

Does the Covid-19 Have an Impact on the Insurance Industry? A Non-Parametric Approach to Takaful and Conventional Insurance in Indonesia

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This study aims to see the efficiency level of insurance companies, especially general insurances in Indonesia, both Islamic insurance (known as takaful) and conventional insurance using nonparametric approach. The study period of this study was five years from 2016 to 2020, especially highlighting the year of 2020, when the COVID-19 pandemic spread in Indonesia, and whether it impacts the insurance companies. The findings of this study indicate that the average efficiency score of Sharia and conventional insurance in Indonesia from 2016 to 2020 has fluctuated differently, with conventional insurance decreasing and sharia insurance increasing following a dip. This may explain why COVID-19 has had little effect on the insurance business. COVID-19 has a detrimental impact on the efficiency of conventional insurance but does not affect Islamic insurance, according to the DEA research. Additionally, this study classifies the improvement potential for each input and output variable.

Keywords: Insurance industry; Indonesia; Covid; Nonparametric; Takaful

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INTRODUCTION

World Health Organization (WHO) has declared the COVID-19 as a global pandemic. The number of cases exposed to COVID-19 has reached more than 245 million, with a death toll of more than 4 million (World Health Organization, 2021). The spread of the COVID-19 virus is rapidly compared to previous pandemics. It has resulted in lockdowns, travels bans, bans on public gatherings, the closure of several businesses, and the loss of many jobs (Babuna, et al., 2020). (Spurred by economic inactivity, the financial intermediation activity deteriorated due to intense pressures, as reflected by a -2.41% (YoY) credit contraction, accompanied by similar -18.23% (YoY) and -3.99% (YoY) declines of disbursed financing and commercial insurance premiums respectively (OJK, 2020).

The insurance sector is part of the financial system, which is very important for the economic growth of a country. (Adams, Andersson, Andersson, & Lindmark, 2009). The increase in cases exposed to covid-19, which is expeditious compared to recovery resulting in a financial weakness in the insurance industry (Babuna, et al., 2020). In the short term, Covid-19 will significantly negatively impact the insurance market due to limited marketing and declining demand for household insurance (Wang, Zhang, Wang, & Fu, 2020). In addition, the Covid-19 pandemic has also caused unemployment, where 1.62 million people became unemployed due to the COVID-19 pandemic in Indonesia in February 2021 (Badan Pusat Statistik, 2021). The increasing number of unemployed causes employees to lose health insurance provided by the company (Sercy, et al., 2021).

Insurance is a financial instrument that mitigates risk, either a threat to the business or a chance to live. 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. (Setiawan, 2013). Insurance positively contributes to economic life as a financial intermediary and long-term investment (Cristea, Marcu, & Cârstina, 2014).

Pandemic conditions can lead to various problems that can trigger financial distress and inefficiency, including insurance sectors. The assessment of insurances efficiency will become important as efficiency reflects units' performance and is considered a concerning factor for stakeholders in formulating rational strategic decisions to reduce the risk

level. The efficiency of the insurances refers to the insurer's ability to produce a given set of outputs via inputs (Diacon et al., 2002). According to Otoritas Jasa Keuangan (OJK), there are three types of Indonesian insurance: general insurance, life insurance, and reinsurance companies. Per 31 December 2015, there were 132 insurances company registered in OJK, with the details of 76 companies of general insurance, 50 companies of life insurance, and six reinsurance companies.

This study aims to see the efficiency level of insurance companies, especially general insurances in Indonesia, both Islamic insurance (known as takaful) and conventional insurance. The study period of this study was five years from 2016 to 2020, especially highlighting the year of 2020, when the COVID-19 pandemic spread in Indonesia, and whether it impacts the insurance companies.

LITERATURE REVIEW

Experts in their fields have widely discussed insurance and economic growth, and it can be concluded that insurance and economic growth have a direct causal relationship. At the same time, what affects the development of insurance is the economic development of the country. In addition to the state's level of development and involvement in the economy, cultural and religious traditions also have a significant influence and role in developing insurance (Cristea, Marcu, & Cârstina, 2014).

The Gulf Cooperation Council (GCC) countries have recorded significant growth over time in the insurance industry. Where there is economic growth, an increasing population is aware of the insurance needs of the area. (Alshammari, Alhabshi, & Saiti, 2018).

In carrying out economic activities, Muslims must be aware of the importance of applying Islamic principles and insurance practices. The first Islamic insurance company (better known as takaful now) was established in 1994 (Nugraheni & Muhammad, 2019). The main difference between conventional insurance and takaful in the treatment of investment funds. Conventional insurance companies invest in interest-based businesses while takaful uses a profit and loss sharing paradigm so that finances and investments must be following Islamic principles (Karbhari, Muye, Hasan, & El Nahass, 2018). In addition, takaful was also founded on the principles of mutual assistance, mutual security, and responsibility, and mutual protection and guarantee, included in the concept of tabarru' (donations) (Adawiyah & Scott, 2008).

Over the past two years, the COVID-19 pandemic has affected financial institutions, including insurance. However, in this current sustainable era, increasing efficiency is one of the goals to be achieved by the institutions. Many studies have been highlighted the level of efficiency of financial institutions, where efficiency is used as an indicator to measure and evaluate bank performance. According to KBBI, efficiency is the accuracy of the way (business, work) in carrying out something (not wasting time, effort, and costs). In management theory, organizational performance is

judged by how well an organization can minimize costs and create maximum profits. The Efficiency concept comes from the microeconomic concept, namely the producer theory. Producer theory tries to maximize profits or reduce costs from the manufacturer's perspective. In the producer theory, a production frontier curve describes the relationship between input and output of the production process (Ascarya and Yumanita 2007). The Production Frontier Curve is described as follows.

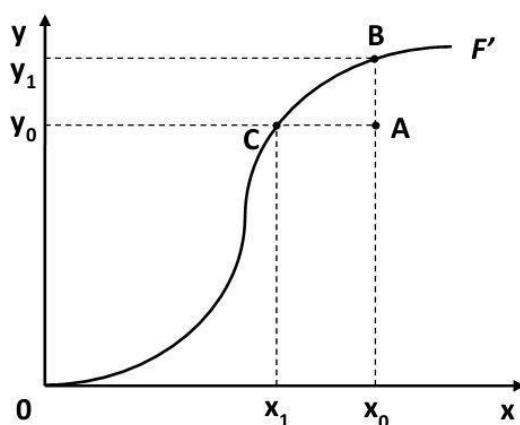


Figure 1. Production Frontier Curve

There are two types of efficiency, namely economic efficiency and technical efficiency. Economic efficiency has a macroeconomic picture, while technical efficiency has a microeconomic picture. Technical efficiency measurements are used to measure operational relationships in the process of user inputs into output. The DEA Term refers more to the definition of technical efficiency, namely the relationship between input and output in a business unit (Rusydiana 2013).

RESEARCH METHODOLOGY

This study uses a non-parametric quantitative approach, Data Envelopment Analysis (DEA). DEA was developed by Charnes, Cooper, & Rhodes (1978), then Banker, Charnes, & Cooper (1984) expanded the DEA, which serves to measure the efficiency and productivity of business units. The DEA method can provide information about the Decision-Making Unit (DMU) (in this context, the insurance industry in Indonesia), which does not use efficient inputs and causes inefficiencies, both in input and output variables. In addition, this method can provide information about the number of inputs and outputs that must be adjusted to achieve maximum efficiency.

In DEA, two primary models can be used: Charnes, Cooper & Rhodes (CCR) models and Banker, Charnes & Rhodes (BCR) Models. The CCR model is used with the assumption that changes in the value of output produced by DMU will always be equal to the proportion of adding a particular output value. This is in line with the Constant Return to Scale (CRS) assumption that the production function is fixed. Whereas the BCR model assumes changes in the output value generated by DMU are different for each proportion of change in the value of a particular input. This is in line with Variable Return to Scale (VRS), which means that each input does not necessarily produce the same output. VRS model assumes that the ratio between input and output increment is different, which means that the addition of input x times will not cause the output to increase by x times. It can be smaller or larger. In this study, insurance efficiency was estimated using VRS models.

This study focuses on the efficiency analysis of 77 insurance industries, namely takaful and conventional Indonesian insurance, in the 2016-2020 period. The input variables used in this study are total assets, equity, operating expenses, while the output variables used are claims, premiums, and investment. The input and output variable data used in this study were obtained from each insurance company's financial statements and annual

reports. As for the efficiency score, it should be around zero and one.

Statistical Descriptive

Before analyzing the efficiency score of Indonesian insurance, an overview of the data used in this study will be presented. Table 1 provides the descriptive statistics of the input and output variables of Indonesian insurances for the 2015 to 2020 period.

Table 1. Statistical Descriptive of Indonesian Insurances (in a million)

Variable	Max	Min	Mean
Input			
Total Asset	13.758.872	30.529	1.543.056
Operating Expenses	2.010.925	54	229.982
Claim Expenses	6.592.523	106	337.814
Output			
Premium/Contribution	12.113.575	214	764.568
Investment Income	527.758	260	43.084

Among the input variables, total assets are the variable with the most significant number. The average real asset is Rp 1.543.056 million, with the essential value of Rp 13.758.872 million and the smallest of Rp 30.529 million. Meanwhile, based on the output variable, the amount of premium/contribution has a more excellent average value than investment income, which is Rp 764.568 million compared to Rp 43.084. the most significant value of premium/contribution is Rp. 12.113.575 million, and the lowest is Rp 214 million.

This discussion will show the efficiency level of 70 Insurances in Indonesia (both Sharia and conventional) during the 2015-202 period using Data Envelopment Analysis (DEA). The results will be displayed through an efficiency score with a range of 0-1. A score of 1 describes the insurance's ability to manage their input and output optimally. However, if the efficiency score is further away from 1, the insurance is inefficient or has not managed its input and output optimally. The efficiency scores after data processing using MaxDea 8 can be seen in the following table:

RESULT AND DISCUSSION

Based on the result (see appendix), it can be seen that the efficiency scores of Insurances in Indonesia have fluctuated. The overall average of Insurances efficiency scores in the 2015-2020 period is 0.65. However, if it is measured annually, the standards show an exciting trend. The scores of Insurances efficiency experienced a sharp decline from 2016 to 2018, increasing in 2019 and relatively stable until 2020. Sinarmas Insurance obtains the maximum efficiency level 1 during 6-years observation, while Sarana Lindung Upaya Insurance is the lowest with a score of 0.33. The result also shows that two insurances experienced an increasing trend from 2016 to 2018: Bosowa and Tokio Marine Insurance. However, there are also some insurances with a decreasing trend during 5 years study period: Jasa Tania, Mega, Mitra Pelindug, Chubb General, and AXA General Insurances.

Efficiency scores also can be classified into four groups based on their efficiency scale, namely Fully

Efficient (100%), Highly Efficient (80-99%), Medium Efficient (50-79%), and Low Efficient (less than 50%) (Rusydiana 2013). Of the total 350 DMU analyzed, there are only 34 DMUs reach a maximum efficiency value of 1, while the others 315 others did not achieve maximum efficiency with the details: 52 DMU's considered at highly efficient, 193 DMU's at medium efficiency, and 71 DMU's at low efficient

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 Islamic banking each year during the five-year study period.

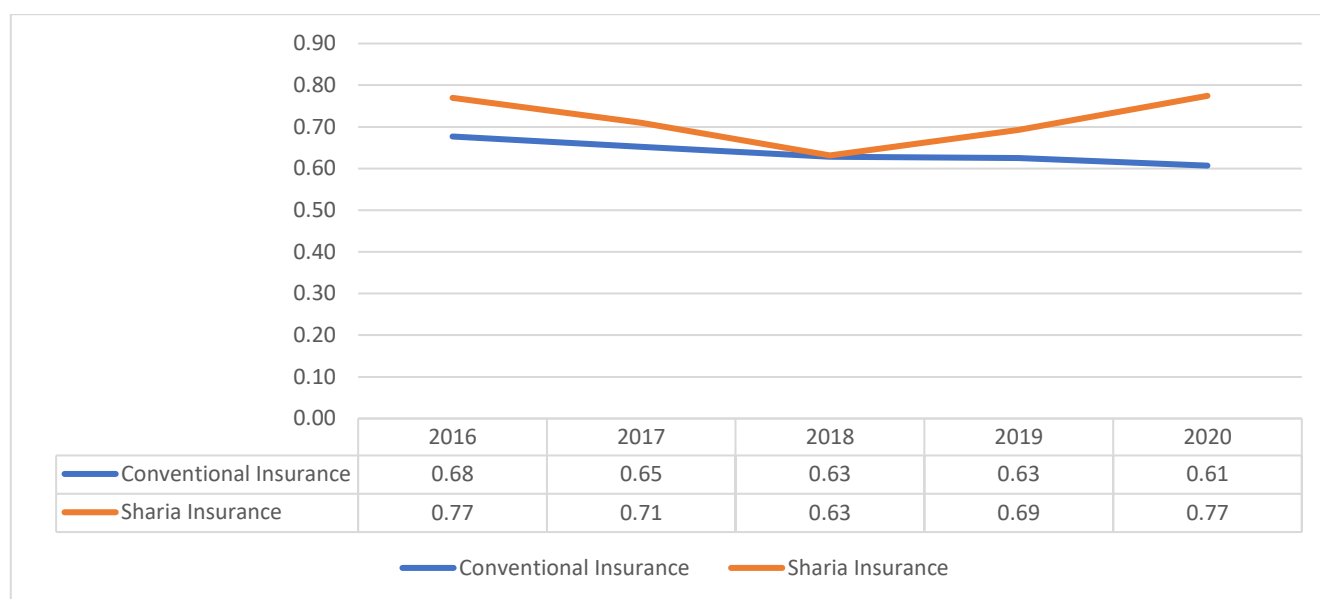


Figure 2. Efficiency Comparison of Conventional and Sharia Insurance

Figure 1 shows that the average efficiency scores of Sharia Insurance are higher than conventional ones. The result of this analysis is in line with [Rahman \(2013\)](#) and [Khan & Noreen \(2014\)](#), where sharia insurances are considered better than conventional insurances. Both Sharia and conventional insurances experienced a decline in average efficiency from 2016 to 2018. In 2018 both had identical average efficiency scores of 0.63. Then sharia insurance experienced an increasing trend from 2018 to 2020, while conventional insurance experienced a slight decrease until 2020. As of the beginning of the 2020 Covid-19 pandemic spread in Indonesia, it affects the decline in the average efficiency of conventional insurance from 0.63 to 0.61. Interestingly, sharia insurance experienced a significant increase from 2019 to 2020 with a score of 0.69 and 0.77, respectively.

Potential Improvement

Besides producing efficiency values, the DEA method can also make potential improvements or the level of improvement needed to achieve optimal efficiency values. So it can be known which variables need to be optimized. Analysis of potential improvement is examined using the last year of observation and is carried out separately from previous years to describe the real value that must be achieved. This analysis compares the projection value to the actual value or current data available. The results of the measurement of potential improvement can be seen in the following graph

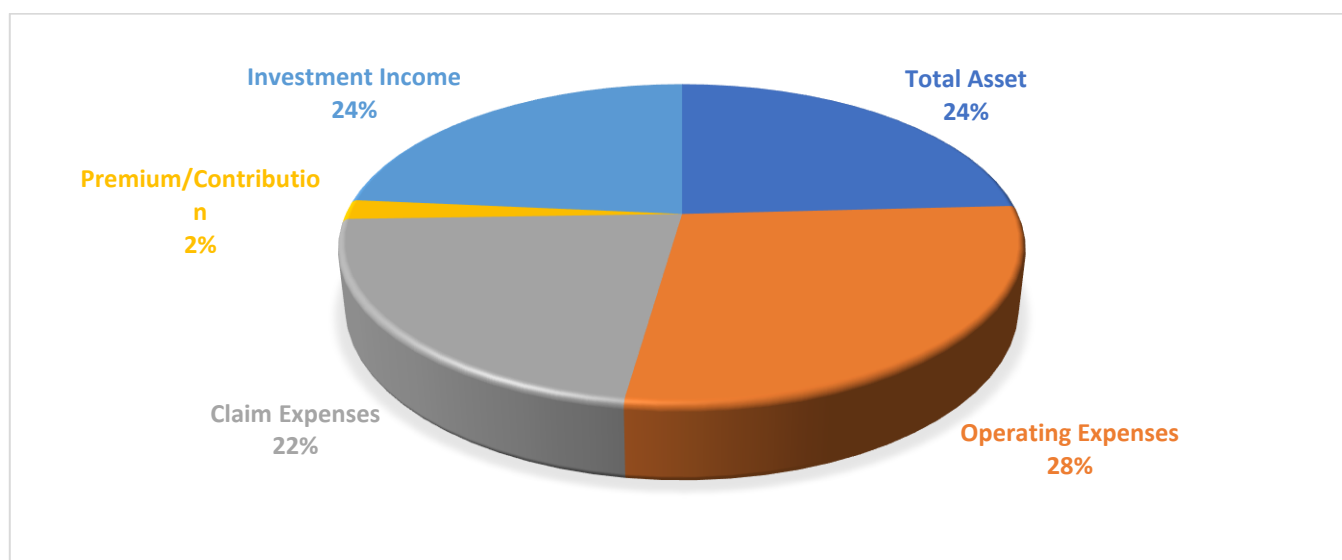


Figure 3. Potential Improvement Analysis

Based on the potential improvement analysis, it can be seen that the leading cause of Insurances inefficiency is operating expenses which are not optimum at 28%. This means that, in general, insurances need to minimize the operating costs by 28% from the existing budget. The result of the potential analysis also shows that besides the premium/contribution variable, other variables require optimization, which is not significantly different

Discussion

The findings of this study reveal that COVID-19 has had little effect on the insurance business, both conventional and sharia insurance. This demonstrates that insurance institutions' efficiency is unaffected by external circumstances like the COVID-19 epidemic, which significantly impacted bank and non-bank financial institutions. The efficiency value of conventional insurance, which had previously shown a downward trend, continued to show a slight decline. In contrast, the efficiency value of sharia insurance, which has also demonstrated a downward trend in 2018 but has since increased significantly, continues to show a significant increase. Several previous studies have found that the efficiency level of Islamic insurance in different countries is different. Many of them follow the results of this study, where Islamic insurance is more efficient than conventional insurance.

In 2018, takaful insurers were inefficient (Karbhari et al., 2018), implying management and operational indifference: non-executive directors, audit committees, or product diversity (Islam et al., 2013). While CEO/chair duality, the board size, organizational age, regulatory jurisdiction, and company size correlate positively with technical efficiency, non-executive directors, Shariah boards, product diversity, and institutional ownership correlate positively with scale efficiency. Meanwhile, in other countries, particularly those in the MENA (the Middle East and North Africa) area, both ownership structure and CEO/chair duality considerably diminish technical efficiency, with board size negatively correlated with scale efficiency. Within the ASEAN area, only the CEO/chair duality has a statistically significant relationship with technological efficiency, with audit committees and SSB size having a positive correlation with scale efficiency.

Islamic insurance is considered to be ineffective in other nations, such as Pakistan. Takaful enterprises are technically inefficient, and this inefficiency is a result of their scale, with some research concluding that the

scale of operation of takaful operators in Pakistan is not well selected. Additionally, it is highlighted that takaful enterprises operate with a rising return to scale, implying that there is still room for takaful operators to expand output and achieve the ideal size of operation. Thus, takaful enterprises in Pakistan should conduct a review of their scale of operation; this will enable operators to achieve their optimal size of operation while also increasing their pure technical efficiency (Taib et al., 2018). Takaful enterprises are more efficient than traditional insurance firms in terms of production. The Malmquist productivity index indicates a noticeable increase in scale efficiency. However, technology makes a negligible contribution to total productivity improvement (Khan & Noreen, 2014).

The effectiveness of sharia insurance in Gulf Cooperation Council (GCC) nations has been studied, and the findings are consistent with this study. Insurance has grown significantly in the GCC nations over time. Its expansion is a product of the region's general economic growth, population growth, increased awareness of the importance of insurance, and a favorable regulatory environment. This industry has grown significantly in terms of premiums/contributions, insurance penetration, and density. Despite these good headline figures, the insurance industry's profitability remains low in the GCC nations, falling short of expectations based on projections and experiences in other countries (Alshammari et al., 2019).

Another research performed in 2014 on the subject in GCC nations discovered that the Takaful insurance sector in the GCC is highly technological and highly efficient on a purely technical level. It is, however, somewhat cost-effective, and there is considerable room for development. UAE and Qatar rank first in terms of technological efficiency, whereas Saudi Arabia and the UAE rank highest in cost efficiency (Al-Amri, 2015).

Relevant to research conducted in Saudi Arabia, Takaful insurance is more efficient than cooperative insurance. However, suitable insurance systems require improved resource allocation, as some Takaful insurance businesses have resource surpluses while others have resource shortages (Benyoussef & Hemrit, 2019). There are several dimensions or measures (governmental support, regulatory compliance, strategic investment in human capital, professional development, and competitiveness) that, when properly implemented by the Takaful industries in Saudi Arabia, have the potential to significantly improve the sustainable efficiency of

motor Takaful diversification for the benefit of the country's less privileged inhabitants (Hassan & Amuda, 2019). Managers and regulators should utilize Takaful/Shari'ah goods based on the Islamic values of universal cooperation and solidarity (Almulhim, 2019).

According to research done in Malaysia, conventional insurance firms operated more efficiently in 2011 than takaful businesses. Takaful and conventional insurance firms should optimize input allocation and service quality, as average scale efficiency is more significant than average overall and technical efficiency. Takaful must also be increasingly cognizant of external factor costs as the efficiency scale declines (Antonio et al., 2013). Takaful operators in Malaysia, on average, are inefficient in allocating resources, although family Takaful is more cost-effective than general takaful. To be precise, corporate governance issues do affect cost efficiency. Still, there is no evidence that firm-specific factors affect cost efficiency or technical efficiency for Takaful operators (Lee et al., 2019). The discrepancies in risk and investment management efficiency rankings are probably related to operational variances between traditional insurers and takaful operators. Takaful operators handle risks more efficiently than conventional insurers (Yakob et al., 2014).

CONCLUSION

The findings of this study indicate that the average efficiency score of Sharia and conventional insurance in Indonesia from 2016 to 2020 has fluctuated differently, with conventional insurance decreasing and sharia insurance increasing following a dip. In 2020, sharia insurance's average efficiency score climbed to 0.77 from 0.69 in 2019. Meanwhile, traditional insurance's score declined to 0.61 from 0.63 earlier. This may explain why COVID-19 has had little effect on the insurance business. COVID-19 has a detrimental impact on the efficiency of conventional insurance but does not affect Islamic insurance, according to the DEA research.

Additionally, this study classifies the improvement potential for each input and output variable. The analysis reveals that insurance in Indonesia needs to improve almost every variable except premium/contribution to achieve optimal efficiency values, while the primary source of inefficiency in the most comprehensive insurance is an inefficient input variable, namely operating expenses that are not optimal; thus, insurance needs to reduce operating expenses by 28% to achieve optimal performance.

Recommendations to practitioners include the need to enhance the quality of human resources in insurance and develop new insurance products to give clients more diversified options and achieve higher efficiency performance. Academics are urged to continue updating insurance efficiency information and statistics, particularly in 2021, since the pandemic has not ended. More studies may provide ideas to increase efficiency performance, with varied updates depending on the conditions. Recommendations to regulators include the importance of enhancing the overall quality of insurance, particularly its efficiency. In future studies, it is also necessary to measure the level of productivity of the insurance industry in Indonesia in relation to the Covid-19 pandemic conditions, for example by using the Malmquist index method (Maliha, 2020; Hamidi & Rusydiana, 2019; Rahayu & Devi, 2023; Uula, 2022).

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APPENDIX

DMU	2016	2017	2018	2019	2020	DMU	2016	2017	2018	2019	2020
KU_ACA_	1	1	0,71	0,59	0,73	KU_MSIG	0,67	0,79	0,55	0,83	0,79
KU_ADIRA_DINAMIKA	0,92	0,76	0,67	0,69	0,59	KU_MULTI_ARTHA_GUNA	0,97	0,75	0,55	0,61	0,61
KU_AIG_INS	0,57	0,55	0,72	0,51	0,51	KU_PAN_PACIFIK	0,79	0,67	0,91	0,53	0,47
KU_ALLIANZ_UTAMA	0,53	0,46	0,55	0,56	0,55	KU_PURNA_ARTANUGRAHA	0,79	0,52	0,59	0,59	0,47
KU_ARTHAGRAHA	0,65	0,55	0,54	0,43	0,49	KU_QBE	0,52	0,56	0,48	0,52	0,48
KU_ASEI	0,43	0,30	0,33	0,44	0,41	KU_RAKSA_PRATIKARA	0,52	0,51	0,51	0,55	0,53
KU_AVRIST	0,76	0,70	0,71	0,58	0,52	KU_RAMA_SATRIA	0,22	0,18	0,32	0,40	0,46
KU_AXA_INDO	0,58	0,53	0,46	0,42	0,52	KU_RAMAYANA	0,51	0,55	0,53	0,52	0,60
KU_BCA_UMUM	0,71	0,68	0,64	0,64	0,59	KU_RELIANCE	0,58	0,63	0,65	0,78	0,70
KU_BERDIKARI	0,45	0,31	0,26	0,44	0,33	KU_SAMSUNG_TUGU	0,57	0,52	0,72	0,58	0,63
KU_BINAGRIYA_UPAKARA	0,70	0,71	0,83	0,82	0,76	KU_SARANA_LINDUNG_UPAYA	0,25	0,18	0,23	0,39	0,45
KU_BINTANG	0,63	0,77	0,50	0,51	0,69	KU_SIMAS_NET	0,87	0,70	0,58	1	0,97
KU_BOSOWA	0,45	0,45	0,51	0,56	0,58	KU_SINAR_MAS	1	1	1	1	1
KU_BUANA_INDEPENDENT	0,63	0,68	0,68	0,56	0,45	KU_SOMPO	0,80	0,74	0,83	0,77	0,61
KU BUMIDA	0,49	0,53	0,49	0,48	0,52	KU_STACO	0,70	0,67	0,43	0,57	1,00
KU_CAKRAWALA_PROTEKSI	1	1	1	0,86	1	KU_SUMIT_OTO	0,87	0,93	0,81	0,91	1,00
KU_CHINA_TAIPING	1,00	0,90	0,84	0,80	0,81	KU_TOKIO_MARINE	0,55	0,56	0,66	0,79	0,80
KU_CHUBB_GENERAL	0,70	0,49	0,43	0,43	0,35	KU_TRI_PAKARTA	0,44	0,54	0,54	0,48	0,60
KU_DAYIN_MITRA	0,82	1	1	0,88	1	KU_TUGU_KRESNA_PRATAMA	0,47	0,48	0,76	0,54	0,44
KU_EKA_LLOYD	0,71	0,65	0,52	0,57	0,56	KU_TUGU_PRATAMA_INDO	1	0,99	1	1	0,89
KU_ETIQA	0,71	0,75	0,45	0,32	0,57	KU_WAHANA_TATA	0,57	0,66	0,58	0,64	0,66
KU_FPG_INDO	0,51	0,50	0,51	0,55	0,50	KU_ZURICH_INS	1	1	1	0,94	0,67
KU_HARTA_AMAN_PRATAMA	0,56	0,52	0,39	0,43	0,50	SU_SONWELIS_TAKAFUL	0,55	0,58	0,49	0,47	0,49
KU_INTRA_ASIA	0,75	0,71	0,77	0,97	0,55	SU_ALLIANZ	0,96	0,94	1	1	1
KU_JASA_RAHARJA_PUTERA	0,59	0,61	0,60	0,66	0,52	SU_AXA_GENERAL	1,00	1,00	0,96	0,85	0,83
KU_JASA_TANIA	0,56	0,55	0,47	0,40	0,34	SU BUMIDA	0,64	0,56	0,57	0,61	0,60
KU_JASINDO	0,86	0,78	0,86	0,81	0,76	SU_JASARAHARJA_PUTERA	0,70	0,72	0,46	0,80	1
KU_KOOKMIN_BEST_INS	0,81	0,69	0,50	0,63	0,56	SU_MEGA	0,70	0,72	0,46	0,80	1
KU_KRESNA_MITRA	0,93	1	0,99	0,66	0,36	SU_RELIANCE	1	0,89	0,80	0,88	0,80
KU_KSK_INS	0,43	0,50	0,51	0,61	0,50	SU_SINARMAS	1	0,85	0,74	0,74	1
KU_MALACCA_TRUST	0,73	0,77	0,66	0,63	0,53	SU_STACO	0,66	0,59	0,38	0,50	0,98
KU_MEGA	0,69	0,59	0,50	0,49	0,40	SU_TRI_PAKARTA	0,59	0,57	0,53	0,75	0,87
KU_MEGA_PRATAMA	0,60	0,75	0,52	0,38	0,36	SU_WAHANA_TATA	0,96	0,84	0,85	0,59	0,67
KU_MITRA_PELINDUNG	0,71	0,58	0,57	0,54	0,49	SU_TPI_SYARIAH	0,68	0,54	0,49	0,48	0,42
KU_MNC_GENERAL	0,74	0,71	0,86	0,86	0,87	SU_CHUBB_SYARIAH	0,56	0,42	0,47	0,55	0,41