

Measuring Financial Efficiency of Insurance Company in Indonesia Using Stochastic Frontier Analysis Approach: A Comparison Between Islamic and Conventional Insurances

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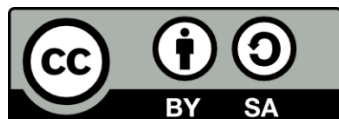
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Abstract

This paper aims to analyze the efficiency value and compare the efficiency ratio between sharia insurance and conventional insurance companies, both life insurance and general insurance in Indonesia, for 2018-2020. The research applies the Stochastic Frontier Analysis (SFA) method, which uses total capital and expenses as input variables, and total income as output variables. The efficiency values of Islamic and conventional insurance companies' results were compared using an independent sample t-test statistical test. The population of this research is all Islamic and conventional insurance companies listed on the website of the Financial Services Authority (OJK). The sample used is 19 sharia insurance companies (15 life insurance companies and four general insurance companies). The sample of conventional insurance is 23 companies (22 life insurance companies and one general insurance company). The results showed that the efficiency value of Islamic insurance companies (0.6549) was 0.0697 lower than conventional insurance (0.7246). It can be concluded that the efficiency of conventional insurance is better than Islamic insurance. Islamic insurance management capabilities are lower than conventional insurance companies' management capabilities.

Keywords: Efficiency, Stochastic Frontier Analysis (SFA), Islamic insurance, conventional insurance, comparison

INTRODUCTION

The measurement of efficiency in the insurance industry is an urgent path to evaluate the level of competitiveness among insurance companies (Naushad et al. 2020). The urgency is higher to measure the efficiency level of Islamic and conventional insurance to highlight their better performance among them. The measurement of efficiency is essential to evaluate the performance of the Islamic insurance industry and determine its competitiveness (Antonio et al., 2013). This paper analyzes the performance of Sharia and conventional insurance companies in Indonesia from 2018 to 2021 using the Stochastic Frontier Analysis (SFA) technique to respond to a positive trend of increasing the number of life insurance companies and general insurance companies in Indonesia. Therefore, the efficiency measurement in Sharia insurance can be a significant indicator in providing an overview of the sharia insurance industry's ability to survive and face fierce competition (Purwanti, 2016; Radwan et al. 2020).

An insurance company's efficiency measurement can be done using two methods, namely the parametric and nonparametric methods. Parametric methods can be applied by Stochastic Frontier Analysis (SFA) or Distribution Free Analysis (DFA). Meanwhile, nonparametric methods can be done by using Data Envelopment Analysis (DEA). Most papers published used DEA. Meanwhile, this study was carried out using the Stochastic Frontier Analysis (SFA) method, which also uses input and output variables. These two variables are determined based on the production function approach considered the main function of the insurance company, the risksharing mechanism in Islamic insurance, and the risk transfer mechanism in conventional insurance. It shows that this study contributed to the existing literature by adding different method perspectives (Shieh et al. 2020; Wanke et al. 2020).

The SFA method has more strengths than other methods; SFA involves a disturbance term representing a disturbance, measurement error, and exogenous shock that is out of control. Second, environmental variables are easier to treat, allow statistical testing of hypotheses, and make it easier to identify outliers (Coelli, 2005). SFA can be applied simultaneously to estimate the technical efficiency and effect models of the technical inefficiency of a firm (Lanfranchi & Grassi, 2021).

As a nonbank financial institution, insurance has experienced significant developments. Sharia Insurance in Indonesia was established by PT Syariah Takaful Indonesia (STI) in 1994. Until June 2022 there were 15 Sharia Industries sharia insurance companies, and 45 Sharia Investment Package/Sharia Business Units (OJK (Otoritas Jasa Keuangan), 2022). Meanwhile, conventional insurance has a higher number of companies than sharia insurance, namely 136 companies (OJK, 2022). Insurance growth in Indonesia is increasing in line with the growing public understanding of insurance's importance in minimizing future risks. Based on the third survey conducted by OJK in 2019, the level of public literacy and inclusion in insurance products has increased and placed number two after banking, namely 19.40%. (OJK, 2019)

In the development of the insurance industry over the past four years, from 2016 to June 2022, the assets of the conventional insurance industry reached an average growth of more than 10%. This data shows that there is positive growth in the insurance business. In 2022 (June), the

conventional insurance industry's assets reached IDR 1.626 trillion, meanwhile the Sharia insurance industry's assets reached IDR 44,255 trillion (OJK, 2022)

Positive developments were also marked in the growth of the sharia insurance industry. Financial Services Authority (OJK) launched the data that the average total asset growth of sharia insurance was 14.79%. The Sharia insurance industry posted a gross contribution of IDR 16.89 trillion as of September 2021 or grew by 41.32 percent compared to the same period last year, valued at IDR 11.95 trillion (Bisnis.com, 2021).

There are several insurance products, namely life insurance, health insurance, education insurance, pension fund insurance, vehicle insurance, property insurance, fire insurance, natural disaster insurance, etc. According to data from Financial Services Authority (OJK), there were 15 sharia life insurance companies full fledged, 44 Sharia Investment Package/Sharia Business Units, and 4 sharia reinsurance companies. (OJK, 2022)

The number of companies engaged in the insurance business creates an opportunity for competition between Sharia and conventional insurance companies. Each company is competing to provide the best service to customers for their products. Each company also strives to improve the competitiveness and quality of company performance. Therefore, the company requires regular efficiency analysis, which is helpful for evaluating and minimizing errors in making decisions, so that company performance will increase. In addition, the efficiency analysis is helpful to be done for determining the company's managerial ability in managing its company.

The research problem of this research is the efficiency level of Islamic and conventional insurance companies and where it is more efficient between Islamic and conventional insurance companies. Thus, the purpose of this paper is to measure the level of efficiency of Islamic and conventional insurance companies, as well as to compare the level of efficiency between them in Indonesia from 2018 to 2020 by using the Stochastic Frontier Analysis (SFA).

LITERATURE REVIEW

Several studies on the efficiency of insurance companies have been carried out, although the objectives for each study are different. The most fundamental differences are in the research object and the efficiency analysis method used. Some of them are very relevant, as follows. Al-Amri analyzed the performance of the Takaful insurance firms in the Gulf Cooperation Council (GCC) countries and did a relative analysis of its different units. He concluded that the Takaful insurance industry in GCC is highly technical and pure technical efficient. However, it is moderately cost-efficient, and there is a significant opportunity for improvement. UAE and Qatar score the highest technical efficiency, while Saudi Arabia and UAE are the most cost-efficient among the GCC countries (Al-Amri, 2015).

Tuffahati, et. al. (2016) analyzed Sharia insurance's efficiency applying DEA with an intermediation approach. Total assets and commission fees were treated as the input variables, and gross contribution and investment income were treated as the outputs. They found that there are no sharia insurance companies that achieved optimal efficiency levels. Meanwhile, two general insurance companies (28.57%) are optimally efficient. In the Sharia unit of life insurance companies, four companies can achieve optimal efficiency levels, or 25% of companies that are

optimally efficient in managing the risks of insurance participants (Tuffahati et al., 2016)

Rusydiana & Nugroho (2017) measured the efficiency of life insurance companies with the Data Envelopment Analysis (DEA) method. This study showed that 15 DMUs are very efficient (100%), and 24 DMUs are inefficient. To be more efficient, the life insurance company must increase the premium value by 91% and investment income by 8%. (Rusydiana & Nugroho, 2017). Sunarsih & Fitriani examined the efficiency of Islamic insurance in Indonesia from 2014 -2016 with the Data Envelopment Analysis (DEA) Method, using the intermediation approach. The input variables were total assets, general and administrative expenses, and claim payments. Investment income and tabarru' funds' were treated as output variables. The results showed that the Central Asia Insurance, Staco Mandiri Insurance, Mega General Insurance, and Sunlife Insurance companies could not reach the highefficiency level during the three research periods. These conditions were influenced by general and administrative expenses, claim payments, investment income, and tabarru' fund collection (Sunarsih & Fitriyani, 2018).

Akhtar (2018) analyzed the performance of Takaful and conventional insurance companies in Saudi Arabia using the data envelopment analysis (DEA) method. The study showed that both Takaful and the larger conventional insurance firms in the country need to strengthen their operations more efficiently to take advantage of the economies of scale and scope. Market share and profitability are essential determinants of efficiency. Regarding efficiency measurement, Grmanová & Ivanová (2018) also conducted research on measuring efficiency in the bank by DEA. This research showed that the three largest banks in the Slovak national banking market were efficient in both analyzed years. Slovenská sporiteľňa, was efficient in all the models with different combinations of inputs and outputs.

Jaloudi (2019) evaluated the Jordan insurance market's technical efficiency by using the DEA method. This study resulted in a slight development of technical efficiency for the Jordanian insurance companies during the study period. The results also showed that owners' equities are among the most critical internal determinants of companies' efficiency, and there is a significant correlation between the type, size, and return on assets of the insurer and its efficiency (Jaloudi, 2019). Almulhim (2019) examined the efficiency of tafakul and conventional insurance in Saudi Arabia. The results of his research indicated that the average efficiency score of takaful insurance companies performs better than conventional insurance companies. However, there is still considerable space for improvement regarding overall efficiency and productivity (Almulhim, 2019).

Regarding efficiency, Jurickova et al. (2019) conducted research on the efficiency measurement of National Innovation Systems of the European Union countries by using DEA. This research indicated differences between the innovation performance investigated by various indices available in public databases and the DEA technical efficiency. The best performers can be considered inefficient in utilizing resources entering the National Innovation System (NIS) for which technical efficiency is examined in this study.

Lee et al. (2020) identified the factors that influence the efficiency level (cost efficiency and technical efficiency) of the Takaful industry in Malaysia by using DEA. This research indicated that Takaful operators in general have allocative inefficiency, but family Takaful is more cost efficient than general Takaful. Ulansari & Septiarini (2020) analyzed the value of efficiency and

comparison of efficiency ratios in conventional insurance companies and Islamic insurance in Indonesia. The efficiency analysis method used was Stochastic Frontier Analysis (SFA) with input variables, total capital, and total expenses. In contrast, the output variable is total income. The result of this research is that there is no difference in the value of efficiency between conventional insurance companies and Islamic insurance in Indonesian (Ulansari & Septiarini, 2020) Based on the above literature review, it is clear that this research is different from previous research, so it is the potential to get novelty in the area of insurance company efficiency.

RESEARCH METHODS

This research is quantitative; namely, the data used in this study is secondary data in the form of specific numbers or quantities that are certain; data like this allows analysis using a statistical approach and the like. This study uses secondary data obtained through the financial statements of each Islamic insurance company and conventional insurance. The data that has been collected is then analyzed using Stochastic Frontier Analysis (SFA) to get the efficiency value.

The population of Sharia and conventional insurance companies in Indonesia is 60 Sharia insurance companies and 136 conventional insurance companies (OJK, 2022) The sample in this study was taken based on the following criteria: a). The company is still active and registered at the Financial Services Authority. b). Company financial reports are published on each company website and presented quarterly for 2018 - 2020. c). The existing report data per the research variables based on input and output variables. The research sample was taken by using purposive sampling, a method of selecting samples that are selected based on consideration (judgment sampling), the sample is chosen not randomly or based on information with specific considerations (Sugiono, 2005). Based on the criteria and the sampling method, 19 sharia insurance companies were selected as the sample in this study, consisting of 15 sharia life insurance companies and 4 sharia general insurance companies. Meanwhile, for conventional insurance, there are 23 companies selected, consisting of 22 life insurance companies and 1 general insurance company.

In this study, the variables used were input variables, namely total income variables, and output variables, namely variables of total capital and total expenses. The operational definition of each variable is as follows:

Table 1. Input and Output Variables

Variables	Sharia Insurance	Conventional Insurance
Input	- Total Capital - Total Expenses (Total Underwriting Expenses, Total Operating Expenses, Other Expenses) on the Company's Funds Report and Tabarru' Funds.	- Total Capital - Total Expenses (Insurance Expense, Operating Expenses, Other Expenses, and Other Comprehensive Expenses After Tax).
Output	- Total income	- Total income

- (Total Investment Return and Investment Management Examination, Underwriting Income, Other Comprehensive Income, and Other Income) in the Company Funds and Tabarru Funds' Report.	- (Premium Income, Investment Income, Other Management / DPLK Fees, Other Income), Other Comprehensive Income After Tax.
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This study analyzes the efficiency of Islamic and conventional insurance using the parametric Stochastic Frontier Analysis (SFA) method and the production function approach in determining the output-input variables. The SFA method has advantages compared to other methods, namely, first, SFA involves a disturbance term that represents a disturbance, measurement error, and exogenous shock that is out of control. Second, environmental variables are easier to treat, allow statistical testing of hypotheses, and are easier to identify outliers (Coelli et al. 2005). The research variables were measured in five stages, namely:

1. Descriptive statistics

Descriptive statistics, as data analysis is carried out by describing comprehensively the data obtained by describing the data in various ways. Descriptive analysis in this study aims to interpret and draw conclusions from several data collected. Descriptive analysis was performed using SPSS software version 24.

2. Econometric models (single model equation)

The single equation model is an econometric model used to test equations individually. The output variable tested is total income, whose variable value is influenced by the combination of the number of input variables (total capital and total expenses).

$$\ln(Q_1) = \beta_0 + \beta_1 \ln(P_1) + \beta_2 \ln(P_2) + V_i - U_i$$

Q1 = total revenue

P1 = total capital

U_i = controllable random factors (inefficiency)

P2 = total cost

V_i = uncontrollable random factor (random noise)

From this model, the hypothesis will be known whether there is an influence of the input variable on the output variable, namely by using a *one-tailed test* with $\alpha = 0,5$.

3. Partial Test t

Partial test t instrument can measure the level of the relationship between the independent variable and the dependent variable. Independent variable testing is done by comparing the t value with the t table obtained from each variable using a one-tailed test with $\alpha = 0.5$ with a significance level of 95%.

4. Stochastic Frontier Analysis (SFA)

The efficiency level can be determined by using Stochastic Frontier Analysis (SFA). The resulting value ranges in scores from 0 to 1, the closer to the value 1, the more efficient the company is, and vice versa. Analysis of the production function using SFA is carried out using equations following the parameterization of the time varying model. Data processing based on the SFA method is carried out by using the Frontier 4.1 software. The standard SFA function with a production function has the following general form (log):

$$\ln(Q_1) = \beta_0 + \beta_1 \ln(P_1) + \beta_2 \ln(P_2) + \beta_3 \ln(P_3) \dots \beta_n \ln(P_n) + E_n$$

Where P1 and P2 are input variables, namely total capital and total costs/expenses of the insurance company. Meanwhile, Q1 is the study's output variable, namely the insurance company's total income n. The error term, E_n , of these two functions consists of two components which are shown in the following equation:

$$E_n = V_i - U_i$$

Note:

U_i = controllable random factors (inefficiency)

V_i = uncontrollable random factors (*random noise*)

The assumptions used are:

$$U_i \sim iid | N(0, \sigma_u^2) |$$

$$V_i \sim iid | N(0, \sigma_v^2) |$$

U_i and V_i are distributed independently of each other, there are also input variables

5. Different test independent sample t-test

The last stage of data processing is to test the hypothesis in the form of an independent sample t-test using SPSS version 24 software. This test aims to verify the truth or error of a hypothesis, or in other words to determine whether the hypothesis is accepted or rejected. The significance to be used is 95%. The requirements that must be met in conducting the independent sample t-test on parametric statistics (Santoso, 2014) are:

6. a. The two samples are not paired. If the sample is paired, the hypothesis test uses the paired sample t-test.
- b. The amount of data for each sample is less than 30 pieces. If there are more than 30 pieces, then you should use the Z test.
- c. The data used in this test are quantitative data at interval or ratio scales.
- d. Data for both samples are normally distributed.
- e. There is a variance or homogeneity similarity for the two research data samples (not an absolute requirement)(Santoso, 2014).

RESULTS AND DISCUSSION

Descriptive Statistic

Descriptive analysis using SPSS version 24 software produces the following output.

Table 2. Descriptive Statistic

Variable	N	Mean	Minimum	Maximum	Std. Deviation
Total Revenue	(S) 57	120,736.36	143.95	1,431,608.96	292,699.09
	(K) 69	1,858,053.17	14,466.50	15,243,545.00	3,117,413.24
Total Capital	(S) 57	420,472.23	26,636.98	3,080,455.82	770,719.92
	(K) 69	2,260,559.84	98,368.31	14,192,456.00	3,019,133.96
Total Cost	(S) 57	70,140.29	93.97	810,854.40	163,740.41
	(K) 69	1,909,566.93	656.00	13,306,770.00	2,957,452.74

Source: Output of Software SPSS 24.

Table 3. Total Revenue, Total Capital, and Total Cost of Insurance Companies

Type of Insurance	Total Revenue			Total Capital			Total Cost		
Syariah Insurance	Min	PT Chubb Life Assurance	2018	Min	PT Mandiri AXA General Insurance	(2018)	Min	PT Chubb Life Assurance	2018
	Max	PT Prudential Life Assurance	(2020)	Max	PT AIA Financial	(2019)	Max	PT Prudential Life Assurance	(2020)
Conventional Insurance	Min	PT Central Asia Financial	(2020)	Min	PT Central Asia Financial	(2018)	Min	PT Heksa Solution Insurance	(2019)
	Max	PT Prudential Life Assurance	(2019)	Max	PT AIA Financial	(2020)	Max	PT Asuransi Jiwa Simas	(2018)

Source: Islamic and conventional insurance company financial reports 2018 - 2020.

Total revenue of 19 sharia insurance companies for the analysis period 2018 - 2020, with a maximum value of Rp. 1,431,608,960,000 is PT Prudential Life Assurance in 2020 and a minimum value of Rp. 143,950,000 is PT Chubb Life Assurance in 2018. Meanwhile, the total revenue of 23 conventional insurance companies for the analysis period 2018 - 2020 has a maximum value of Rp. 15,243,545,000,000 is PT Prudential Life Assurance in 2019, and the minimum value of Rp. 14,466,500,000 is PT Central Asia Financial in 2020.

The total income of the sharia insurance company has a mean of Rp. 120,736,360,000 and a standard deviation of Rp. 292,699,090,000. While the total income of conventional insurance companies has a mean of Rp. 1,858,053,170,000 and a standard deviation value of Rp. 3,117,413,240,000. Both types of companies have a standard deviation value that is higher than the average value of their total income, the value of the standard deviation in conventional insurance companies is higher than in sharia insurance companies. So that the total income variable shows that the range of data held by Islamic and conventional insurance companies is increasingly varied and growing, because the standard deviation value is higher than the average value.

Total capital in a sharia insurance company has a mean value of Rp. 420,472,230,000 and a standard deviation of Rp. 770,719,920,000. While the total capital of conventional insurance companies has an average value (mean) of Rp. 2,260,559,840,000 and a standard deviation value of Rp. 3,019,133,960,000. Both types of companies have a standard deviation value higher than the average value of their total capital, the standard deviation value in conventional insurance companies is higher than in Islamic insurance companies. So that the total capital variable shows that the range of data held by Sharia and conventional insurance companies is increasing because the standard deviation value that is owned is higher than the average value.

The maximum value of the total burden on 19 sharia insurance companies is Rp. 810,854,400,000 is PT Prudential Life Assurance in 2020 and a minimum value of Rp. 93,970,000

is PT Chubb Life Assurance in 2018. While the total expense of 23 conventional insurance companies for the 2018 - 2020 study period with a maximum value of Rp. 13,306,770,000,000 is PT Asuransi Simas Jiwa in 2018, and the minimum value of 656,000,000 is PT Heksa Solution Insurance in 2019. The average total expense of a sharia insurance company is Rp. 70,140,290,000 with a standard deviation value of Rp. 163,740,410,000. Meanwhile, the average total expense of conventional insurance companies is Rp. 1,909,566,930,000 and the standard deviation value is Rp. 2,957,452,740,000. Both types of Islamic and conventional insurance industries have a standard deviation value that is higher than the average value, and the value of conventional insurance companies is higher than the value of Islamic insurance companies. So that the total load variable shows that the range of data owned by Islamic and conventional insurance companies is increasing, because the standard deviation value that is owned is higher than the average value. Based on Table 2 and Table 3 above, it can be concluded that Islamic and conventional insurance companies have various variations, as evidenced by the varying maximum and minimum value holdings and not in certain companies. The variable value of total income, total capital, and total expenses owned by Islamic insurance companies is lower than conventional insurance companies.

Econometric Model (Model Single Equation)

Analysis of the efficiency value of Islamic and conventional insurance companies using the SFA (Stochastic Frontier Analysis) method which refers to the equation $Ln(Q_1) = \beta_0 + \beta_1 ln(P_1) + \beta_2 ln(P_2) + V_i - U_i$. From this equation, a frontier model is generated in the form of a log model, which is not a linear model, so that all variables are converted into natural logarithms (Hakim, 2009).

After all the existing secondary data is converted into natural logarithms, the data is processed using Frontier 4.1 software. First, we will look at the relationship between the independent variable and the dependent variable, namely the extent to which the independent variable represented by the input variable affects the dependent variable represented by the output variable. The results of tests conducted on Islamic insurance companies are as follows:

Table 4. SFA Test Results on Sharia Insurance Companies

	Coefficient	standard-error	t-ratio
Constanta	-0.87579278	0.57512392	-0.15227897
Total Capital (P₁)	0.38849284	0.75465921	0.51479242
Total Burden (P₂)	0.70907380	0.70441127	0.10066190
Sigma-Squared	0.45818671	0.16967931	0.27003097
Gamma	0.82197206	0.18132776	0.45330734

Source: Software Frontier 4.1 processed data

The regression equation model for Islamic insurance companies can be written as the following equation:

$$Ln(Q_1) = -0.8757 + 0.3884 ln(P_1) + 0.7090 ln(P_2) + 0.458 - 0.8219$$

From the regression equation above, it is known that the constant is -0.8757. The input variable, namely total capital (lnP1), has a regression coefficient of 0.3884, indicating that if total capital increases by 1%, total income will increase by 0.3884%. Then in the input variable, namely full load (lnP2), has a regression coefficient of 0.7090, indicating that if the total load has increased by 1%, the total income has increased by a value of 0.7090%. While the test results conducted on conventional insurance companies are shown in Table 9.

Table 5. SFA Test Results on Conventional Insurance Companies

	Coefficient	standard-error	t-ratio
Constanta	0.72418773	0.84165943	0.86042846
Total Capital (P₁)	0.38849284	0.75465921	0.51479242
Total Burden (P₂)	0.18899895	0.70084007	0.26967486
Sigma-Squared	0.45818671	0.16967931	0.27003097
Gamma	0.77345541	0.58142721	0.13302704

Source: Software *Frontier* 4.1, data diolah.

The conventional insurance company regression equation model can be written as the following equation:

$$\ln(Q_1) = 0.7241 + 0.1889 \ln(P_1) + 0.7734 \ln(P_2) + 0.4579 - 0.4373$$

From the regression equation above, the constant is 0.7241. The input variable, namely total capital (lnP1), has a regression coefficient of 0.1889, which indicates that if total capital increases by 1%, total income increases by 0.1889%. Then in the input variable, namely total load (lnP2), has a regression coefficient of 0.7734, indicating that if the total expense has increased by 1%, the total income has increased by 0.7734%.

Partial Test t

The level of the relationship between the independent variable and the dependent variable can be measured by testing the partial t-test using the one-tailed test with $\alpha = 0.5$ with a significance level of 95%. Testing of independent variables is done by comparing the t value with the t table obtained from each variable where $df = n-k$ is $126-2 = 124$, then the t table obtained is 0.6764.

Table 6. Result of the t-statistic test

Variable	Sharia Insurance	Result	Conventional Insurance	Result
Total Capital	0.5147	< 0.6764 Then, there is an insignificant influence between total capital and total income.	0.2696	< 0.6764 Then, there is an insignificant influence between total capital and total revenue.

Total Cost	0.1006	< 0.6764 Then, there is an insignificant influence between total expenses on total income.	0.1330	< 0.6764 Then, there is an insignificant influence between total expenses on total income.
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Source: Software *Frontier 4.1*, processed data.

Stochastic Frontier Analysis (SFA)

The efficiency value from time to time can be determined by using Stochastic Frontier Analysis (SFA). The resulting value ranges in scores from 0 to 1, the closer to the value 1, the more efficient the company is, and vice versa. Analysis of the production function using SFA is carried out using equations following the parameterization of the time-varying model. For data processing using SFA using the *Frontier 4.1* software. The results of the efficiency test for Islamic insurance companies that have been carried out are shown in the following Table.

Table 7. Results of the 2018-2020 Sharia Insurance Company Efficiency Test

No.	Sharia Insurance Company Name	2018	2019	2020
1	PT Asuransi Takaful Keluarga	0.7039	0.7055	0.5981
2	PT Asuransi Jiwa Syariah Jasa Mitra Abadi	0.6190	0.6797	0.5803
3	PT Capital Life Syariah	0.2673	0.2410	0.6152
4	PT AIA Financial	0.5557	0.8645	0.8678
5	PT Asuransi Simas Jiwa	0.3365	0.5259	0.4700
6	PT Asuransi Jiwa Sinar Mas MSIG	0.6298	0.8569	0.8907
7	PT Avrist Assurance	0.5475	0.8035	0.6936
8	PT Axa Financial Indonesia	0.6174	0.6323	0.6448
9	PT Axa Mandiri Financial Services	0.3848	0.7155	0.6533
10	PT BNI Life Insurance	0.6902	0.6729	0.6756
11	PT Panin Daichi Life	0.8798	0.6707	0.7502
12	PT Prudential Life Assurance	0.6744	0.7095	0.7316
13	PT Sun Life Financial Indonesia	0.7978	0.7985	0.6966
14	PT Chubb Life Assurance	0.3269	0.8569	0.8429
15	PT Asuransi Jiwa Generali Indonesia	0.2743	0.8204	0.7678
16	PT Asuransi Takaful Umum	0.8324	0.6490	0.6308
17	PT Asuransi Chubb Syariah Indonesia	0.7611	0.7702	0.7641
18	PT Mandiri AXA General Insurance	0.5733	0.5236	0.5357
19	PT Sampo Insurance Indonesia	0.4618	0.7388	0.7518
Mean Efficiency		0.6549		

Source: Software *Frontier 4.1*, processed data.

Table 4.7 shows the technical efficiency conditions of sharia insurance companies during the 2018-2020 period. The trend of efficiency development of sharia insurance companies

is quite diverse. Some companies experience a trend of decline, stagnation and increased efficiency. Overall, the average efficiency value of Islamic insurance companies for the 2018-2020 period is 0.6549.

It is known that the highest efficiency value in the sharia insurance company for the period 2018-2020, namely PT Asuransi Jiwa Sinar Mas MSIG for the period 2020 amounted to 0.8907. While the lowest efficiency value is PT Capital Life Syariah for the 2019 period of 0.2410. PT BNI Life Insurance, PT Panin Daichi Life, PT Prudential Life Assurance, PT Sun Life Financial Indonesia, and PT Asuransi Chubb Syariah Indonesia achieved an efficiency value above the average of all companies.

Table 8. Efficiency Test Results of Conventional Insurance Companies 2018-2020

No.	Conventional Insurance Company Name	2018	2019	2020
1	PT AIA Financial	0.7146	0.7950	0.7479
2	PT Asuransi Allianz Life Indonesia	0.7251	0.7961	0.7134
3	PT Avrist Assurance	0.6933	0.7114	0.7098
4	PT Asuransi Jiwa BCA	0.7297	0.7446	0.7603
5	PT BNI Life Insurance	0.7076	0.7779	0.7409
6	PT Central Asia Financial	0.5901	0.6305	0.5281
7	PT Asuransi Jiwa Generali Indonesia	0.7685	0.7733	0.7597
8	PT Great Eastern Life Indonesia	0.7521	0.8035	0.5438
9	PT Hanwha Life Insurance Indonesia	0.6350	0.6807	0.6596
10	PT Asuransi Jiwa Inhealth Indonesia	0.7574	0.7596	0.7567
11	PT Asuransi Jiwa Nasional	0.6733	0.6768	0.7167
12	PT Asuransi Jiwa Sinarmas MSIG	0.7278	0.7689	0.6633
13	PT Asuransi Jiwa Taspen	0.6895	0.7817	0.7379
14	PT Asuransi Simas Jiwa	0.8235	0.8244	0.8095
15	PT Bhinneka Life Indonesia	0.7637	0.7581	0.5595
16	PT Heksa Solution Insurance	0.7637	0.9034	0.7543
17	PT PFI Mega Life Insurance	0.8060	0.7946	0.7578
18	PT Pacific Life Insurance	0.7637	0.7889	0.7826
19	PT Panin Dai-ichi Life	0.7279	0.7721	0.6911
20	PT Prudential Life Assurance	0.7402	0.8174	0.4470
21	PT Asuransi Jiwa Tugu Mandiri	0.7560	0.7609	0.7434
22	PT Zurich Topas Life	0.6804	0.4345	0.6258
23	PT Sampo Insurance Indonesia	0.7418	0.7480	0.7541
Mean Efficiency		0.7246		

Source: Software *Frontier 4.1*, data processed.

Table 8 shows the technical efficiency conditions of conventional insurance companies during the 2018-2020 period. The trend of efficiency development from conventional insurance companies is quite diverse. Some companies experience a trend of decline, stagnation and

increasing efficiency. Overall, the average efficiency value of Islamic insurance companies for the 2018-2020 period is 0.7246.

It is known that the highest efficiency value in conventional insurance companies for the 2018-2020 period, namely PT Heksa Solution Insurance for the 2019 period is 0.9034. While the lowest efficiency value is PT Zurich Topas Life for the 2019 period of 0.4345. Based on the average efficiency value of conventional insurance companies, companies that consistently have above average efficiency values are PT Asuransi Jiwa BCA, PT BNI Life Insurance, PT Asuransi Jiwa Generali Indonesia, PT Asuransi Jiwa Inhealth Indonesia, PT Asuransi Simas Jiwa, PT Heksa Solution Insurance, PT PFI Mega Life Insurance, PT Pacific Life Insurance, PT Asuransi Jiwa Tugu Mandiri, and PT Sampo Insurance Indonesia.

Data above told us that that Islamic insurance companies are working quite efficiently with an average efficiency value of 0.6549. The efficiency level of the sharia insurance company is 0.0697 which is lower than the conventional insurance company which has an average value of 0.7246. This can be caused by various factors, one of which is the total capital owned by Islamic insurance companies is lower than conventional insurance companies.

Different Test Independent Sample t-Test

In testing this hypothesis, it aims to verify the truth or error of the hypothesis, or in other words to determine, accept, or reject the hypothesis in the two groups of research objects of Islamic insurance companies and conventional insurance companies using the SPSS version 24 software. The results of the independent sample t-test are in Table 9.

Table 9. Result of Different Test Independent Sample t-Test

Group Statistics					
	Kode Perusahaan	N	Mean	Std. Deviation	Std. Error Mean
Efficiency Value	Sharia Insurance	57	.654899	.1605751	.0212687
	Conventional Insurance	69	.724580	.0825531	.0099382

Source: Software SPSS 24, processed data.

Based on the Group Statistics output table above, it is known that the number of data on the efficiency of Islamic insurance companies is 57 units, and the number of data on the efficiency of conventional insurance companies is 63 units. The average efficiency value for sharia insurance companies is 0.654889, while for conventional insurance companies it is 0.724580. Thus statistically descriptive it can be concluded that there is a difference in the average efficiency value of Islamic and conventional insurance companies for the 2018-2020 period. Furthermore, to prove whether the difference is significant, it is necessary to interpret the outputs of SPSS 24, namely the Sig. Levene's Test for Equality of Variances is 0.000 < 0.05. So it can be concluded that the data variants between Islamic and conventional insurance companies are different. Meanwhile, based on the Sig. (2-tailed) of 0.002 < 0.05, it can be concluded that H0

is rejected and H_a is accepted. Thus, the hypothesis test that can be concluded is that there is a significant difference between the average value of the efficiency of the financial performance of Islamic and conventional insurance companies. Furthermore, from the output table, it is known that the value of 'Mean Difference' is -0.0697. This value shows the difference between the average efficiency value of Islamic and conventional insurance companies of $0.6549 - 0.7246 = -0.0697$.

Efficiency can be defined as the company's ability to produce some outputs optimally with specific inputs or manage existing inputs optimally to produce a certain result. Three conditions of efficiency occur in a company: the company uses the same input and produces more output, the company uses fewer inputs and produces the same output, or the company uses more inputs to produce more output. Based on the tests carried out in this study, it is known that a company's efficiency level is not determined by the amount of total income, total expenses, or total capital owned by the company. However, the efficiency level is determined by the company's ability to create maximum profits by optimally utilizing its source. So it can be concluded that the management ability of conventional insurance companies is better at 0.0697 compared to sharia insurance companies.

CONCLUSION

Based on the results of the data analysis and the discussion above, it can be concluded that the efficiency value of Islamic insurance companies in 2018-2020 is 0.6549. The most efficient sharia insurance company was PT Asuransi Jiwa Sinar Mas MSIG in 2020, and the least efficient is PT Capital Life Syariah in 2019. Meanwhile, the efficiency value of conventional insurance companies in 2018- 2020 amounted to 0.7246. The most efficient conventional insurance company is PT Heksa Solution Insurance in 2020, and the least efficient is PT Zurich Topas Life 2019. The results of the independent sample t-test show that there is a significant difference between the average value of the efficiency of the financial performance of Islamic insurance companies and conventional insurance companies. Conventional insurance companies are more efficient than Islamic insurance companies. The level of efficiency of a company is not determined by the amount of total revenue, total expenses, or total capital owned by the company but is determined by the company's ability to create maximum profits by optimally utilizing its resources.

The limitation of this study is that the method can only analyze the efficiency of the production function of insurance companies. Therefore, a suggestion for future research is how to develop a more comprehensive method, so that it can be known what factors cause inefficiency in the company under the study. In addition, the regional scope also needs to be expanded, for example, comparisons between countries or other regions.

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