



Article history:

Received: 2019-02-13

Revised: 2019-04-10

Accepted: 2019-06-28

Keywords:

Conventional insurance;
Efficiency; Sharia insurance;
Stochastic Frontier Analysis

JEL Classification: C73, G22, L15

Kata kunci:

Asuransi konvensional; Efisiensi;
Asuransi Syariah; Stochastic
Frontier Analysis

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A comparative study of the efficiency of conventional and Sharia insurance in Indonesia

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Abstract

This study aimed to analyze the value of efficiency and the comparison of efficiency ratio in conventional insurance companies and Islamic Sharia Business Unit (ISBU) of Sharia insurance, both life and general insurance, in Indonesia from 2011-2018. The input variables used are total capital and total expenses. While the output variables in this study were total income. The method used to obtain efficiency value for each insurance industry was Stochastic Frontier Analysis (SFA). The result of efficiency value from the conventional insurance companies and ISBU Sharia insurance would be compared by using independent sample t-test statistic tests. The population in this research was all conventional insurance companies, both life and general, and all life and general insurance of ISBU Sharia insurance that registered in the web of Financial Services Authority (FSA). The sample used was 28 conventional insurance companies consisting of 21 life insurance companies and seven general insurance companies, and 12 ISBU Sharia insurance consisting of nine Sharia life insurance and three Sharia general insurance. This research resulted that there was no difference in efficiency value between conventional insurance companies and ISBU Sharia insurance.

Abstrak

Penelitian ini bertujuan untuk menganalisis nilai efisiensi dan perbandingan rasio efisiensi pada perusahaan asuransi konvensional dan Unit Usaha Syariah (UUS) asuransi Syariah, baik asuransi jiwa dan umum, di Indonesia dari 2011-2018. Variabel input yang digunakan adalah total modal dan total pengeluaran. Sedangkan variabel output dalam penelitian ini adalah total pendapatan. Metode yang digunakan untuk mendapatkan nilai efisiensi untuk setiap industri asuransi adalah Stochastic Frontier Analysis (SFA). Hasil nilai efisiensi dari perusahaan asuransi konvensional dan UUS asuransi Syariah akan dibandingkan dengan menggunakan uji statistik uji-t sampel independen. Populasi dalam penelitian ini adalah semua perusahaan asuransi konvensional, baik jiwa dan umum, dan semua asuransi jiwa dan asuransi umum Syariah yang terdaftar di website Otoritas Jasa Keuangan (OJK). Sampel yang digunakan adalah 28 perusahaan asuransi konvensional yang terdiri dari 21 perusahaan asuransi jiwa dan tujuh perusahaan asuransi umum, dan 12 UUS asuransi Syariah yang terdiri dari sembilan asuransi jiwa Syariah dan tiga asuransi umum Syariah. Penelitian ini menghasilkan bahwa tidak ada perbedaan nilai efisiensi antara perusahaan asuransi konvensional dan UUS asuransi Syariah.

How to Cite: Ulansari, D. R., & Septiarini, D. F. (2020). A comparative study of the efficiency of conventional and Sharia insurance in Indonesia. *Jurnal Keuangan dan Perbankan*, 24(2), 202-213. <https://doi.org/10.26905/jkdp.v24i2.3165>

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1. Introduction

The rapid development of Islamic economics in Indonesia began with the emergence of Islamic banks. Islamic banking regulations are reinforced with the existence of Banking Law Number 10 of 1998 and Law Number 21 of 2008 which encourage the existence of Islamic banking in Indonesia. For that matter, various types of regulations and Islamic business regulations have been made in line with the discovery of new contracts that have contributed to the development of the Islamic industry.

The strengthening of the Sharia institutional structure in Indonesia has finally paid off, namely the growth and development of other business entities that apply Sharia principles, including Sharia insurance, Sharia foreign exchange transactions and Sharia stock exchange trading, Sharia pawnshops, Sharia Rural Banks (SRB), and Sharia cooperatives better known as Baitul Maal Wat-Tamwil (BMT). The existence of Sharia insurance in Indonesia is now strengthened by the Financial Services Authority Regulation Number 69/POJK.05/2016 referring to the Operation of Insurance Companies, Sharia Insurance Companies, Reinsurance Companies, and Sharia Reinsurance Companies. Therefore, it is increasingly clear the laws that protect the implementation of Islamic financial institutions in Indonesia.

Nowadays, insurance is considered as a necessity of life to provide guarantees of self-protection from disasters or losses that will befall. Some people are involved in insurance practices with the motive to divert the burden of the potential loss (which befall him/her) to other parties who are willing to take over the risk. Generally, insurance contracts rely on uncertainty, for instance, future events that are unpredictable, so this is often used as a speculative motive from a risk.

In 1994, Asuransi Takaful was established as the pioneer of Islamic insurance in Indonesia. Although the development of Law No. 2 of 1992 referring to Sharia Insurance still does not expressly regulate how the mechanism for implementing Is-

lamic insurance, yet the government still opens space for conventional insurance companies to open branches or Sharia service units or are called Sharia Business Units (SBU). The following is a Table of growth of insurance companies in Indonesia with Sharia principles from 2012-2016.

Table 1. Growth of Sharia insurance companies in Indonesia period 2012-2016

Information	2012	2013	2014	2015	2016
Life insurance company with Sharia principles	3	3	3	5	6
General insurance companies with Sharia principles	2	2	2	3	4
Life insurance company that has a Sharia unit	17	17	18	21	21
General insurance company that has a Sharia unit	20	24	23	23	24
Total	42	46	46	52	55

Source: FSA Insurance Book is processed.

Based on Table 1, it is explained that the growth of Islamic insurance in Indonesia has had a significant increase. The Financial Services Authority (FSA) states that the growth of insurance on a Sharia basis every year is always greater than the conventional one. However, Islamic insurance has a relatively small share of the market compared to conventional insurance (Effendi, 2018). Thus, according to Firdaus Djaelani, FSA Non-Bank Financial Industry Supervisor (NBFI), it is requiring great effort in the Sharia insurance industry to catch up with the conventional. Even the growth of Sharia insurance as a whole has not reached 30 percent. Even though Indonesia has the most populous of the Muslim population in the world, yet only a few use Sharia products, including in this case the use of Islamic insurance. Based on the conditions mentioned above, so researchers want to conduct this research to measure the extent of Sharia insurance production. In this case, the main comparison is conventional insurance which has long been in service

and still operating in Indonesia. Thus, how to measure production is to calculate to what extent the efficiency of the company is.

According to Mihaiu, Opreana, & Cristescu (2010) explained that efficiency can be achieved by maximizing the results of the effort to the resources consumption, and it is calculated by comparing the effects obtained in their efforts. Mihaiu, Opreana, & Cristescu (2010) revealed that measuring the effectiveness requires four sectors, estimating the costs, the resources consumed the effort, in general, found in the literature as the input, estimating the results, or the outputs, and comparing the two. Efficiency is simply understood as a measure of the ability of insurance companies to manage their financial resources (inputs) in generating maximum income (output). The ability to produce maximum output with the existing input is the expected size of the output. Through the process of identifying input and output allocations, it can be analyzed further to see the causes of inefficiency conditions.

The efficiency analysis of an insurance company sort by the group of insurance companies accounts and provides information which of the companies' group is the most efficient in its operations and the group of inefficient companies, so that companies can establish and implement strategies for improvement of operational activities for the progress of their company.

Sharia insurance will benefit the participants who pay contributions as their guarantee deposits if Sharia insurance in Indonesia is more efficient because Sharia insurance will give a refund in insurance claims paid which are more beneficial. Besides, if Islamic insurance is able to run its operations efficiently, it will further increase the value-added of the insurance and will increase public trust in Islamic insurance. Hence, this trust level can develop Islamic insurance's development by increased profits level. The study of efficiency with the Stochastic Frontier Analysis (SFA) measurement tool has been widely done, especially in the areas of

corporate operations, banking finance, and also financial non-bank financial institutions. Such research has been carried out by Ahmad, Nawi, & Aleng (2013), Jarraya & Bouri (2013), and Rao & Venkateswaru (2014).

The purpose of this research was to answer and to examine the comparative efficiency values of Sharia and conventional financial insurance. Besides, previous researchers nevertheless rarely made a comparison of the efficiency values from the performance of Sharia and conventional insurance. In this case, the researchers still have difficulty in finding data, therefore this research was conducted. This research was conducted since there was a research gap for several studies about efficiency in insurance companies in Indonesia which conducted previously by Faradilla (2014) and Tuffahati (2016). Faradilla (2014) was conducted during 2009-2012. Insurance company performance was measured by the DEA approach and with the input-output specification based on the intermediation approach. The results of this study showed that by using the constant return to scale (CSR) and variable return to scale (VRS) models, there were only one of the nine insurance companies that consistently competent to achieve the frontier value (1,000) in both models, and its PT Panin Insurance Tbk (PNIN). However, when calculated partially, with the VRS model, more companies are of efficient value than the calculation with the CSR model. This study was still limited to one insurance industry, namely conventional insurance or not being compared with other insurance industries, for example, Sharia insurance. Benarda et al. (2016), which examined the efficiency of Sharia life insurance companies in Indonesia in 2011-2014 using the two-stage Data Envelopment Analysis approach, found that out of the 14 Sharia life insurance studies, on average for the entire Decision-Making Unit (DMU) has not shown efficiency. The efficiency score for overall technical or CSR was 0.6931, the efficiency score for technical efficiency (purely technical) or VRS was 0.7760, and the score for efficiency on a scale was 0.8842. While the effi-

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ciency trend of Sharia life insurance shows that Sharia life insurance management in Indonesia is still fluctuating so it still needs to be improved to make it more efficient.

The limitation of this study is that the method of measuring efficiency comparison is divided by two types, namely the comparison of the efficiency of conventional life insurance companies with the efficiency of ISBU Sharia life insurance and the comparison of the efficiency of conventional general insurance companies with Islamic general insurance (ISBU) using the Stochastic Frontier Analysis (SFA) method. Hence, it is because of the lack of reference sources from previous research that calculates the efficiency of the Islamic insurance industry in Indonesia using this method.

Based on the background above, we can conclude whether there are differences in the efficiency level of conventional insurance companies and Sharia insurance in Indonesia. This statement is supported by the data collection about financial statements in each research samples during the observation. The limitation of this study is the method of measuring efficiency comparison between conventional and Sharia insurance in Indonesia, including life and general insurance, by using the Stochastic Frontier Analysis (SFA) method. The period preference, 2011-2018, in this study is determined based on the amount of data and information required by the researcher completely. This study also uses input and output variables which are determined based on the production function approach in considering the main functions of insurance companies as a mechanism for transferring risk (*risk transfer mechanism*) to conventional insurance and risk-sharing mechanisms in Sharia insurance, with measurements using frontier production function. Through these problems, this study aims to determine the differences in the level of efficiency of conventional insurance companies and Sharia insurance in Indonesia in the period 2011-2018. By knowing the level of efficiency, it can encourage each industry to improve

their respective performance to improve the quality of the insurance industry. Besides, the results of this study are expected to be able to help stakeholders form new policies which will, later, help to improve financial performance in Indonesia that still uses dual systems.

According to Coelli et al. (2003), SFA has more advantages compared to other methods. First, it involves disturbance terms that represent disturbances, measurement errors, and exogenous surprises that are out of control. Second, environmental variables are easier to treat because they can be separated and clearly differentiated by random noise. Third, it allows hypothesis testing (the hypothesis explain below) to use statistics. Fourth, it is easier to identify outliers. Fifth, the cost frontier and distance function can be used to measure business efficiency that has a lot of output.

This research was conducted because of the lack of previous literature sources relating to the measurement of efficiency of insurance, especially Sharia insurance which has now been developed. The development of the Islamic industry needs to be supported by all levels of society, therefore researchers should also contribute according to their roles.

Efficiency measurement using the SFA approach can be done through an output-oriented approach for measuring technical efficiency and an input-oriented approach for measuring cost efficiency. Technical efficiency is measured by the production frontier, while cost efficiency is measured based on the cost frontier (Kumbhakar & Knox, 2000). Battese & Coelli (1995) explained that the results of the measurement of the SFA method that emerged were in the form of scores between 0-1.

While the hypothesis in making a decision on the average difference test is as follows:

$H_0 = \mu_1 = \mu_2$, there is no difference in average efficiency between conventional and Sharia insurance companies.

H_1 = There is a difference in average efficiency between conventional and Sharia insurance companies.

2. Method, Data, and Analysis

This study analyzed the efficiency of conventional life and general insurance companies with Sharia life and general insurance with a quantitative research approach through the parametric SFA method based on frontier production functions. Quantitative research is explaining phenomena by collecting numerical data that are analyzed using mathematically based methods (in particular statistics). This study used software STATA version 13 to analyze the data that has been collected. The variables and data needed in this study include in Table 2 and Table 3.

The data used in this study were secondary data and panel data with annual frequencies obtained from the websites of related insurance companies in 2011-2018. Secondary data sets comprised of qualitative data which was the information consisted of studied objects whose characteristics are coded in variables that have a range of possible values.

The population in this study was all conventional life and general insurance companies as well as all Sharia SBU life and general insurance registered on the FSA website in the period 2011-2018. The sample was determined based on specific objectives or often called purposive sampling. The sample in this study was determined based on the following conditions: (i) conventional and Sharia life and general insurance companies operating in Indonesia during the 2011-2018 observation period. (ii) Have complete financial statements, including the types of variables specified, during the 2011-2018 observation period. (iii) Conventional and Sharia life and general insurance companies that have assets above 30 billion.

The data in this study were analyzed using a parametric approach with the SFA method. This study measured efficiency by using an output-oriented approach or frontier production function. Production efficiency was formulated as the relationship between the amount of production output and the number of inputs. Production efficiency could occur if the company produces optimum production which resulted in a combination of a certain number of inputs. In this method, the production of an

Table 2. Classification of input-output variables in conventional insurance companies and Sharia insurance

Type of Insurance	Conventional Insurance	Sharia Insurance
Input	- Total Capital - Total Expenses (Claim Expenses, Company Expenses, Non-Operating Expenses, Other Comprehensive Expenses After Taxes).	- Total Capital - Total Expenses (Company Expenses, Non-Operating Expenses, Insurance Expenses, Investment Portfolio Management Expenses, Other Expenses in Tabarru Fund Surplus / Deficit Reports', and Claim Payments.
Output	- Total Revenue (Company Revenues, Non-Business Revenues, Investment Revenues, Other Comprehensive Income after Taxes, Revenue Sharing (specifically for conventional life insurance companies, namely Central Asia Raya Life Insurance)).	- Total Revenues (Company Revenues, and Non-Business Revenues (Corporate Income Statement), Tabarru 'Fund Surplus, and Total Investment Results, Other Revenues in Tabarru's Investment Funds (Tabarru' Fund Underwriting Deficit Report ')).

Table 3. Classification of dummy variables in conventional insurance companies and Sharia insurance

Dummy variable type one	Sharia insurance as 0	Conventional insurance as 1
Dummy variable type two	Life insurance as 0	General insurance as 1

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insurance company was modeled to be deviated from its production efficient frontier due to random noise and inefficiency. The general form of the frontier production function model for panel data is as follows:

$$Y_{it} = f(X_{it}, t, \beta) \exp \epsilon_{it} ; \epsilon_{it} = v_{it} - u_{it} \quad (1)$$

Where: Y_{it} = output value of company i in period t ; X_{it} = input value of company i in period t ; β = parameters to be estimated; t = time trend; ϵ_{it} = error term/random noise; v_{it} = random error company i in period t ; u_{it} = company inefficiency i in period t

The method used to estimate the factors that influenced the technical efficiency, as well as sources of efficiency, could use the two-step or one-step method. There were two steps to using a two-step method. The first was by estimating the frontier production function equation model to get the value of u_{it} . Second, u_{it} was regressed to independent variables using the OLS method. This study used a one-step method of analysis techniques and the software used in Stata version 13. This study used three statistical tests.

First, it is estimating the Cobb-Douglas production function model to get a level of technical efficiency. This first stage automatically exited its data processing by using the Software Stata version 13. The LR statistical test was estimated using the chi-square distribution (χ^2) with its degree of validity was the difference in parameters used between the Cobb-Douglas production function models.

Second, it is testing the effect of inefficiency in the frontier production function model. If the results of the second stage proved that there was an effect of inefficiency in the frontier production function, then the third stage was doing a t-statistical test to find out the source of inefficiency or at the same time as factors that can affect technical efficiency. The t-statistic test was used to determine whether the coefficients of each independent variable (δ_i) partially had a significant or no effect on

the dependent variable inefficiency (μ_i) in the model of the effect of inefficiency. The hypothesis for the statistical t-test in this study are:

H_0 : $\delta_i = 0$ (independent variables have no effect on inefficiency)

H_1 : $\delta_i \neq 0$ (independent variables affect inefficiency)

If $t_{\text{ratio}} > t_{\text{table}} (\alpha/2, n-k-1)$, then the null hypothesis (H_0) is rejected. This meant that each independent variable had a partially significant effect on inefficiency, so that the independent variable could be a factor that could affect technical efficiency. However, if $t_{\text{ratio}} < t_{\text{table}} (\alpha/2, n-k-1)$, then the null hypothesis (H_0) is accepted. This meant that each independent variable did not have a significant effect partially on inefficiency, so that the independent variable could not be a factor that influences technical efficiency.

Different independent sample t-test

The data in this study were processed using statistical techniques in the form of an average sample t-test. Samples were declared not to be independent between the two groups, if the samples that became the object of research could be separated clearly. The difference in the average count of two samples (\bar{x}_1, \bar{x}_2) could be found by calculating the ratio t . The ratio of t was calculated by finding the difference between the first and second sample group average counts ($S\bar{x}_1 - \bar{x}_2$). The formula can be written through the following flow:

Calculate the value of the average measurement of the i -group

$$\bar{x}_i = \frac{\sum X_i}{n} \quad (2)$$

Calculate the standard deviation value of the sample of the i -group

$$S_i^2 = \frac{\sum (X_i - \bar{x}_i)^2}{n_i - 1} \quad (3)$$

Whereas the variant itself is the root of the standard deviation ($\sqrt{S^2}$)

Incorporating sample variance (combining sample variance):

$$S_p^2 = \frac{(n_1-1)S_1^2 + (n_2-1)S_2^2}{n_1+n_2-2} \quad (4)$$

So that in determining the value of t can be written with:

$$t = \frac{\bar{X}_1 - \bar{X}_2}{\sqrt{S_p^2 \left(\frac{1}{n_1} + \frac{1}{n_2} \right)}} \quad (5)$$

Where: X_i = i -group measurement data; \bar{X}_i = the average value of measurement data for the i -group = number of respondents to i -group; S_i^2 = value of variant of the i -group; $\sqrt{S^2}$ = variant; \bar{X}_1 = average of the first sample; \bar{X}_2 = average of the second sample; n_1 = number of observations in the first sample; n_2 = number of observations in the second sample; S_p^2 = combined estimates of population variance

The purpose of testing the hypothesis of a different test t-test was to determine whether there were differences in the average value of two unrelated samples. There were two stages in this analysis, first, testing the assumption whether the population variants of the two samples were the same or not by looking at the value of the Levene test. Second, the value of the t-test to determine whether there were significant differences in the average value (significant value of 95 percent with $\alpha = 0.05$). The hypothesis in the different test independent sample t-test for the variance test is:

H_0 : conventional insurance companies and Sharia insurance have the same variant value

H_1 : conventional insurance companies and Sharia insurance have different variant values

If $t_{count} > t_{table}$, then H_0 is accepted, meaning that conventional insurance companies and Sharia insur-

ance have the same variance value. However, if $t_{count} < t_{table}$, then H_0 is rejected, meaning that conventional insurance companies and Sharia insurance have different variant values.

While the hypothesis in making a decision on the average difference test is as follows:

$H_0 =$, There is no difference in average efficiency between conventional and Sharia insurance companies.

$H_1 =$, There is a difference in average efficiency between conventional and Sharia insurance companies)

If $t_{count} > t_{table}$, then H_0 is accepted, meaning that conventional insurance companies and Sharia insurance have an average efficiency value that is not different or the same. However, if $t_{count} < t_{table}$, then H_0 is rejected, meaning that conventional insurance companies and Sharia insurance have different efficiency values.

3. Results

Descriptive statistics

Table 5 describes the descriptive statistics of the research variables efficiency of conventional insurance companies and SBU in Indonesia in period 2011-2018. The variables to be compared are the total capital, the total expenses, and the total income.

Based on the Table 5 it can be seen that the total capital of 28 conventional insurance companies that were sampled in this study from 2011 to 2018, has a maximum value of IDR 11,255,789,000,000 found in PT. Manulife Indonesia Life Insurance (LI) in 2018 and a minimum value of IDR 3,690,000,000 found at PT Tokio Marine Life Insurance (LI) in 2011. While the total capital of 12 SBU Sharia insurance sampled in this study from 2011-2018 has a maximum value of IDR 7,600,494,000,000 contained in SBU Sharia Prudential Life Assurance (LI) on in 2018 and a minimum value of IDR 1,056,000,000 found in the SBU Bringin Jiwa Bringin Jiwa Sejahtera

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(LI) Life Insurance in 2012. Total capital in conventional insurance companies has an average value (mean) IDR 1,879,169,000,000 and standards deviation of IDR 2,374,799,000,000. While the total capital at SBU Sharia Insurance has an average value (mean) of IDR 336,006,800,000 and standard deviation of IDR 914,469,200,000. Both of insurance industries has a higher standard deviation than the mean. But in this section the standard deviation of conventional insurance companies is still higher than that of Sharia insurance. So for the total capital shows that the more varied or expanded with the range of data owned by conventional insurance companies and Sharia insurance, because the standard deviation is greater than the average (mean).

Description of the total expenses

Table 5 shows that from the 28 conventional insurance companies that were sampled in this study from 2011 to 2018, total expenses had a maximum value of Rp. 30,029,319,000,000 found in PT Generali Indonesia Life Insurance (LI) in 2016 and a mini-

imum value of IDR 26,836,000,000 found at PT Asuransi Staco Mandiri (GI) in 2011. While the total expenses of 12 SBU Sharia Insurance which was sampled in this study from 2011-2018 has a maximum value of IDR 1,829,612,000,000 contained in SBU Prudential Life Assurance (LI) in 2018 and a minimum value of IDR 3,862,000,000 found in SBU Manulife Indonesia Insurance (LI) in 2011. The total expenses on conventional insurance companies has an average value (mean) of IDR 2,966,443,000,000 and a standard deviation of IDR 4,713,263,000,000. While the company's total expenses on SBU Sharia Insurance has an average value (mean) of IDR 200,152,000,000 and a standard deviation of IDR 369,450,200,000. Both insurance industries have higher standard deviations than the mean. But in this section the standard deviation of conventional insurance companies is still higher than the Sharia insurance. So for the total expenses shows that is the more varied or expanded with the range of data owned by conventional insurance companies and Sharia insurance, because the standard deviation is greater than the average (mean).

Table 5. Descriptive statistics (in million IDR)

Variable/Category	N	Mean	Minimum	Maximum	Std. Deviasi
Total capital	(K) 224	1,879,169	3,690	11,253,789	2,374,799
	(S) 104	336,006.8	1,056	7,600,494	914,469.2
Total expenses	(K) 224	2,966,443	26,836	30,029,319	4,713,263
	(S) 104	200,152	3,862	1,829,612	369,450.2
Total income	(K) 224	3,491,649	17,582	35,586,650	5,764,371
	(S) 104	273,986.6	6,744	2,227,366	538,632.8

Table 6. Total capital, total expenses, and total income on type of insurance industry

Type of Insurance Industry	Total Capital		Total Expenses		Total Income	
Conventional	Min.	PT. Tokio Marine Life Indonesia (LI)	Min.	PT. Asuransi Staco Mandiri (GI)	Min.	PT. Asuransi Jiwa Sequis Financial (LI)
	Max.	PT. Asuransi Jiwa Manulife Indonesia (LI)	Max.	PT. Asuransi Jiwa Generali Indonesia (LI)	Max.	PT. Prudential Life Assurance (LI)
Sharia	Min.	SBU Asuransi Jiwa Bringin Jiwa Sejahtera	Min.	SBU Asuransi Jiwa Manulife Indonesia	Min.	SBU Asuransi Umum Mega
	Max.	SBU Prudential Life Assurance	Max.	SBU Prudential Life Assurance	Max.	SBU Prudential Life Assurance

Description of the total income

Total income at conventional insurance companies in the Table 5 shows that of the 28 companies sampled in this study from 2011-2018, total income had a maximum value of IDR 35,586,650,000,000 found in PT Prudential Life Assurance (LI) in 2017 and a minimum value of IDR 17,582,000,000 found at PT Sequis Financial Insurance (LI) in 2018. While the company's total income from 12 SBU Sharia Insurance sampled in this study from 2011-2018 has a maximum value of IDR 2,227,366,000,000 contained in SBU Prudential Life Assurance (LI) in 2015 and a minimum value of IDR 6,744,000,000 contained in SBU Mega General Insurance SBU (GI) in 2018. The total income variable in conventional insurance companies has an average value of IDR 3,491,694,000,000 and a standard deviation of IDR 5,764,371,000,000. While the company's total variable income at SBU Sharia Insurance has an average value (mean) of IDR 273,986,600,000 and a standard deviation of IDR 538,632,800,000. Both insurance industries have higher standard deviations than the mean. But in this section the standard deviation of conventional insurance companies is still higher than that of Sharia insurance. Hence, the company's total variable income shows that is the more varied or expanded with the range of data owned by conventional insurance companies and Sharia insurance, because the standard deviation is greater than the average (mean). For more details, can also be seen in the following Table 6.

Based on Table 6, it can be concluded that the Conventional Insurance Industry has more variety. This can be proven by the ownership of maximum and minimum values that are not in certain companies. Unlike the Sharia insurance industry, the maximum value is still maintained by one company, SBU Prudential Life Assurance, even though the minimum value is extended across different companies. So, through this it can also be concluded that the Sharia insurance industry is still lacking in development. Therefore, opportunities for the development of Islamic insurance are increasingly progressing.

Efficiency model using the Cobb-Dougllass production function

Efficiency generally means the ratio of several outputs (goods or services) to several inputs or inputs (e.g labor, capital, raw materials, and information). This shows how much organizational input appears as output and how much is absorbed in internal processes, thus relating to resource utilization, as opposed to acquisition resources.

Comparative analysis of the efficiency of conventional insurance companies and Islamic insurance using the SFA method by using the production function that refers to the previous equation. According to Coelli (2003), based on these equations, a frontier model will be produced in the form of a Cobb-Dougllass production function model that is converted into a natural logarithm. All input and output data are converted into natural logarithms and

Table 5. Stochastic Frontier Model and inefficiency effects model estimated

Information	Coefficient	Standard-Error	t-Ratio
<i>Constants (1)</i>	0.7691	0.2385	0.005
<i>Total Capital</i>	0.2346	0.0275	0.000
<i>Total Expenses</i>	0.7292	0.0216	0.000
<i>Constants (2)</i>	-2.0291	0.1481	0.000
<i>Dummy_{SC}</i>	-0.9628	0.2829	0.001
<i>Dummy_{GI}</i>	0.1743	0.2733	0.524
<i>Log Likelihood</i>	-0.8472		

Significance at $\alpha = 0.05$.

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will then be processed using Stata version 13 software.

Hypothesis testing was done to determine the effect of input variables on output variables using SFA. The results of the panel of conventional insurance companies and Sharia insurance are as follows:

The form of the model of the level of efficiency of conventional insurance companies and Sharia insurance is as follows:

$$\ln TI = \alpha + \ln TC + \ln TE + e \quad (6)$$

$$\ln TI = \alpha + \ln TC + \ln TE + \hat{a} + \text{dummy}_{SC} + \text{dummy}_{GILI} \quad (7)$$

$$\begin{aligned} \ln TI = & 0.691809 + (0.2346488)\ln TC + \\ & (0.72925431)\ln TE - 0.8472228 - \\ & (0.9628633) \text{ dummy}_{SC} + \\ & (0.1743176) \text{ dummy}_{GILI} \end{aligned} \quad (8)$$

Where: TI = Total Income; TC = Total Capital; TE = Total Expenses; dummy_{SC} = Dummy Variable type of insurance industry, Sharia (0) or Conventional (1); dummy_{GILI} = dummy variable type of insurance (Life (0) or General (1))

4. Discussion

Based on the results and explanations above, in this study we have succeeded in finding evidence that there is efficiency distinction between conventional insurance and Sharia insurance because each of one the results of the first dummy variable, from the insurance industry, t table value is smaller than alpha value 0.05. But it is different with the second dummy variable, from, type of insurance (life and general), because t table value is greater than alpha value 0.05. Thus, we can concluded that there was difference in the efficiency value between conventional insurance and the efficiency of Sharia insurance in Indonesia in the 2011-2018 period based of the type insurance industry (conventional and Sharia). This is because, in terms of principles between

conventional and Sharia insurance are different. Namely conventional insurance applies the principle of risk transfer while Islamic insurance applies the principle of risk sharing. This was included taking claim funds which applied to conventional insurance that was from the company's financial statements, while Sharia insurance was taken from participant funds which followed the principle of mutual assistance.

There is no difference in the efficiency value between conventional insurance and the efficiency of Sharia insurance in Indonesia in the 2011-2018 period based on the type of insurance (life and general insurance). Since one of the dummy variables has different result, therefore the analysis techniques that used the independent t-test sample were not valid. Conventional insurance and Sharia insurance do not have a difference from the type of insurance (both life and/or general), this is due to both life insurance and general have in common in the industry, namely both financial institutions. In this case also, between conventional and Sharia insurance (both life and general) has the same type of financial reporting, where life insurance has the same type of reporting as financial reporting on general insurance. It's just different that financial reporting owned by conventional insurance and different from financial reporting in Islamic insurance. Because, in Islamic insurance separate funds from participant funds and company funds, except in conventional insurances. Their funds are from participants' funds and company funds, or in other words, mixed.

The research in efficiency comparison of insurance was conducted. in Pakistan which results Syaria insurance (75 percent) was more efficient than the conventional one (67percent) using DEA calculation. The similar research was conducted by Shafique, Ahmad, & Ahmad (2015) and Almulhim (2019) in Saudi Arabia, as a matter of fact, it resulted the reduction from the average of efficiency activity from both conventional insurance and syaria insurance. Rahman (2013) also conducted an efficiency insurance research at a conventional life insurance

company and syaria in Bangladesh which resulted that conventional life insurance was way better compared with syaria life insurance on the geometric average using the DEA calculation, with the result that indicated the smaller the company's size was, the higher its probability to maximize the input used in order to gain lots of output. The result contrary with Antonio, Ali, & Akbar (2013) conducted that conventional insurance companies in Malaysia performed better efficiency than Takaful companies.

5. Conclusion

This study concludes that there is a difference between conventional and Sharia insurance based on the type insurance industry and there is no difference in the value of efficiency between conventional insurance and the efficiency of Sharia insurance based on type insurance in Indonesia in the 2011-2018 period. Both Sharia and conventional have the same level of efficiency. Although Sharia insurance has just been established, its performance has been as good as conventional insurance and Sharia insurance, can operate or utilize its resources very well, in the form of capital and expenses. The type of insurance industry has a difference, because in terms of principles between Islamic and conventional insurance is different and also a separate financial statement. While the type of insurance industry (life and general) has no difference, this is because it

could be because the similarity of insurance industry in the financial sector. In this case, if both of the insurance industry can develop their activity efficiently, it could be better for the Indonesian financial institution. Along with it, the regulatory system can help by making new regulation that can be applied in insurance sector to make them upgrade their performances. This is remembering that our population (in Indonesia) continues to rise rapidly. Hence, in the future, people will need life support and life protection to face uncertainly condition that can happen anytime

The limitation of this study lies in the use of input and output variables. Also, what was compared in this study was still limited to two types of insurance (life and general) which were directly made into a single sample population. Therefore, for further research to get the best results, you can group the types of insurance for each and do each calculation. Also, the used method to calculate is still limited to one method, namely SFA. For further research, it will be better to use more than one method to clearly see the difference, between the first method and the second method. In order to get better results, it is recommended for further research to add variables, both input variables, output variables and those describing characteristics and/or environmental variables (i.e. variables that cannot be controlled), or it can be by increasing the number of observations.

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