

DATA ENVELOPMENT ANALYSIS: EFFICIENCY ASSESSMENT OF ISLAMIC LIFE INSURANCE (*TAKAFUL*) IN INDONESIA

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Abstract

The growth of sharia financial industry nowadays creates a challenge towards Global Takaful industry. In Indonesia, even though the total asset and insurance premium from Islamic insurance company is continuing to grow, the growth of the sharia insurance activity is separated from the doer itself. The main cause is lack of capital basis supporting for the development of business process and is related to company adaptability toward efficient condition. Therefore, this study tries to analyze the technical efficiency of Islamic life insurance companies in Indonesia by using Data Envelopment Analysis (DEA) with a BCC model through orientation input production approaching during period 2009-2012. The result shows that the insurance company by the form of sharia unit has a high efficient level, instead of full fledge sharia insurance company. It indicates that none of economical scope and economical scale occurs within sharia insurance industry.

Keywords: *Data Envelopment Analysis, Takaful, Efficiency*

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Introduction

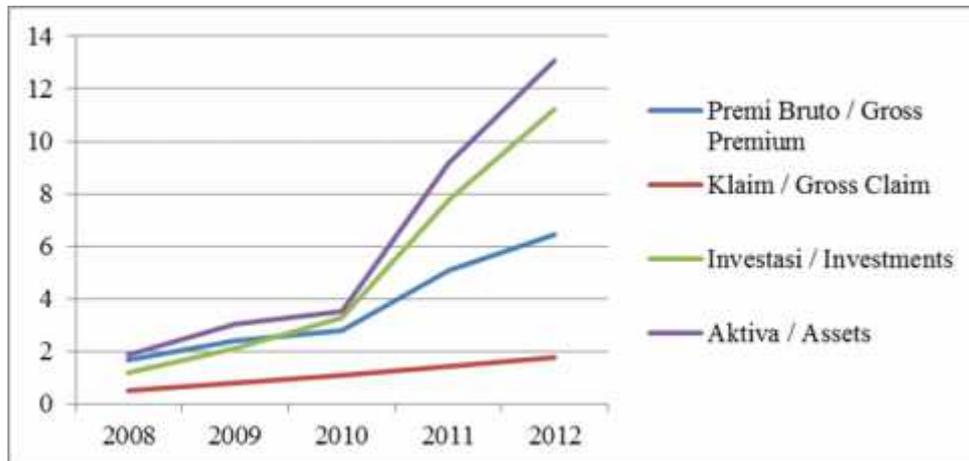
Nowadays, the growth of global sharia insurance which is also known as *Takaful* has a great concern and contribution itself towards the performance of Islamic Financial System. Sharia Insurance (*Ta'min, Takaful, or Tadamun*) is an attempt to protect and to help between a group of person or another parties by investing either the form of asset or *tabarru*. *Tabarru* also provide a returning pattern, in order to face certain risk by *akad* (mutual assistance) which is related with the Sharia. *Takaful* (Islamic Insurance) indicates to be alternative way for society while the competitiveness among conventional insurance industry in the middle of competition in a cross-insurance industry conventionally.

This concept also has not been introduced in moslem country and some others non-moslem country. The concept of *Takaful* introduced in Sudan in 1979, along with Saudi Arabia in a recent year. Even though the implementation and expansion of *Takaful* industry has been done, the growth seems to be insignificant value in the middle of the insurance market global competition. In general, the gross contribution of global *Takaful* was predicted to be 14 million dollar in the 2014, and it will increase to 14% in 2012 ASEAN countries, such as

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Malaysia, Indonesia, Brunei, Singapore, and Thailand with its demographic condition have a dynamic economy power reaching 22% in average. Conversely, GCC country which is not included in Saudi Arabia reached to 12%. Looking at the growth and the contribution itself, ASEAN territory, including Indonesia, had a great opportunity towards the growth of *Takaful* industry. The growth of sharia banking sector in Indonesia in last period seems to be an incentive towards the growth of another sharia financial industry including sharia insurance industry.



Source: Financial Services Authority Statistic Insurance, 2013 data processed

Total Growth of Claim, Investment, Insurance and Reinsurance Asset using Sharia Principle During Period 2009-2012

The data shows development of asset and sharia insurance premium continues to increase rapidly. In according to the activity of investment result, the activity of sharia insurance using sharia-based investment instrument is developing towards goodness.

Market Segment of Sharia Insurance

No	Categories	Gross Premium		Gross Claim		Assets	
		2011	2012	2011	2012	2011	2012
1	All Life & Non Life Insurance	153,13	178,07	87,79	110,59	481,75	569,32
2	All Life & Non Life Sharia Insurance	5,08	6,45	1,42	1,76	9,15	13,07
3	/Percentage of All Life & Non-life Sharia Insurance	3,3%	3,6%	1,6%	0,5%	1,9%	2,3%

Source: Financial Services Authority Statistic Report, 2013

Despite the asset of sharia insurance grows rapidly comparing to total contribution of insurance industry, market insurance showed the percentage at lowest level. Until 2012 the percentage of all sharia insurance reached 2.3%. It has been occurred because of the involving of some *Takaful* doers still limited, and so *Takaful* is encouraged to solve concerned problem that will be faced in the future. The concerned problem for *Takaful* doers is an adequate capital that *Takaful* doers competes between both sharia and conventional insurance company. Lower capital that contribute towards company is becoming obstacle in promote, market education related to existence, benefit, and development insurance sharia product activity.

According to *large of number* law that is applied for insurance company, the burden must be in large of number with purpose to dissipate unsystematic risk. In addition, related to the obstacle occurs in market sharia insurance, if this concept can be fulfilled and unsystematic risk can be dissipated then efficient condition will occur in the company. To understand how long the efficiency and performance of insurance company is performing business process, some research have been done; primarily using frontier efficiency measurement. Frontier efficiency measurement by financial institution is measured on how the performance of financial institution itself is relative toward the performance of financial as “The best” in the industry. Efficiency measurement using DEA method is well-used for analyzing frontier efficiency, in this case is to estimate technical, allocative and efficiency cost.

According to the research that has been done (Hwang, 2006; Shahroudi, 2011; Dalkilic, 2014) this research used debt equity and equity capital and operational cost as input variable while capital and total contribution as output variable. Business model is efficient if the prominent participant or insurance customer fits with the benefit of the company. Therefore prominent participant is related with premium value which is fitted and is related to claim expense and underwriting expense. Total contribution as output has been fitted with indicator that is used in sharia insurance in which fund gathered from participant is total premium in conventional insurance (Antonio, 2013).

With the existence of the obstacle that faced sharia insurance market related to limited structure capital and causing lower *Takaful* doer, the purpose of this research is to measure efficiency sharia insurance company in Indonesia period 2009-2012 through DEA and production input orientation method. The purpose of measurement is to evaluate performance and reveal competitiveness among *Takaful* doer also to compare efficiency level of full fledged *Takaful* and window *Takaful*.

Literature Review

Sharia Insurance Business Practice (Takaful)

The obstacle exists in *Takaful* global industry related to growth; adding market doer, diversification and specialization of business, and also acceptability aspect. In Indonesia, dual financial system competitiveness along with conventional market is not the only obstacle that must be faced. In view of the different concept between sharia and conventional, the next model of sharia insurance business practice in term of technical rank decides operation process of one company. Generally, there are international scale of concensus from every party that related to *Takaful* concept.

- (1) “*Islamic Insurance is a system through which the participants **donate** part or all of their contributions which are used to pay claims for damages suffered by some of the participants. The company’s role is restricted to managing the insurance operations and investing the insurance contribution*” Accounting and Auditing Standard for IFIs (AAOIFI, 2010)
- (2) “*Takaful is the Islamic counterpart of conventional insurance, and exists in both life (or “family”) and general forms. It is based on concepts of mutual solidarity, and a typical Takaful undertaking will consist of a two-tier structure that is a hybrid of a mutual and a commercial form of company*” (IFSB, 2006)

- (3) “*Takaful is a scheme based on brotherhood, solidarity, and mutual assistance which provides for mutual financial aid and assistance to the participants, in case of need whereby, the participants mutually agree to contribute for that purpose*” (The Malaysian *Takaful Act 1984*)

In Indonesia, the growth of the insurance product is bounded to the rules applied. The function of the law is to control the implementation of insurance so that it fits with sharia compliant. The Islamic law (*Fatwa*) supervisory board of sharia (DSN) No. 21 period 2001 about General Principle Insurance Sharia is one of the principle used to execute sharia-based insurance in Indonesia. *Fatwa* supervisory board of sharia (DSN) No. 52 period 2006 about *Akad Wakalah Bil Ujrah* towards Insurance and Reinsurance of sharia completes the rules that have been applied before.

The increasing of sharia-based insurance operator is followed by variation kinds of product sharia insurance that company offers. Product that is offered is divided into two kinds, general insurance and life insurance. In general view of selling practice, to sell sharia insurance product is not specifically different than conventional insurance. The development of distribution and kinds of product have been done is usually adopting conventional insurance. Therefore the innovation and diversification of sharia insurance product in Indonesia can be categorized as low-level.

Efficiency Concept

Based on economic theory, there are two comprehending of efficiency concept, which is technical efficiency and economic efficiency. Economic efficiency has viewpoint of macroeconomic, while technical efficiency has viewpoint of microeconomic. Technical efficiency measurement is often limiting itself to technical and operational relation in conversion process of input into output. On the contrary in viewpoint of economic efficiency, the price is not decided as *given*, because the price itself can be influenced by macro policy (Ascarya, 2009).

The efficiency of the company consists of two components, which are technical and allocative efficiency. The technical efficiency reflects the skill of the company in order to produce the output that using a number of available input. Meanwhile, allocative efficiency reflects the skill of the company in optimizing the input process by the price structure and he production technology. This two measuring will be combined into economic efficiency. A company will be recognized as economically efficient if the company can minimize the cost of a production in order to produce a certain output with a level of technology in general which is used with the market price in general.

Economies of Scale and Economies of Scope

During the process of production, each goods and service generally show the economies of scale by the amount of producing output that the average cost company often to get decreased. If the average cost is starting to decrease (AC) along with the increase of output, then the marginal cost of each unit (MC) must be less than the average cost (AC). This condition occurs if the company has worked on a larger scale, it means the combination of input is effectively used and the production input can be obtained in large amount of lower cost.

The economies of scale is related to the economies of scope which has been used repeatedly. The economies of scale will be achieved if the company successfully minimize the average cost for each producing output unit. Whereas, economies of scope occurs if the company succeed in minimalizing the average cost production in order to increase the variety of goods and services (Pindyck, 2009).

Methodology

The analysis method which used in this research are Non-parametric Efficiency Measurement and Data Envelopment Analysis (DEA) method. Non-parametric method is a model that does not apply certain requirements. The population parameter is the research sample (Cooper, 2002).

According to the DEA method, there are two models of method categorized as relationship between input and output variables such as CCR model, and BBC model mentioned by (Charnes, Cooper, & Rhodes, 1978). The main difference of both models is return to scale condition. In CCR model point of view, it indicates that each DMU works in a constant return to scale which means the increasing ratio towards the production factor (input) is not affecting the increasing production (output). Conversely, BBC assumes that each DMU can work with the variable return to scale, which is the increasing of the production factor (input) does not give a result towards the increasing or decreasing production capacity (output) (Ascarya, 2009).

Based on the activity and function of a company, this research uses the production method and investment. This research attempts to replicate the previous study that had been done (Hwang, 2006; Shahroudi, 2011; Dalkilic, 2014) which is using debt equity, equity capital, and operational cost variables as the input of the revenue and the output of the total contribution (Antonio, 2013). The usage of total contribution as the output is adjusted with the indicator used in sharia insurance, where the funds collected from the participants are the total of premium in the conventional insurance. In this research, the writer also tries to observe the condition of a company based on the level of solvability or the ratio of RBC (Risk Based Capital), which is the ratio of the company's net worth that is calculated based on the accounting standard rules, divided by net worth that is added by the risk of deterioration that may occur.

The model of this research tries to replicate as it was done by (Dalcilic, 2014) using the BCC approach (VRS) input orientation model, with the assumption that the company is not always operating at an optimal scale. In other words, not all of DMU works at the CRS condition, but it has variable trait of returns to scale and it aims to determine the pure technical efficiency (PTE).

$$\begin{aligned} \text{Min } Z_o &= \theta - \varepsilon \sum_i s_i^- - \varepsilon \sum_r s_r^+ \\ \text{s.t. } \theta x_{ij_o} - s_i^- - \sum_j x_{ij} \lambda_j &= 0, \quad i = 1, 2, \dots, m \\ -s_r^+ + \sum_i y_{rj} \lambda_j &= y_{rj_o}, \quad r = 1, 2, \dots, s \\ s_i^-, s_r^+, \lambda_j &\geq 0 \end{aligned}$$

Zo unconstrained
 m= the total input

s= the total output

Which:

z_o	= Efficiency value of DMU _o unit
θ	= Measurement reduction of input
x_{1j}	= Operational Expense
x_{2j}	= Debt Equity
x_{3j}	= Equity Capital
y_{1j}	= Net income
y_{2j}	= Total investment
λ_j	= DMU proportion to create an efficient unit
s_1^-, s_2^-, s_3^-	= input excess/slack variable
s_1^+, s_2^+	= output excess/slack variable

From the equation above, it indicates that a unit is said to be efficient if z_o and w_o equal to 0. In other words, if the optimum value equal to 1 and slack variable and both equal to 0, then the unit can be categorized as efficient.

Result and Discussion

Based on the result of the calculation process of DEA method using the VRS assumption with the MaxDEA software, the level of efficiency of 10 *Takaful* Life Insurance companies in Indonesia can be seen in Table 4.1. The result shows the accomplishment of the level of efficiency in each *Takaful* life insurance company.

Level of Technical Efficiency of 10 *Takaful* Life Insurances in Indonesia During 2009-2012

No	Takaful Life Insurance	Period			
		2009	2010	2011	2012
1	Allianz	1	0,804732	1	1
2	Avrist	1	0,672656	0,542988	0,916088
3	Axa Financial	0,746384	0,631257	0,29588	0,38046
4	BNI Life	0,908597	0,702259	0,774862	0,896268
5	Bringin Jiwa Sejahtera	1	1	1	0,806516
6	Bumiputera	0,599114	0,661773	0,405434	0,411753
7	Manulife	1	1	0,851973	0,768424
8	Prudential	0,953295	0,992714	1	1
9	Sinarmas	1	0,645291	0,79568	1
10	Takaful Keluarga	1	0,540149	0,17446	0,620567
	Average	0,92074	0,76508	0,68413	0,78001

Source: Data processed (Output MaxDEA 6.3)

The result shows that during period 2009-2012, full fledge sharia life insurance which is *Takaful Keluarga* could only achieved efficiency condition in 2009. As well as the total

sharia unit company on the average showed the highest efficiency ratio which was happened in 2009 and reached 92%. Table 4.1 shows that technical efficiency ratio was fluctuated during period 2009-2012. It can be comprehended as the highest efficiency ratios occurred in 2009 up to 92%. On contrary, the decreasing occurred during the next following years down to 76,5% and 68%. Efficiency ratios condition revert into increasing state in 2012 which could achieve 78%.

As for proportionate movement on MaxDEA result, in 2009 Prudential sharia had the highest efficiency ratio comparing to other 3 companies that is up to 95%. Value of every unit which used was exceeding the expectation efficiency for about 469.848 (million) for operational cost, 75.341 (million) debt capital and 451.675(million) equity capital. Furthermore, it indicates that target of each input used is 398.037 (million) operational cost, 71.822 (million) debt capital, and 430.580 (million) equity capital. The result indicates that it is needed to decrease each of inputs ratio down to 5% while increasing total contribution up to 413.589 (million).

In 2010, *Axa Financial* sharia life insurance was in inefficient condition with ratio 63%. Value for each of inputs used are 16.928 (million) operational cost, 8.370 (million) debt capital and 47.510 (million) equity capital. Furthermore, it indicates that the target used for each of inputs are 10.686 (million) operational cost, 5.284 (million) debt capital, and 29.002 (million) equity capital. Where as the result shows that to achieve efficiency; decreasing each of inputs for about 37%. *BNI Life*, *Bumiputera*, and *Prudential* sharia also experienced inefficient condition. The result indicates that input used must be decreased to total contribution down to 33% (*BNI Life*), 34% (*Bumiputera*) and 0.7% (*Prudential sharia*) which almost achieve efficiency ratio up to 100%.

Condition happened in years later to be exact in 2011, there are 3 sharia insurance companies that had experienced efficiency ratio 100%. As for some other companies, most of them experienced the same condition as these past years. However, in 2011 *Allianz* life could achieve efficiency ratio up to 100% while *Avrist insurance*, *Axa Financial*, *BNI Life*, *Bumiputera*, *Manulife*, *Sinarmas* and *Takaful Keluarga* were known from the calculating result that inefficiency still occurred within input used. According to component variable inputs based on the result is indicated that each of inputs need to decrease down to 6% (*Avrist insurance*), 70% (*Axa Financial*), 23% (*Bni Life*), 60% (*Bumiputera*), 15% (*Manulife*), 20% (*Sinarmas*), and 17% (*Takaful Keluarga*). It also can be comprehended that *Axa Financial* has the highest proportionate movement than other companies.

In 2012 there were 7 sharia life insurance which experienced inefficiency such as *Avrist insurance*, *Axa Financial*, *BNI Life*, *Bringin Jiwa Sejahtera*, *Bumiputera*, *Manulife*, and *Takaful Keluarga*. In 2012, *Axa Financial* had the lowest efficiency ratio about 38% than other companies. Each of inputs used are surpassed efficiency expectation ratio relative for about 4.495 (juta) operational cost, 17.888 (million) debt capital, and 106.792 (million) equity capital. Furthermore it indicates that the target used for each of inputs are 1.710 (million) operational cost, 2.853 (million) debt capital, and 30.291 (million) equity capital. And so the result shows that to achieve efficiency; decreasing each of inputs down to 62% and slack output or increasing total contribution up to 2.839 (million) is a must.

Other sharia life insurance component variable input used is based on the result that each of inputs need to be decreased down to 70% (*Axa Financial*), 23% (*BNI Life*), 60% (*Bumiputera*), 15% (*Manulife*), 20% (*Sinarmas*), 17% (*Takaful Keluarga*) and *Avrist*

Insurance which are almost had efficiency ratio near 100%, and it is recommended to decrease each of inputs down to 8%. According to the result, Bumiputera and Manulife insurance is indicated that each of slack output had approximately 27.749 (million) and 1.869 (million). On the capital aspect with maximal efficiency ratio *PT Allianz life* in 2012 which the was in best DMU condition is known to have lowest total input comparing to years later. And so companies will be marked as a capable companies to take good advantage of input ratio which is experienced to create maximal output.

Conclusion

According to the total result it is known that during period 2009-2012 some sharia unit companies had efficiency ratio that is bigger than full fledge sharia *Takaful Keluarga*. Life insurance companies unit with high efficiency ratio are *Prudential Life* (98%), *Allianz Life* (95%), and *Bringin Jiwa Sejahtera* (95%). Based on the result it can be comprehended that insurance companies in form of sharia unit are had higher efficiency rate than full fledge sharia companies. To be able to achieve good efficiency value then spin off sharia insurance unit from central market is suggested in order to accelerate business growth and to increase sharia market share insurance industry in Indonesia. This condition shows that there is no economic scope and economic scale in sharia insurance industry because there is operational aspect related to earn input access with the purpose to make efficient sharia unit when it is ventured with holding company. Sharia unit which is still ventured with holding company also has an advantage in building system. Therefore, the suggestion can be given is that sharia insurance is expected to be capable of developing strategy in order to take advantage of its resources.

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