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Determinants of The Sharia and Conventional Insurance Efficiency Before and During Covid-19

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Insurance companies are part of financial institutions that contribute to the financial system. During this Covid-19 pandemic, people are certainly more concerned about the importance of health or life insurance. Therefore, for insurance companies, this is a big opportunity to increase their market share. This study aims to compare the efficiency of the performance of sharia insurance companies (full fledge) and conventional insurance operating in Indonesia using two stages of data envelopment analysis (DEA) for the period before and during Covid-19 (2018 - 2021). The first stage is to measure efficiency using the non-parametric DEA approach and the second stage uses the Tobit Regression model to see the factors that affect the efficiency level of insurance companies during the period of Covid-19. This result indicates the average efficiency score of Sharia and conventional insurance fluctuated, especially in 2020 there was a decline in efficiency scores, and it is evidence that Covid-19 has had little effect on the insurance business, both conventional and sharia insurance. However, this study reveals that the average conventional insurance can adjust to these conditions faster than the average sharia insurance. The effect on the efficiency level of the insurance companies can be seen from internal and external factors. The findings in this study indicate that insurance efficiency is more influenced by internal variables such as SIZE, ROA and NPM than external variables. There was no significant change in insurance efficiency during the Covid-19 pandemic.

Keywords: Efficiency; Sharia Insurance; Conventional Insurance; Covid-19; Tobit Regression

INTRODUCTION

The Covid-19 pandemic began to spread to Indonesia at the end of 2019 and the World Health Organization (WHO) declared as a global pandemic on March 11, 2020. It shakes many ways, not only had an impact on the health sector but also caused global economic conditions to experience severe shocks. Fernandes (2020) tells about the impact on economic activity to stop from production disruptions, decreased consumption, supply chain disruptions, loss of income, and a decline in financial markets. The financial sector was badly affected during the pandemic, it is evident that most of the financial sector has experienced a decline, although some have experienced an increase (Kusuma & Widiarto, 2022).

The insurance sector is part of the financial system, which is very important for the economic growth of a country. As part of the financial services sector, the insurance sector has a strategic role in promoting economic stability in the risk management of economic activities (Ikhwan & Rusydiana, 2022). Insurance development is positively correlated with economic growth (Han et al., 2010).

Two systems are operating in the insurance industry today. Currently developments, at least there is insurance based on sharia principles and conventional insurance. When measured by total assets, the growth rates for both insurance companies increased from year to year. Sharia insurance, known as takaful, first appeared in Indonesia in 1994 and has now been around for approximately 28 years. Regarding future developments, the sharia insurance financing industry will continue to grow (Azhari & Sukmaningrum, 2021).

According to Maksum (2011), the fundamental difference between Islamic insurance and traditional insurance lies in the purpose and base of operations. The purpose of sharia insurance is to help each other (ta'awuni), while conventional insurance aims to replace each other (tabaduli). Operationally both are based on statutory regulations, but sharia insurance prohibits it, in contrast to riba (usury), gharar (Ambiguity) and maysir (gambling). There are also significant differences in risk management principles: Islamic insurance is called risk sharing and traditional insurance is called risk transfer (Sula, 2000).

The concept of risk sharing, which is the risk that is shared with fellow insurance participants, makes the company distinguish between company funds and participant funds. So that no one party feels benefited or harmed (Puspitasari, 2011). Meanwhile, the concept of risk transfer, namely the principle of risk by transferring or transferring the risk of insurance participants to insurance companies. It makes premium payments the full rights of the company and the risk that customers will switch to conventional insurance companies.

According to data from the Financial Services Authority (OJK) (2020), the percentage of the market share of the sharia insurance industry in Indonesia in gross contributions and gross claims in 2020 has increased compared to 2019, while in total assets, it has decreased. The year of 2020 was difficult because Indonesia was hit by an outbreak of Covid-19 infection (Coronavirus Disease 2019). This has significant implications not only for public health but also for the financial services industry, particularly the insurance industry. As shown in Table 1 below:

Table 1 Market Share of Insurances in Indonesia

Description	Gross Contribution		Gross Claim		Asset	
	2019	2020	2019	2020	2019	2020
All Life & Non Life Insurance (Seluruh Asuransi)	287,65	278,75	199,62	208,62	756,52	748,75
All Life & Non Life Syaria Insurance (Seluruh Asuransi Syariah)	16,75	17,52	10,68	13,08	45,8	44,28
Percentage of All Life & Non Life Sharia Insurance (Persentase	5,82%	6,28%	5,35%	6,27%	6,05%	5,91%

Seluruh Asuransi Syariah)	

Source: OJK (Insurance Statistics 2020)

Based on table 1, in 2020, the assets of the Islamic insurance industry decreased by 3.30% compared to the previous year from Rp. 45.8 trillion to Rp. 44.28 trillion. The same thing happened to conventional insurance; in 2020 the company's total assets amounted to Rp. 748.75 trillion, a decrease of Rp. 3.77 trillion compared to assets in 2019, which was Rp. 756.52 trillion. The decline in assets in the two insurance industries was mainly due to the Covid-19 pandemic, which had impacted the performance and development of the Non-Bank Financial Industry (IKNB), including Sharia IKNB.

Based on data from the OJK (2020), for sharia general insurance companies, the impact of Covid-19 on the total value of tabarru' contributions in 2020 was Rp. 1,699.40 billion, this decreased by Rp. 187.75 billion or 9.95% lower compared to This means that the pandemic conditions have a major impact on the income of sharia general insurance companies in Indonesia (Ghoni, 2021).

The same thing happened to conventional insurance, where there was a significant decline due to the Covid-19 pandemic. Based on data from the OJK (in Siswanto, 2021), at least there was a decline in the acquisition of conventional insurance premiums by 13.8% in the March 2020 report. However, conventional insurance market share still dominates over sharia insurance companies.

Seeing the impact of the Covid-19 pandemic on health, people should be aware of the importance of life or health protection. So that, it will increase public awareness of having life and health insurance. This is certainly a great opportunity for the insurance industry to increase its market share in Indonesia, and one of the measuring tools is efficiency. Many studies on efficiency have been carried out by comparing the Islamic insurance industry with conventional ones resulting in differences in results or a research gap.

Several studies show that the efficiency of the Islamic insurance industry is better than that of the conventional insurance industry (Ade et al., 2018; Khan & Noreen, 2014; Janjua & Akmal, 2015; Almulhim, 2019), while other studies state the opposite such as (Antonio et al., 2013; Rahman, 2013; Ikhwan & Rusydiana, 2022).

Further studies on efficiency also have been done with development of analysis namely Two-Stage method on efficiency which is combine DEA with Tobit Regression in the financial services sector. Regarding the factors that influence insurance efficiency in studies, several literatures show varying results. Iskandar et al. (2020) who found that the variable size which reflects total assets in Islamic insurance has a significant effect on the value of technical efficiency (TE). This result is consistent with research which states that variable size has a significant impact on the efficiency of insurance companies (Abbas et al., 2018; Cummins & Xie, 2016; Indrarini et al., 2019; Wasseja & Mwenda, 2015; Biener et al. 2016; Yakob et al. 2014; Afza & Asghar 2012). Nevertheless, research by Rahman (2013) revealed a different result from Conventional and Takaful life industry in Bangladesh where the higher Size of the companies, the smaller the probability for the companies to be more efficient in utilizing their inputs to generate more outputs.

The correlation between insurance efficiency and macroeconomic variables has been studied before. One of them is Karbhari et al. (2018) who examines macroeconomic variables such as GDP and inflation variables. The finding indicates that economic growth in a country tends to significant increased in technical efficiency and also scale efficiency in Islamic insurance companies. Despite the fact that GDP growth has no effect on efficiency change of insurance by (Chakraborty & Harper, 2017). In addition, Abdou et al. (2014) tells the macro-economic variables like GDP and CPI have no statistically significant influence on the performance of the overall insurance industry in Malaysia, as measured by net contributions.

Moreover, further research on factors affecting efficiency has been carried out such as (Abdin et al., 2022; Abidin & Cabanda, 2011; Iskandar et al., 2020). The results of previous studies state that there are differences in the effect on the efficiency of insurance companies. The difference in this study is in the independent variables where there are internal and external factors.

Based on these studies, no one has specifically discussed about the efficiency level comparison of sharia and conventional insurance regarding conditions before and during the Covid-19 and its determinants. Therefore, efficiency research in both conditions is needed to measure and analyze whether there is a

decrease or increase in the level of efficiency of Islamic and conventional insurance companies. In addition, further studies were conducted using the Tobit regression to measure which variables affect the level of insurance efficiency. So, the purpose of this paper is to compare the performance efficiency of Islamic insurance companies (full fledge) and conventional insurance companies operating in Indonesia using two stages of data envelopment analysis (DEA) for the period before and during Covid-19 (2018 – 2021).

LITERATURE REVIEW

Efficiency

The concept of efficiency comes from the concept of microeconomics: namely consumer theory and producer theory. From the point of view of consumer theory trying to maximize utility or individual satisfaction, while from the point of view of producer theory trying to maximize profit or minimize costs (Ascarya & Yumanita, 2007). Moreover, according to Antonio et al. (2013), the measurement of efficiency is one of the benchmarks for comparing insurance performance and also as a determining factor for the level of competitiveness. Efficiency measures assess the level of competitiveness in terms of inputs and outputs.

There are two types of efficiency: economic efficiency and technical efficiency. In economic efficiency has a macroeconomic picture, while technical efficiency has a microeconomic picture. Farrell (1957) states that the efficiency of a company consists of two components, namely Technical Efficiency (TE) and Allocative Efficiency (AE). Technical efficiency is the ability of a company to use its inputs in maximizing the achievement of output. Meanwhile, allocative efficiency is the company's ability to use inputs at an optimal level. The combination of these two components will produce a measure of economic efficiency, or cost efficiency, or overall efficiency (Ascarya & Masrifah, 2022).

In this study, the measurement of technical efficiency with the DEA analysis technique is used to measure the operational relationship in the process of using inputs into outputs. The term DEA refers more to the definition of technical efficiency, namely the relationship between inputs and outputs in a business unit (Rusydiana, 2013).

Efficiency is a relative indicator that reflects the results of a particular business unit by comparing them with the results of other similar business units. Profitability is expressed through the values of the analyzed subject indicators. However, efficiency and profitability are essential for an insurance company to achieve its goals. Defining the relationship between them can help the insurance company's management better manage its performance and better identify the tasks that must be completed to achieve the goals set by the shareholders.

The efficiency of financial institutions such as insurances may be evaluated through their operations, which explains the relationship between the insurance's input and output. The approach used in calculating insurance efficiency is the added value approach which is a theory of the intermediation approach as a determinant of the output. This interpretation is complemented by non-parametric calculations using DEA.

Abidin & Cabanda (2011) tried to measure the efficiency of 23 non-life insurance in Indonesia over the period 2005 to 2007 using two stages of analysis, namely: Data Envelopment Analysis (DEA) in the first stage and the Tobit model in the second stage. The study's results found that non-life insurance in Indonesia during the study period had a few reached the optimal level of efficiency and bigger insurance companies were found to be efficient than smaller companies. The Tobit model reveals that variables such as ROE and NPM have a positive relation between profitability and value of DEA, while ROA has a negative relation.

Abbas et al. (2018) who evaluated the cost, allocative and technical efficiency on performance of Takaful and Conventional Insurance Firms in Pakistan. Using the two-stage method on 6 years panel data (2010-2015) of 32 life and non life conventional insurance firms and 5 general and family Islamic insurance. The study's results found that Takaful and insurance firms have been operating on almost equal efficiency levels. Moreover, Leverage is the main contributor for efficiency optimization, followed by the firm Size, whereas, firm's Age has no contribution in efficiency scores.

Furthermore, Abdin et al. (2022) use the Two-Stage Data Envelopment Analysis approach to the influence and efficiency level of general insurance companies in Indonesia for the period 2017 – 2018. The empirical findings illustrate a positive trend in the efficiency level of general insurance companies. In this study, The expense ratio is the only factor influencing the efficiency level of general insurance companies in Indonesia. Meanwhile, company ownership and investment adequacy ratio do not affect the efficiency level of general insurance companies in Indonesia.

Insurance with national and foreign license has different efficiency levels, where foreign-owned companies are better.

In one side, Abdou et al. (2014) who measured external factors on the performance of the insurance industry in Malaysia in terms of net contributions revealed that the explanatory macro-economic variables, GDP, CPI have no statistically significant influence. On the other side, research by Ismail et al. (2018) investigated the impact of macroeconomic factors towards the performance of insurance companies in Malaysia, measured by ROA. The findings conclude that GDP affect the company's performance while CPI gives less impact towards the company's performance. But, GDP is negatively correlated to company performance.

METHODOLOGY

Research Sample

This research uses quantitative data with the DEA stage method to explain the efficiency performance and its determinants. The data is sourced from the annual financial reports of insurances companies during the 2018-2021 period. This study takes a population of Sharia Insurance (full fledge) and the population of Conventional Insurance only takes a few companies registered with the Financial Services Authority (OJK) and the sample selection is based on the following criteria:

1. Sharia Insurance Companies (full fledge) and Conventional Insurance Companies operating in Indonesia and registered with the OJK in the year of 2018-2021.
2. Insurance companies that have complete financial report data and are published on the website of each company from 2018 to 2021.
3. Sampling is in the form of a comparison of the same type between Islamic insurance and conventional insurance and there are report data that are in accordance with the research variables both based on input and output variables.
4. The population of sharia insurance (full fledge) was taken from data from the Indonesian Sharia Insurance Association (AASI) and conventional insurance companies were taken in the form of life and general insurance companies which have the largest assets of around 10 trillion and 1 trillion rupiah.

So that in this study there was a sample of 12 Islamic Insurance companies (full fledge) including life and general insurance and 12 Conventional Insurance companies. The conventional insurance samples were taken from a number of insurance populations in Indonesia where some of these samples represented a population. The following is a sample table in the study:

Table 2 Samples of Islamic Insurance Companies (Full Fledge) and Conventional

No	Syaria	Type	No	Conventional	Type
1	PT Asuransi Jiwa Syariah Al Amin	Life	1	PT Prudential Life Assurance	Life
2	PT Asuransi Jiwa Syariah AmanahJiwa Giri Artha	Life	2	PT Asuransi Jiwa AIA Financial	Life
3	PT Asuransi Jiwa Syariah Jasa Mitra Abadi	Life	3	PT AXA Mandiri Financial Services	Life
4	PT Asuransi Takaful Keluarga	Life	4	PT Asuransi Jiwa Manulife Indonesia	Life
5	PT Capital Life Syariah	Life	5	PT Allianz Life Indonesia	Life
6	PT Asuransi Syariah Keluarga Indonesia	Life	6	PT Asuransi Simas Jiwa	L ife
7	PT Prudential Sharia Life Assurance	Life	7	PT Indolife Pensiontama	Life
8	PT Asuransi Chubb Syariah Indonesia	General	8	PT Asuransi Astra Buana	General
9	PT Asuransi Sonwelis Takaful	General	9	PT Asuransi Tugu Pratama Indonesia	General

10	PT Asuransi Takaful Umum	General	10	PT Asuransi Central Asia	General
11	PT Asuransi Jasindo Syariah	General	11	PT Asuransi Sinar Mas	General
12	PT Asuransi Askrida Syariah	General	12	PT Asuransi MSIG Indonesia	General

Analysis Tool

In the first-stage of the analysis, we uses a non-parametric quantitative approach, Data Envelopment Analysis (DEA). The DEA efficiency metthodology are commonly methods used by insurance researcher. The DEA Method is a mathematical programming technique that measures the efficiency of a decision-making unit (DMU) which does not use efficient inputs and causes inefficiencies, both in input and output variables. Moreover, DEA can be used to evaluate multiple inputs and outputs (Ascarya & Masrifah, 2022) and gives information about the number of inputs and outputs that must be adjusted to achieve maximum efficiency (Potential Improvement). The advantage of this approach is that it does not require an explicit specification of the function form and only requires a little structure to form an efficiency frontier (Ascarya & Yumanita, 2007). The first model in the DEA method is CRS which was introduced by Charnes, Cooper, and Rhodes (CCR) and the second model is VRS which was developed by Banker, Charnes, and Rhodes (BCC).

To culculate the level of efficiency, we using the MaxDEA software with input oriented CRS model where we assume that insurances company have more control over inputs than output quantities. The measurement of DEA efficiency in the first stage uses variabel data based on previous study, the input variabel are: total asset, equity and total expenses, for the output variable investment incomes, premiums/contribution and claims (Ikhwan & Rusydiana, 2022). An efficient DMU determined by value of 1 or 100%. While, The inefficient of firm considered which is less than 1.

The second stage uses Tobit Regression model to estimate the factors that affect the level of efficiency with the statistical program Stata. Two-stage DEA analysis has been the dominant approach in exploring the influence of a firm-specific or exogenous factor on the efficiency of insurance firms (Kaffash et al., 2020). There are several techniques to determine the dependent between the technical efficiency score and other factors. One of the most important methods is Tobit regression. The Tobit regression was used to test the association between the value of DEA as dependent variable because the value of dependent variable the DEA score has limited outcome or always equal to one. As independent variables that effect the efficiency level of insurance in this study such as internal and external factors. The internal factors are Total Asset (SIZE), Return on asets (ROA), Return on equity (ROE), Net premium margin (NPM) and Gross Profit Margin (GPM), for the external factors are Gross Domestic Product (GDP) and Inflation (IHK).

In addition, a dummy variable is included to assess the extent to which the insurance's efficiency changed before and during the Covid-19. The pandemic period began when the Covid-19 virus was declared to have spread in Indonesia, namely in 2020 until now. The Tobit regression estimation model used in this study is :

$$Y_t = \beta_0 + \beta_1 \text{SIZE} + \beta_2 \text{ROA} + \beta_3 \text{ROE} + \beta_4 \text{NPM} + \beta_5 \text{GPM} + \beta_6 \text{GDP} + \beta_7 \text{IHK} + \mu$$

Where:

Y = Efficiency Score

SIZE = Total asset in log form

ROA = Return on Asset (earnings before taxes to Assets)

ROE = Return on Equity (earnings after taxes to Equity)

NPM = Net Profit Margin (Earning after tax to total net premium income)

GPM = Gross Profit Margin (Earning before tax gross profit income)

GDP = Gross Domestic Product per capita in log form (WorldBank)

IHK = Inflation (WorldBank)

Dummy = Before Covid-19 (0) and During Covid-19 (1)

We use this model and develop the analysis to be more comprehensive with indicators of financial performance of insurance companies as well as macroeconomic factors. The impact of financial performance on insurance efficiency has been carried out by (Abidin & Cabanda, 2011; Iskandar et al., 2020; Abdin et al., 2022; Indrarini et al., 2019) where the profitability ratios is an internal factor in this study.

Next, we did the same analysis by Karbhari et al. (2018), Abdou et al., (2014), Chakraborty & Harper (2017) where macroeconomic variables were used as external factors.

The Mann-Whitney U test is used to compare difference in input-output between the average of sharia and conventional insurance during Covid-19 period in Indonesia. We used this method cause the assumption of normality is not met. The criteria is if the significance value is less than $\alpha = 0.05$ then Ho is rejected with a decision that there is a difference in efficiency level, otherwise if the significance value is greater than $\alpha = 0.05$ then Ho is accepted with the conclusion that there is no difference in sharia and conventional insurance.

The hypothesis in the different test independent sample t-test for the variance test is:

H0 : there is no difference in average input-output between the sharia insurance companies with conventional insurance companies.

H1 : there is a difference in average input-output between the sharia insurance companies with conventional insurance companies.

RESULT AND ANALYSIS

Descriptive Statistics

An overview of the data used in this study will be presented. Table 3 presents descriptive statistics of the input and output variables of Sharia (full fledge) and Conventional Insurances in Indonesia, before and during Covid-19 periods.

Table 3 Descriptive Statistics

Variable	Before Covid-19					
	N	Mean	Max	Min	Stdev	
Sharia Insurances						
Total asset	24	1.348.169	9.213.438	78.593	2.529.927	
Equity	24	127.025	552.500	5.000	140.235	
Total expenses	24	155.796	1.310.033	12.941	331.131	
Investment incomes	24	17.501	167.557	1.368	37.925	
Premiums/contribution	24	319.558	2.554.158	8.828	672.446	
Claims	24	95.879	506.818	212	127.946	
Conventional Insurances						
Total asset	24	28.616.131	71.619.133	3.374.090	19.822.901	
Equity	24	428.492	1.933.133	100.000	513.342	
Total expenses	24	8.588.824	22.215.490	467.791	6.982.959	
Investment incomes	24	1.187.823	5.202.462	25.148	1.371.685	
Premiums/contribution	24	9.431.356	23.594.320	1.425.017	6.371.986	
Claims	24	6.118.784	16.716.399	426.742	4.838.261	
Variable	**During Covid-19**					**Growth**
	N	**Mean**	**Max**	**Min**	**Stdev**	
Sharia Insurances						
Total asset	24	1.438.699	9.046.944	74.531	2.367.694	**6,72**

Equity	24	128.972	552.500	5.000	139.882	**1,53**
Total expenses	24	217.518	1.748.654	11.858	467.718	**39,62**
Investment incomes	24	12.413	107.999	1.004	24.132	**-29,08**
Premiums/contribution	24	405.572	2.961.751	12.548	796.615	**26,92**
Claims	24	158.994	1.182.990	1.659	266.785	**65,83**
Conventional Insurances						
Total asset	24	31.686.005	67.396.709	5.087.106	20.534.624	**10,73**
Equity	24	429.051	1.933.133	100.000	513.789	**0,13**
Total expenses	24	9.909.399	21.998.922	484.041	7.385.218	**15,38**
Investment incomes	24	1.339.153	3.893.021	65.229	1.228.063	**12,74**
Premiums/contribution	24	11.818.134	35.550.689	1.544.002	8.150.309	**25,31**
Claims	24	7.806.047	22.494.667	413.555	6.505.990	**27,58**

Source: (Data processing)

From the statistical description table above, there were significant differences in the input-output variables in conditions before and during Covid-19, namely 2018-2021. During the observation period, conventional insurance has a greater amount than sharia insurance in all input and output variables. However, sharia and conventional insurance seem to have experienced a lot of growth on average during the Covid-19 period. There was an average growth in sharia insurance, except for the investment income variable, which experienced a significant decrease of around 29.08 percent. The biggest growth on average in sharia insurance is in the claims variable, which recorded an increase of 65.83 percent.

On the other hand, the input-output variables in conventional insurance all experience growth on average. the largest and smallest change can be seen in the claims output variable and the capital input variable, which are around 27.58 and 0.13 percent respectively. The difference in the growth of the two insurances is only a decrease in the output variable of investment income in sharia insurance, while conventional insurance does not.

Insurances Efficiency Score

The discussion will show the efficiency level of 12 sharia and conventional insurances, respectively in Indonesia before and during Covid-19, which is in the years 2018 until 2021 period using Data Envelopment Analysis (DEA). The results will be displayed through an efficiency score with a ranging from 0 to 1. A score of 1 describes the insurance's ability to optimally its inputs and outputs. However, if the efficiency score has not reached 1 or 100%, then the insurance is inefficient or has not managed its inputs and outputs optimally. The efficiency score after data processing using MaxDea 8 can be seen in the following table.

Table 4 Insurances Efficiency Score

DMU	CRS			
	2018	2019	2020	2021
SU_AL-AMIN	1,00	0,57	0,58	0,98
SU_AmanahJiwa	0,32	1,00	0,61	0,76
SU_Jasa_Mitra	1,00	0,91	0,70	0,90
SU_Takaful_Keluarga	0,36	0,37	0,38	0,68
SU_Capital_Life	0,42	0,70	0,18	0,19

SU_ASKI	0,40	0,46	0,53	0,79
SU_Prudential_Sharia	1,00	1,00	1,00	1,00
SU_Chubb_Syariah	0,51	0,73	0,45	0,40
SU_Sonwelis	0,29	0,25	0,27	0,23
SU_Takaful_Umum	0,44	0,38	0,33	0,56
SU_Jasindo_Syariah	0,53	0,61	0,37	0,40
SU_Askrida_Syariah	0,88	0,65	0,57	0,68
KU_Pridential_Life	0,87	1,00	0,83	0,99
KU_AIA	0,32	0,43	0,39	0,48
KU_AXA	0,95	0,65	0,61	0,77
KU_Manulife	0,54	0,62	1,00	0,78
KU_Allianz	0,54	0,69	0,67	0,69
KU_Simas_Jiwa	0,70	1,00	1,00	0,97
KU_Indolife	0,84	0,88	1,00	0,76
KU_Astra_Buana	0,75	0,78	0,71	0,82
KU_Tugu_Pratama	0,88	1,00	0,99	1,00
KU_Central_Asia	0,76	0,66	0,87	0,67
KU_Sinar-Mas	0,70	0,93	1,00	0,76
KU_MSIG	1,00	0,48	0,49	0,48
Mean	**0,67**	**0,70**	**0,65**	**0,70**

Based on Table 4, it can be seen that the insurance efficiency score in Indonesia fluctuates. The average overall insurance efficiency score for the 2018-2021 is 0.68. However, if measured annually, the standard shows an interesting trend. The average insurance efficiency score decreased significantly in 2020. Then, there was an increase in the average efficiency score in 2021. The findings of this study reveal that Covid-19 has had little effect on the conventional and sharia insurance. This study is in line with (Ikhwan & Rusydiana, 2022).

In sharia insurance companies, some companies obtain a maximum efficiency level of 1 or 100 percent for four years of observation which is Prudential Sharia insurance company. Meanwhile, none of the conventional insurance companies showed perfectly efficient results from 2018 to 2021. The lowest score shows in the sharia insurance company, which is Sonwelis insurance company in 2021 around 0.23 or 23 percent.

Efficiency Comparison of Conventional and Sharia Insurance

Furthermore, a comparison will be made on Insurance efficiency based on conventional and Sharia insurance classification. The comparison is made by looking at the average efficiency value of conventional and Sharia insurance each year during the four-year study period.

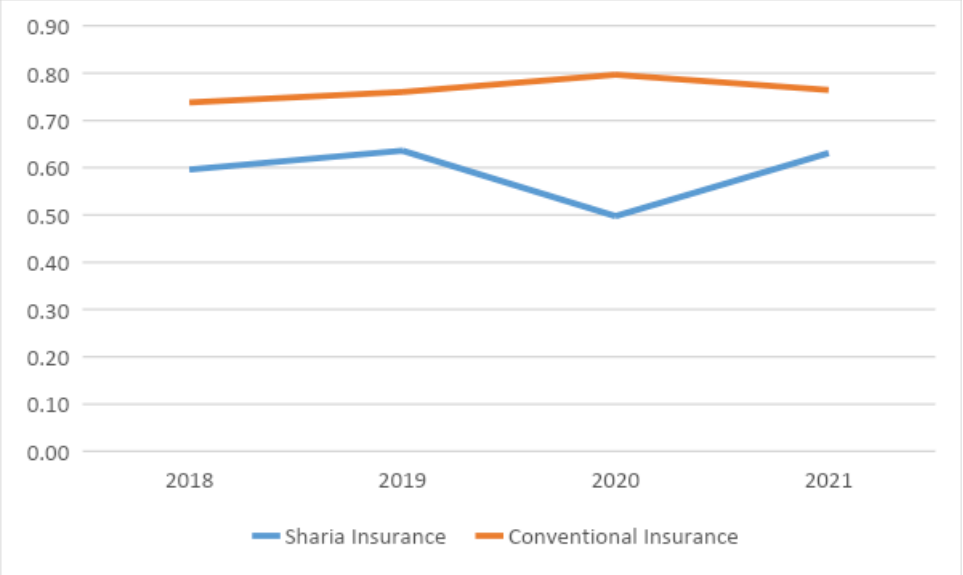

Figure 1. Efficiency Comparison of Conventional and Sharia Insurance

Figure 1 shows the average efficiency score of conventional insurance is higher than that of Islamic insurance. These analysis results are in line with (Khan & Noreen, 2014; Janjua & Akmal, 2015; Almulhim, 2019; Ade et al., 2018), where conventional insurance is considered more efficient than Islamic insurance. However, the results of several other studies contradict the results of this study (Rahman, 2013; Antonio et al., 2013; Ikhwan & Rusydiana, 2022). The efficiency value of sharia insurance experienced a significant decrease in 2020 of around 0.14 or 14 percent, while the opposite happened on conventional insurance, which had a slight increase in the average efficiency score of about 0.04 or 4 percent in 2020. Interestingly, a significant difference is seen in the average efficiency score of those insurances in the year of observation, where Islamic insurance has an average score of about 0.59 and conventional insurance has an average score of 0.76.

Tobit Regression

The data are then analyzed using the Tobit model to identify which factors influence the level of technical efficiency while utilizing intermediation procedures. Table 6 represents the overall findings of the Tobit estimation in this investigation:

Table 5 Tobit Regression Result

Variabel Dependent: DEA	Coefficient	P-value
Independent		
SIZE	0.3043	0.023
ROA	3.3724	0.068
ROE	0.2211	0.344
NPM	-0.9988	0.038
GPM	0.6105	0.121
GDP	-8.53	0.932
IHK	-0.4148	0.900
Dummy	-0.5447	0.899
_Cons	8.5330	0.927

Notes: **significant at 10% significance level, *significant at 5% significance level

Based on the results of the analysis in Table 5, it can be seen that several variables have positive and negative impacts. The results of this analysis indicate that many variables do not have a significant effect, while several variables show a significant effect. Thus, by using this Tobit model, we can see the factors that affect the value of insurance efficiency are internal and external. The SIZE variable, an internal factor of the

insurance company, shows a significant effect on insurance efficiency at 0.023 which is lower than 5% probability level and shows a positive effect. These results support the findings of the study from (Iskandar et al., 2020; Abbas et al., 2018; Indrarini et al., 2019; Wasseja & Mwenda, 2015; Biener et al., 2016; Yakob et al., 2014; Cummins & Xie, 2016). This result shows that the greater the number of company assets, the better the value of technical efficiency. The large size of the insurance company can be controlled better so that its performance is more efficient. Therefore, the larger the insurance company, the more efficient. These results do not support the findings of Rahman (2013) who states that in conventional and Islamic industries in Bangladesh, the smaller the company size, the higher the possibility for companies to be more efficient.

Furthermore, the ROA variable has a positive relation with a coefficient value of 3.3724. It shows a positive influence on insurance efficiency with a probability value is smaller than the 10% of confidence level, which is 0.068. It means that increasing ROA causes insurance's companies efficiency level to rise. This result contrasts with research from Abidin & Cabanda (2011), which states that ROA is negatively related and insignificant to the efficiency of insurance. Then, the ROE variable negatively affects the technical efficiency of the firm with probability value of 0.344 which is greater than the 10% confidence level, but the coefficient has a positive relation. This result is not by research states that ROE significantly affects on efficiency (Indrarini et al., 2019; Akhtar, 2018; Afza & Asghar, 2012).

This study also found that the NPM variable has a coefficient value of -0.9988, which indicates a negative relation but shows a significant effect on insurance efficiency because the probability value is 0.038 < 0.05. This finding is opposite to research from (Abidin & Cabanda, 2011). In addition, the GPM variable shows different things which do not affect efficiency because the probability value is 0.121 > 0.1.

External factors such as GDP and IHK show negative results and do not affect the efficiency score of insurance companies. Because the two variables show a probability value greater than the 10% confidence level. This result is in line with research by Chakraborty & Harper (2017), which express that GDP growth does not affect the efficiency change of insurance in Malmquist productivity analysis. In contrast, Karbhari et al. (2018) show macroeconomic variables such as GDP and inflation tend to increase with a country's economic growth in terms of technical and scale efficiency in Islamic insurance companies. Meanwhile, the dummy variable before and during Covid-19 also showed negative results and no effect.

The findings in this study indicate that the internal variable is more influenced rather than external variables and there is no significant change in insurance efficiency during the Covid-19 pandemic.

Table 6 Wilcoxon Samples Test

	N	Mean	Std. Deviation	Std. Error Mean	t Stat	P(T<=t) two-tail
Sharia Insurance						
Before Covid-19	24	2063929	3630548	741082.5	-3.371	0.0007
During Covid-19	24	2362167	3805312	776756.1		
Conventional Insurance						
Before Covid-19	24	5437140	3702435	7557565	-3.314	0.0009
During Covid-19	24	6298779	3794121	7744718		

From the table above, the results of the different tests on the Wilcoxon test sample of sharia insurance showed differences before and during Covid-19. It can be seen that the probability value is around 0.0007 < 0.05. So it can be concluded that there are significant differences in Islamic insurance in the period before and during Covid-19. The same thing happened to conventional insurance, where the probability value of 0.0009 was less than 0.05. This means that Ho is rejected and H1 is accepted, so there is a significant

difference between before and during Covid-19 in conventional insurance. To sum up, this result shows that both insurance (sharia and conventional) have quite different in input-output before and during Covid-19 in the average Islamic and conventional insurance.

Table 7 Independent Two-sample Mann-Whitney Test

Category	N	Mean	Std. Deviation	Std. Error Mean	t Stat	P(T<=t) two-tail
Sharia	24	2362167	3805312	776756.1	5.856	0.0000
Conventional	24	6.30e+07	3.79e+07	7744718		

From Table 7, it can be seen the statistically significant difference between the input-output of the sharia and conventional insurance was confirmed. There is a difference in the probability value for around 0.0000, which is less than 0.05. H1 accepted. To summarize, the finding of this study indicates a significant difference in input-output between the sharia and conventional insurance during the covid-19 period.

CONCLUSION

This study focuses to measured and compared the efficiency level of 24 Indonesian insurance (both conventional and Sharia insurance) in the 2018 to 2021 period. Then, Tobit Regression is used to find determinants of sharia and conventional efficiency of insurance through internal and external factors. The internal factors are by insurance's performance profitability, while the external factors are macroeconomic indicators. The result shows that the average efficiency score of Sharia and conventional insurance fluctuated throughout the study period. It can be seen in 2020, the average of efficiency score of those insurances declined to 0.65 from 0.70. However, this study reveals that the average conventional insurance company can adjust to these conditions faster than the average sharia insurance company. Prudential Sharia insurance is the only company with the highest efficiency value of 1 during the study period.

Further analysis is shown by Tobit regression. The internal variables such as SIZE, ROA and NPM had a significant positive impact on insurance efficiency. It means that Indonesian insurance will be more efficient in line with the increase in performance of SIZE, ROA NPM insurances. For the external variables, there is no effect on insurance companies efficiency score and the dummy variable in the form of the period before and during Covid-19.

Indonesian insurance companies (both sharia and conventional) need to be careful in taking action amid the Covid-19 pandemic. One thing can be to try to reduce some costs of insurance management and evaluate each policy. The limitation of this study lies in the use of samples. Therefore, for further research to get the best results, you can take both sharia and conventional insurance in Indonesia. Also, DEA method used to calculate is still limited to one way, namely CRS. For further research, it will be better to compare Technical Efficiency (TE), Allocative Efficiency (AE) and Overall Efficiency (OE).

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APPENDIX

```
Tobit regression                                  Number of obs     =         96
                                                  LR chi2(7)        =      25.53
                                                  Prob > chi2       =     0.0006
Log likelihood = -16.843054                       Pseudo R2         =     0.4312
```

y	Coef.	Std. Err.	t	P>|t|	[95% Conf.	Interval]
size	.0304269	.0131255	2.32	0.023	.0043469	.056507
roa	3.372398	1.82763	1.85	0.068	-.2590639	7.003859
roe	.2210748	.2323052	0.95	0.344	-.2405107	.6826603
npm	-.9987978	.475004	-2.10	0.038	-1.942621	-.0549749
gpm	.6104563	.3902918	1.56	0.121	-.1650452	1.385958
gdp	-8.53e-10	9.91e-09	-0.09	0.932	-2.05e-08	1.88e-08
ihk	-.4147866	3.286883	-0.13	0.900	-6.945753	6.11618
dummy	-.5447401	4.283285	-0.13	0.899	-9.055536	7.966056
_cons	8.533005	92.41762	0.09	0.927	-175.0988	192.1648
/sigma	.2431364	.0200215			.2033542	.2829186

```
  0  left-censored observations
 80     uncensored observations
 16 right-censored observations at y >= 1
```

Syaria Wilcoxon Test

```
. signrank sebelum= sesudah

Wilcoxon signed-rank test
```

sign	obs	sum ranks	expected
positive	6	32	150
negative	18	268	150
zero	0	0	0
all	24	300	300

```
unadjusted variance      1225.00
adjustment for ties         0.00
adjustment for zeros        0.00
                        ---------
adjusted variance        1225.00

Ho: sebelum = sesudah
                z =   -3.371
    Prob > |z| =    0.0007
```

Conventional Wilcoxon Test

```
. signrank sebelum= sesudah

Wilcoxon signed-rank test

      sign |      obs    sum ranks    expected
-----------+---------------------------------
  positive |        3           34         150
  negative |       21          266         150
      zero |        0            0           0
-----------+---------------------------------
       all |       24          300         300

unadjusted variance     1225.00
adjustment for ties        0.00
adjustment for zeros       0.00
                       ---------
adjusted variance       1225.00

Ho: sebelum = sesudah
            z =  -3.314
    Prob > |z| =   0.0009
```

Two –sample Man-whitney Test