba. Muslim jurists conclude that insurance in Islam should be based on principles of mutuality and co-operation, encompassing the elements of shared responsibility, joint indemnity, common interest and solidarity.

In Takaful industry, they offered general and family Takaful whereas in conventional insurance industry, they offered general and life insurance. Furthermore, according to RAM Rating Services (RAM), the assets of Takaful funds in Malaysia have recorded a five-year compounded annual growth rate of 16%, and it is double than conventional insurers. Meanwhile, assets in the Takaful industry also increased by 17% to RM14.7 billion (US$4.82 billion) in the year of 2010, accounting for 8.7% of the combined asset base of the insurance and Takaful industries (IFN, 2011). Besides that, based on Takaful annual report and insurance statistics, both industries experienced growth in their premium. Nevertheless, the premium growth for Takaful is doubled than in Insurance industry.

Hence, it is interesting to study the performance of insurance and Takaful as well as their level of efficiency in their operations. Therefore, this study is aimed at investigating the performance of Takaful industry and the performance of conventional insurance industry in Malaysia. Besides that, this study will identify which company in the industry that is efficient in their operations.

This paper is organized as follows. Section 2 discusses about the previous researches that have been done on the performance of both Takaful and insurance industry. Section 3 describes the methodology and data employed in order to get the results. Section 4 discusses the findings, and the last section is the conclusion of the paper.

2. Literature Review

There are several ways in measuring the performance of Takaful operators and conventional insurance companies. One of it is by looking at the efficiency of both companies. Saad et al (2006) argues that there is an impact upon the efficiency of Takaful operators and insurance companies as the Malaysian financial system has experienced structural changes with several liberalization measures since a decade ago. Therefore, Saad et al (2006) uses Data Envelopment Analysis (DEA) with Malmquist Index in order to investigate the life insurance industry in Malaysia and to compare its performance with Takaful operators from year 2002 to 2005. They evidence that scale efficiency has big contribution rather than pure efficiency to the total factor productivity in the insurance industry in Malaysia. On the other hand, they found that Takaful has performed below than the industry average in pure efficiency, but the Takaful scale efficiency is at the industry average. As a result, they conclude

that, Takaful Nasional is competitive in Malaysian insurance industry.

On another occasion, Ismail et al (2011) conducts a study on technical efficiency to measure the performance of conventional insurance industry and Takaful industry using DEA. In order to examine the technical efficiency of both industries, Ismail et al (2011) uses constant return to scale and variable return to scale assumptions. By examining the technical efficiency, they also make a comparison for pure technical efficiency and scale efficiency. In the end, Ismail et al (2011) evidence that conventional insurance industry is more efficient than Takaful industry in constant return to scale and variable return to scale assumptions. Besides that, Takaful industry has lower pure technical efficiency and scale efficiency than conventional insurance, and this is in line previous study done by Saad et al (2006).

Rahman (2009) examines the Takaful performance by looking at the growth of the Takaful industry. Based on the study, she finds that the population size and demographic factors play a vital role in contributing to the growth of the Takaful industry. However, in the study, she only used descriptive statistic from a secondary data. Furthermore, Kassim (2008) conducts a study regarding Takaful in Malaysia using qualitative techniques. According to Kassim (2008), it is difficult to compare the performance of Takaful industry and the conventional insurance industry as both industries have different product and have different ways in recording their profit. Furthermore, he also concludes that, it is hard to look at the level of capital and solvency margin in comparing the performance of both industries because they have different nature of contracts.

3. Data and Methodology
3.1 Data
The sample of this study consists of 7 companies from insurance industry and 5 companies from Takaful industry. Data are collected from the annual report of Takaful and insurance companies from the year of 2008 to 2010. In order to perform this study, return on asset will be calculated as in accordance to Akhter and Zia-ul-Rehman (2011) and Liquid Asset to Total Asset Ratio, premium and reinsurance receivable to total asset ratio, Total Equity to Total Asset ratio will be calculated as in accordance to Ozdemir and Balkanli (2011). Besides that, commission and management expenses are taken as input, while premiums and investment income are taken as output and this is in line with what have been done by Saad et al (2006) and Ismail et al (2011).

3.2 Methodology
Following Akhter and Zia-ul-Rehman (2011) and Ozdemir and Balkani (2011), ratio analysis will be employed in order to identify which industries have better performance. The ratio analysis includes;
1. Liquid asset to total asset ratio. This ratio is measured by dividing cash in hand and bank and financial asset with total assets of the firms. This ratio is to identify how much liquid asset is comprised on the total assets of the firm.
2. Premium and reinsurance receivable to total asset ratio. This ratio is calculated by dividing premium and reinsurance receivable with the total assets of the firms. This ratio indicates the performance of the firms in managing their liquidity position.
3. Total Equity to Total Asset ratio. This ratio is calculated by dividing total equity of the firms with the total assets of the firms. This ratio measured how much amount from shareholders equity is used to finance the assets.
4. Return on asset (ROA). This ratio is measured by dividing the return of the

firms with the total assets of the firms. This ratio explained the management ability to generate profit from the investment of the assets of the firms. If the ratio is high, it shows that, the management is efficient in their assets utilization.

Then, DEA will be used to compute Malmquist index in order to measure the performance of both insurance and Takaful industry in Malaysia.

4. Findings and Discussion
4.1 Ratio Analysis

As mentioned in previous section, liquid asset to the total asset ratio is calculated by dividing the liquid asset with the total assets. In this ratio, liquid asset is consisted of cash, bank and financial assets. Therefore, based on the ratio calculated in the Table 1 below, insurance industry has more liquid assets as compared to Takaful industry. It is because; they have invested more in financial assets such as in government securities. Based on the information provided in Table 1, both industries experienced growth in the liquid asset to the total asset ratio. Hence, both industries will be less risky if there is a liquidity crisis. Even that so, in year 2010, there is no much different in the means for both industries, but the standard deviation for insurance industry is doubled than Takaful industry, which shows that insurance is more volatile in the year of 2010.

Table 1.
Liquid Asset to Total Asset Ratio (%)

		2010	2009	2008
Takaful	Mean	3.5482	1.0131	1.1375
	Std. Deviation	3.7117	1.1581	1.3704
Insurance	Mean	4.2274	3.9617	1.4378
	Std. Deviation	6.5305	6.3178	2.5272

In a while, for premium and reinsurance receivable to total asset, it is calculated by using premium and reinsurance receivable and then, dividing it with total assets of the firms. As can be seen at Table 2 below, insurance industry has low premium and reinsurance receivable to total assets ratio as compared to Takaful industry. Thus, it shows that insurance industry has a low impact in liquidity positions if there is any event of default. Nevertheless, it does not mean that Takaful industry will be much affected if there are any events of default as they will use *tabarru'* (donation) account to cover it. Although insurance industry has high premium and receivable than Takaful industry, the big amount of assets that belongs to insurance industry is indirectly affected by this premium and receivables to total assets ratio.

Table 2.
Premium and reinsurance receivable to total asset ratio (%)

		2010	2009	2008
Takaful	Mean	2.7850	2.4959	1.3268
	Std. Deviation	2.2915	2.0454	2.0819
Insurance	Mean	1.0448	1.2461	1.0924
	Std. Deviation	0.9101	1.1605	1.1442

Table 3 shows the measurement of total equity to the total asset ratio by dividing

total equity to the total assets of the firms. It can be seen that Takaful industry has high total equity to the total asset ratio as compared to insurance industry. Nevertheless, Takaful industry shows a downward trend in the ratio, while insurance industry shows an upward trend in the ratio. This total equity to total assets ratio indicates that, the highest the ratio, the less risky to the firms. Nevertheless, it cannot be said that insurance industry is riskier as compared to Takaful industry because the asset of insurance industry is more than tripled from the assets of Takaful industry.

Table 3.
Total Equity to Total Asset ratio (%)

		2010	2009	2008
Takaful	Mean	13.8101	14.8652	18.7489
	Std. Deviation	8.6157	9.8640	11.6361
Insurance	Mean	9.9225	8.7371	7.5664
	Std. Deviation	7.2403	4.6662	3.9238

Finally, Table 4 shows the ratio analysis of the return on assets ratio which is looking at the overall profitability of the industry by dividing the return with the total assets of the firms. Overall, it can be seen that, insurance industry has better performance than Takaful industry even though there is only a slight difference in the ratio. However, Table 4 also depicts that both industry performance is fluctuated in the 3 years of the analysis. The ROA for Takaful industry is low may be because of Takaful operators does not have many place to invest as they have to invest with the *shariah* compliant instrument. Besides, the Takaful operators might be less efficient in managing the assets investment.

Table 4.
Return on asset (%) - ROA

		2010	2009	2008
Takaful	Mean	1.1008	2.2044	-0.3263
	Std. Deviation	1.1230	2.4224	1.6876
Insurance	Mean	1.2537	1.9365	0.6220
	Std. Deviation	0.6596	1.1762	1.8901

4.2 Data Envelopment Analysis
In order to perform data envelopment analysis in this study, input and output for each firm will be used. Input consists of commissions and management expenses, while in output, premiums and investment income will be used. Those inputs and outputs will be used in order to measure the efficiency of both Takaful and insurance industry. There are five Takaful operators (Takaful Ikhlas, Etiqa Takaful, CIMB Aviva Takaful, BSN Takaful, and Hong Leong MSIG Takaful) and seven insurance companies (Etiqa Insurance, CIMB Aviva Insurance, ING Insurance, Prudential, UniAsia Life Insurance, Great Eastern, and Alliance Life Insurance) included in this study. This study is an output oriented in order to identify how much output than can be produced by the firms for the given input.

Table 5.
Statistic of Input-Output for 2008 – 2010

	OUTPUT		INPUT	
	Premiums (RM mill.)	Investment income (RM mill.)	Commissions (RM mill.)	Mgt expenses (RM mill.)
Total	50,449,176	9,375,114	7,534,114	4,714,684
Mean	1,401,366	260,420	209,281	130,963
Median	771,219	51,110	80,155	84,443
Std. Deviation	1,410,495	477,024	250,227	101,897

Table 5 depicts the descriptive statistics of variables included in the analysis from the year of 2008 to 2010. Overall, this study is covering RM 50,449,176 millions of total premiums and RM 9,375,114 millions of investment income respectively. In a while, for input, it covers RM 7,534,114 millions of commissions and RM 4,714,684 millions of management expenses. For this 3-year period, Great Eastern insurance has maximum value of both input and output in 2010, which are about RM 4,890,825 millions of premiums, RM 1,778,121 millions of investment income, RM 855,344 millions of commissions and RM 313,249 millions of management expenses. On the other hand, Hong Leong MSIG Takaful has the minimum amount of inputs and premiums, which are only about RM 67,450.5 millions of premiums in 2009 and RM 3,171.5 millions of commissions and RM 6,744 millions of management expenses in 2008.

Table 6.
Efficiency in 2008 - 2010 for CRS (Constant Returns to Scale)

Takaful/Insurance Company	Year		
	2008	2009	2010
Takaful Ikhlas	0.176	0.245	0.271
Etiqa Takaful	1.000	1.000	1.000
CIMB Aviva Takaful	0.393	0.279	0.639
BSN Takaful	0.173	0.233	0.374
Hong Leong MSIG Takaful	1.000	1.000	1.000
Mean	*0.548*	*0.551*	*0.657*
Standard deviation	*0.422*	*0.410*	*0.341*
Etiqa Insurance	1.000	1.000	1.000
CIMB Aviva Insurance	1.000	1.000	1.000
ING Insurance	0.733	0.721	0.886
Prudential	0.921	0.887	0.856
UniAsia Life Insurance	0.693	0.769	0.998
Great Eastern	1.000	1.000	1.000
Alliance Life Insurance	0.799	0.647	0.911
Mean	*0.878*	*0.861*	*0.950*
Standard deviation	*0.134*	*0.149*	*0.064*

As Malmquist index is used to measure the efficiency of both industries, the

efficiency under constant returns to scale and variable returns to scale will be taken into consideration. Under constant returns to scale, feasible output is achieved when average productivity, which is output divided by input, is maximized (Fare et al, 1994). If the value for constant returns to scale or variable returns to scale is more than 1, it indicates that the firm is efficient, and if the value is less than 1, it indicates that the firm is less efficient. Therefore, based on Table 6 and 7, it can be seen that few operators in both industries are efficient as they are able to produce maximum output for a given input in both constant returns to scale and variable returns to scale. The operators are Etiqa Takaful, Hong Leong MSIG Takaful, Etiqa Insurance, CIMB Aviva Insurance, Great Eastern. However, for UniAsia Life Insurance, it is only efficient under variable returns to scale and the efficiency is fluctuated for the three-year period of analysis. The reason might because of the impact of the global financial crisis, in the year of 2008. Nevertheless, based on geometric means, it can be summarized that, insurance industry is more efficient under both constant returns to scale and variable returns to scale as compared to Takaful industry.

Table 7.
Efficiency in 2008 - 2010 for VRS (Variable Returns to Scale)

Takaful/Insurance Company	Year		
	2008	2009	2010
Takaful Ikhlas	0.890	0.951	0.606
Etiqa Takaful	1.000	1.000	1.000
CIMB Aviva Takaful	0.739	0.374	0.755
BSN Takaful	0.362	0.377	0.378
Hong Leong MSIG Takaful	1.000	1.000	1.000
Mean	*0.798*	*0.740*	*0.748*
Standard deviation	*0.266*	*0.334*	*0.267*
Etiqa Insurance	1.000	1.000	1.000
CIMB Aviva Insurance	1.000	1.000	1.000
ING Insurance	0.873	0.882	0.912
Prudential	0.926	0.991	0.879
UniAsia Life Insurance	1.000	0.787	1.000
Great Eastern	1.000	1.000	1.000
Alliance Life Insurance	0.996	0.743	0.911
Mean	*0.971*	*0.915*	*0.957*
Standard deviation	*0.051*	*0.111*	*0.054*

Table 8 shows the summary of Malmquist index from the year of 2008 to 2010 for all companies. BSN Takaful recorded the highest total productivity growth for Takaful industry, which is about 5.5 percent and UniAsia Life Insurance recorded the highest total productivity growth for insurance industry, which is about 6.3 percent. In contrast, Hong Leong MSIG Takaful and Etiqa Insurance recorded the lowest of total factor productivity growth for Takaful and insurance industry, which is about -33.8 percent and -15.9 percent respectively. Overall, the average means in total productivity growth for insurance industry is higher than the Takaful industry, and this is in line with Saad et al (2006). Nevertheless, Takaful industry recorded higher growth in efficiency change compared to insurance industry.

Table 7.
Malmquist Index Summary of Firm Means (2008 – 2010)

	Effch	Techch	Pech	Sech	Tfpch
Takaful Ikhlas	1.243	0.754	0.825	1.506	0.937
Etiqa Takaful	1.000	0.717	1.000	1.000	0.717
CIMB Aviva Takaful	1.275	0.638	1.011	1.261	0.813
BSN Takaful	1.470	0.717	1.022	1.438	1.055
Hong Leong MSIG Takaful	1.000	0.662	1.000	1.000	0.662
Mean (geometric mean)	*1.1843*	*0.6963*	*0.9686*	*1.2225*	*0.8247*
Etiqa Insurance	1.000	0.841	1.000	1.000	0.841
CIMB Aviva Insurance	1.000	0.922	1.000	1.000	0.922
ING Insurance	1.100	0.958	1.022	1.076	1.053
Prudential	0.964	0.974	0.974	0.990	0.939
UniAsia Life Insurance	1.200	0.886	1.000	1.200	1.063
Great Eastern	1.000	0.975	1.000	1.000	0.975
Alliance Life Insurance	1.068	0.961	0.956	1.117	1.027
Mean (geometric mean)	*1.0448*	*0.9298*	*0.9929*	*1.0522*	*0.9714*

Note: Effch: efficiency change; Techch: technical change; Pech: pure efficiency change; Sech: scale efficiency change; Tfpch: total factor productivity change.

5. Conclusion

This study aims to measure the performance and efficiency level of insurance industry in Malaysia, both Takaful and conventional insurance, during the period of 2008 to 2010. In order to achieve the objective of this study, ratio analysis and DEA methods are employed. The findings are showing that insurance industry is more efficient than Takaful industry in both ratio analysis and data envelopment analysis. Even that so, there is only a slight different in the efficiency in both industry. The reason might be because of Takaful industry, even though its products are different from insurance, is operated under the same financial system as insurance industry.

There are few limitations that have been discovered throughout this research. First, only few Takaful companies being used as compared to insurance companies. This is because, Takaful industry is still new even though the industry has already established in 1984. Second, the time frame for this research period is short, i.e. 2008 to 2010. This is because few Takaful companies have just been established, and few insurance companies experienced company merger and restructuring.

However, as few studies were done in measuring the performance of Takaful and insurance industry, this research might help the regulators and practitioners to identify which industry has better performance and the factors that contribute to the performance of the industry. Thereby, they might have several options in order to improve the performance of the industry.

6. References

Akhter, W. and Zia-ur-Rehman, M. (2011). Financial performance of Pakistan insurance industry in global scenario. *Far East Journal of Psychology and Business*, Vol. 3, No. 2, pp. 1-14.

Fare, R., Grosskopf, S., Norris, M. and Zhang, Z. (1994). Productivity growth, technical progress, and efficiency change in industrialized countries. *The American Economic Review*, Vol. 84, No. 1, pp. 66-83.

IFN. (2011). Takaful's Strong Growth. *Islamic Finance News*, Vol. 8, Issue. 25, p.34.

Ismail, N., Alhabshi, S.O., and Bacha, O.I. (2011). Organizational form and efficiency: The coexistence of family Takaful and life insurance in Malaysia. Paper presented at 2nd International Conference on Business and Economic Research, 14-16 March 2011, Langkawi, Malaysia.

Kassim, Z.A.M. (2008). Are Takaful models converging?. Paper presented at The 2nd International Takaful Summit, 15 July 2008, London, United Kingdom.

Ozdemir, O. and Balkanli, A. (2011). Liquidity structure of Turkish insurance industry: Ratio analysis. *International Research Journal of Finance and Economics*, Issue 71, pp. 160-174.

Rahman, Z.A. (2009). Takaful: Potential demand and growth. *JKAU: Islamic Econ.*, Vol. 22, No. 1, pp. 171-188.

Saad, N.M., Majid, M.S.A., Yusof, R.M., Duasa, J., and Rahman, A.R.A. (2006). Measuring efficiency of insurance and Takaful companies in Malaysia using data envelopment analysis (DEA). *Review of Islamic Economics*, Vol. 10, No. 2, pp. 5-26.