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Efficiency Analysis of Private Insurance Firms Before and After The Application of BPJS Regulations

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***Abstract*—This study aims to examine the efficiency of Indonesian private health insurance following the application of Badan Penyelenggara Jaminan Sosial (BPJS), Indonesia's Social Insurance Administration Organization's regulations in 2014. This study compares the level of efficiency using data envelopment analysis (DEA) output orientation. Also, this study uses financial statements from 18 private insurance firms during the years 2009 to 2016. The results of this study show that, following the application of BJPS regulations, there have been no significant differences in firms' efficiency than before the application. In addition, we find that the efficiency of the joint venture health insurance companies decreased, while local health insurance efficiency increased during the observation period. This is because of a significant decline in investment returns for the joint venture health insurance companies in 2015. The results of this study are in accordance with the results of another study [16], where efficiency improvements only occur in small companies.**

Keywords—DEA, efficiency, universal insurance, comparative analysis

I. INTRODUCTION

Badan Penyelenggara Jaminan Sosial Kesehatan (BPJS Kesehatan) is a state-owned enterprise specially assigned by the Indonesian Government to provide health care insurance for all Indonesian citizens. Officially, BPJS started in early 2014 and definitely has had an impact on insurance companies. Inevitably, the mandatory government program will affect the profile of the insurance industry in Indonesia. At least, basic protection is no longer included in the cover offered by insurance companies.

The presence of a strong competitor will improve the company's performance [1]. To measure financial performance and company conditions, financial analysts can use ratio analysis [2].

Ratio analysis has weaknesses. Financial ratio analysis failed to be useful when there was more than one input and output; therefore, data envelopment analysis (DEA) is used as an alternative to calculate multiple input and output solutions [3].

Some of the earlier empirical studies of this competition gave different results from one another. A study was conducted on the relationship of competition efficiency, revealing that managers of companies with market power enjoyed a 'quiet-life' free from competition [4]. This lack of competition will result in less managerial effort leading to inefficiency. Strong competition has the potential to increase managerial pressure in reducing slackness and improving efficiency [5]. The study by Cummins, Rubio-Misas, Vencappa [6] stated that increased competition could make insurance companies change from being inefficient to efficient, hence, the company became healthier. Changes in the productivity environment had an impact on increasing the efficiency of insurance companies because the business environment became increasingly challenging [7].

In contrast, some studies said that competition had the potential to exacerbate information asymmetry in the insurance market which would lead to market failures [8]. According to Alhassan & Biekpe [4], competition lowered the efficiency level of insurance companies. Increasing the cost of obtaining new information would cause a decrease in the efficiency level. Whereas in a low competition market the market would gain benefits, such as low risk on insurance portfolios, which would lead to the decreased cost of screening and monitoring.

In Indonesia, insurance companies are divided into two ownerships, foreign and local. Regulation state that there is a limit on foreign ownership levels, in that the Indonesian shareholder should own at least 20% of the total joint venture capital of the insurance business, while foreign investors may own up to 80% of the ownership [8].

The efficiency levels of joint venture companies and local companies are different. Local insurance companies have higher technical efficiency than foreign companies [9]. Efficiency in local insurance was higher than the efficiency of foreign insurance on the life insurance market in China [10]. This was because foreign insurance in China was first introduced in the year 2000 and there has not been enough time to get the return from initial issued investment.

In addition, the cause of the different levels of efficiency between foreign and local companies is because foreign insurance companies can directly provide management techniques, skills, training procedures, and newer and better technology in the domestic or local market. Indirectly, this foreign insurance also improves the efficiency of local firms by stimulating competition in the domestic [9].

Using this information, there are differing opinions as to whether higher competition can improve insurance

performance or have an adverse effect. In association with this research, the presence of BPJS can help to improve financial performance. Therefore, it is necessary to analyze the performance of insurance companies before and after the entry of BPJS came into effect.

II. LITERATURE REVIEW

A. Insurance

According to Article 1, Paragraph 1 of the Law of the Republic of Indonesia No. 2 in 1992 (akademiasuransi.org), the insurance is an agreement between the insurer and the insured where the bearer will receive the premium to provide reimbursement for damages and losses suffered by the insured from an uncertain event.

B. Performance and performance measurement

Performance refers to a result of measurable activities, processes, products, services, systems, and organizations. Good performance indicates that the results can be accepted. Conversely, poor performance signifies the results are unacceptable (ISO 9000 2015). Performance is also defined as the potential for a successful implementation of action to achieve future goals and targets [11].

The performance management process is a process by which a company regulates its performance in line with its strategy, objectives, and functions [12]. The purpose of the process is to provide an integrated control system, whereby the company's strategies and functions are deployed to all processes, activities, tasks, and business feedback gained through a performance measurement system to help management make decisions. The main purpose is to improve the company's performance. Measuring means converting a complex reality into a sequence of limited symbols that can be communicated and more or less reproducible under the same circumstances [11].The objectives of the measurement are divided into four categories, (1) directing the business, (2) anticipating the possibility of achieving the target, (3) as material to improve the performance measurement system in order to maximize, and (4) as redefinition of the target on a sustainable basis [11].

C. Financial performance

Financial measures have been used widely, for example, to evaluate financial performance. Generally, there are three main reasons for measuring performance, (1) the importance of the value of money in all evaluation processes, (2) focusing on economics, efficiency, and effectiveness, (3) focusing on management rather than administrative staff [13]. According to Fahmi [2], to measure financial performance and company condition, financial analysts can use ratio analysis, which is a comparison of figures contained in the financial statements.

However, the financial ratios have some weaknesses, such as (1) financial ratios are a relative measure because financial ratios are not absolute criteria of a company, (2) financial ratios can only be used as an early warning and not as a final conclusion, (3) any financial constellation data is sourced from the financial statements, so the accuracy level is not high, (4) many financial ratios are artificial, meaning that each party has different interpretations on the ratio results. To overcome the weakness of these financial ratios, another approach was needed to look at the problem more generally [2]. Therefore, in this study, the authors use two performance measurements. In addition to using the traditional tools such as ratio, they use modern performance measures such as the efficiency measurement.

Measurement of the company's performance in terms of efficiency has been made in the past by Hu Xiaoling, et al. [14], who examined the value of efficiency in foreign and domestic life insurance providers in China, and explored the relationship within the ownership structure and the efficiency of insurers. He also considered other company attributes. The result was that the average value of efficiency for all insurance companies had cycles. The efficiency scale reached its peak in 1999 and 2000 and then gradually decreased until 2004, after which it slowly increased again. Using the Tobit Regression model, results showed that insurers' market power, distribution channels, and ownership structure may be associated with efficiency.

Insurance companies in Ghana were evaluated [15] using a two-stage procedure to see if insurance companies were cost efficient and also to see what are the determinants of efficiency. The result was that on the first stage, it was found that efficiency scores for life insurance were higher than for non-life insurance. In the second stage, it was found that market share, firm size, and the ratio of equity to total invested assets had an important role in determining the efficiency of insurance companies.

D. Efficiency measure method

There were four major methods for efficiency measure [16]:

- Least-squares econometric production models;
- Total factor productivity indices;
- Data envelopment analysis (DEA);
- Stochastic frontier.

DEA and stochastic frontier methods are the most widely used when there are many companies being measured at the same time, as it provides a measure of relative efficiency among these firms. In addition, DEA and the stochastic frontier method can be used to measure technical change and efficiency change if the data panel is available.

DEA's popularity in measuring relative efficiency is because of several differentiating features that make it an attractive measuring tool for use in performance analysis [17]. First, DEA is a methodology directed at frontiers rather than at central tendencies [18]. Second, DEA as a non-parametric technique does not need to make assumptions about residual distributions [19]. Therefore, the author chose to use DEA as a measure of efficiency.

III. RESEARCH METHODOLOGY

A. Hypothesis

Increased competition between companies will make the company more driven to improve its services and improve efficiency [6]. This study, supported by Eling & Schaper [7],

identified the impact of environmental changes on productivity and efficiency on European life insurance. The results suggested that from 2002 to 2013 there was increased efficiency in European life insurance companies due to increasingly challenging business conditions.

Increased competition can make insurance companies change from inefficient to efficient, hence the company grows healthier. But the effects of this competition can only be felt by companies that are still weak, and it is hard for large or healthy companies to feel the effects [6].

Poorer product selection in competitive insurance markets makes monopolists improvise their [20]. Therefore, a negative relationship between competition and efficiency will show the existence of asymmetry information on the insurance market.

Thus, this study would like to examine the impact of the enactment of government policies set forth in the BPJS law, which is assumed to increase competition in the health insurance industry, on the financial performance of private insurance companies as measured by efficiency measures. The hypotheses tested in this study are

Ho1: Insurance companies do not experience a significant change in the value of efficiency after the implementation of government policy.

In addition, in Indonesia, insurance companies are divided into two ownerships, foreign and local [40]. The efficiency levels of foreign and local companies differ due to different levels of competition after the entry of foreign companies [9, 10]. This research was to find the difference of efficiency performance of local and foreign insurance companies.

Ho2: There is no significant difference between the efficiency of local health insurance companies and joint ventures.

B. Population and sample

The data used in this study are quantitative data that are the annual financial statements from 2009 to 2016. The population in this study is private Indonesian insurance companies that provide health and life insurance services. There were fifty companies as of December 31, 2015 (ojk.go.id).

TABLE I. SAMPLE FIRMS

No.	Foreign Insurers	No.	Domestic Insurers
1.	Allianz	1.	Tugumandiri
2.	Sunlife	2.	Wanaartha
3.	Avrist	3.	Sequis
4.	Prudential	4.	Panin
5.	AIA	5.	CAR
6.	Generali	6.	Equitylife
7.	Greateastern	7.	MNClife
8.	Commonlife	8.	Hanhwa
9.	Manulife		
10.	Astralife		

The sampling technique used in this research is purposive sampling. The criteria used in this sample are:

- Life insurance companies listed in ojk.go.id
- Insurance companies have a balance sheet and financial statements listed on their official website, respectively.
- Insurance companies provide financial statements from 2009 to 2016.

Based on the criteria, there are 18 companies eligible to be used to be sampled in this study.

C. Concentration ratio

The calculation of the concentration ratio in this study uses four companies that have the greatest income in the year, then the results are compared with the total income of the insurance industry. After the BPJS, the total income of the four big companies will be compared to the total income of the health insurance industry coupled with the income of BPJS.

Concentration ratios (CRs) will provide information on the level of competition in the industry [21]. Low concentration will indicate increased competition among companies in the industry. So, it will be a comparison of the average CR value between before BPJS (2009–2012) and after the existence of BPJS (2015–2016).

D. Efficiency test

The first step to start the efficiency analysis will determine which Decision-Making Unit (DMU) will be used in this study. In this case, the DMU is a private life insurance company in Indonesia. This private insurance company must have a balance sheet and financial statements on the company's website.

The second step is the process of identifying variables that will be used in research. The variable used in this research is variable from the side of finance. There is general agreement in defining input variables in efficiency studies. The input variables are classified into two parts: labor input and capital input [22]. The labor input is classified into two parts, business services input and labor cost. Capital input is divided into two parts, capital and debt. Selection of input and output variables in this study is also based on the availability of data.

Input in this study is the amount of assets as capital input and also claims, and other expenses as labor input. Although there is general agreement in the input variables, the output in the study of the insurance industry is still debated [8]; therefore, the output used in this study is the premium income and investment returns. This is based on previous research [7], which uses premium as output. Since insurance companies also benefit from investment returns the authors also include investment returns as outputs, in line with research conducted by Alhassan & Biekpe [4].

The third step is calculation of relative efficiency by using the DEA method. Similar input or output variables between DMUs will be used to see if the DMU used in this study is in a relative efficient position when compared to other DMUs. The closer to the one on this efficiency point indicates that the company is more efficient.

TABLE II. INPUT AND OUTPUT VARIABLES

No.	Input	No.	Output
1.	Aset	1.	Premium
2.	Claim expense	2.	Investment return
3.	Another expense		

Source: processed data

E. Wilcoxon test

The Wilcoxon signed-rank test is a non-parametric test used to measure significance on the differences between two groups of coupled but not abnormally distributed data. This test is an alternative to paired t-test when it does not meet the normality assumption (statistikian.com). This test is used to see whether there is a significant change in the efficiency of private insurance companies between before and after the presence of BPJS.

F. Mann Whitney U test

The Mann Whitney U test is a non-parametric test used to measure significance on mean differences between two independent groups when the data scale is ordinal or interval / ratio but not normally distributed (statistikian.com). This test is used to see if there is a significant difference between the efficiency results of local health insurance companies and joint ventures.

IV. RESULTS

Table III shows the average of life insurer's concentration ratio. The average CR value between before and after the existence of BPJS has decreased. This means that there is an increased competition in the industry after the implementation of BPJS regulations. The noticeable effect is seen by the number of individual customers and premiums that decreased by almost 50%, while the group or corporation customers decreased by about 30–40%. This is caused by companies that usually do not want to pay a double premium for their employees, namely for BPJS and for commercial insurance.

Table IV shows the average of efficiency score before and after the application of BPJS regulations. On 2009 data, the average value on the VRS is quite high at 0,982. In 2010, the value decreased to a VRS value of 0,970.

Since the SE in 2010 was greater than its VRS value, it can be said that DMU can improve its efficiency by reducing the scale of the company. As explained earlier, the decline in the number of efficient values is due to an increase in the amount of expenses and assets unequal to the increase in premium income and investment returns.

In 2011, the value of efficiency decreased from the previous year on value. Because the SE in 2014 is greater than its VRS value, it can be said that DMU can improve its efficiency by improving the operation of its company. As mentioned earlier, this decline in the number of efficient values is due to an increase in other expenses and a decrease in investment returns.

TABLE III. CONCENTRATION RATIO OF LIFE INSURERS INDUSTRY

Year	2009	2010	2011	2012	2013	Average
CR Before	0,466	0,432	0,437	0,451	0,428	0,443
Year	2015	2016				Average
CR After	0,404	0,371				0,388

TABLE IV. EFFICIENCY SCORE OF LIFE INSURANCE INDUSTRY

Efficiency	Year Before					Average
	2009	2010	2011	2012	2013	
CRS_TE	0,954	0,966	0,945	0,947	0,956	0,954
VRS_TE	0,982	0,970	0,959	0,959	0,983	0,971
Scale	0,971	0,996	0,986	0,988	0,973	0,983
Efficiency	Year After					Average
	2015	2016				
CRS_TE	0,911	0,932				0,922
VRS_TE	0,941	0,974				0,958
Scale	0,967	0,957				0,962

In 2012, the value of efficiency increased slightly from the previous year on CRS value. Because the SE in 2012 is greater than its VRS value, it can be said that DMU can improve its efficiency by reducing the scale of its company. CRS value also increased in 2013. As mentioned earlier, the increase in the number of efficient values is due to the decreasing amount of claims expense.

By 2015, the value of efficiency decreased from the previous year on the value of CRS, VRS, and SE. This decrease in the amount of efficient value occurs due to the decline in investment returns. For example, Manulife whose investment yields decreased to 88%. From Asosiasi Asuransi Jiwa Indonesia (AAJI) data it is also said that income from investment returns still decelerated 104,1% in quartal 4 in 2015.

By 2016, the value of efficiency increased from the previous year on the value of CRS and VRS. The increase in the number of efficient values is due to an improvement in investment returns. The AAJI data also says that revenues from investment returns improved from the previous year, as the company shifted its investment portfolio to a portfolio of minimal risks.

In addition to premium income from AAJI data, cnnindonesia.com shows that in 2016 health insurance premiums only increased 1.5% from the previous year. This is because the number of people who previously used private insurance switched to BPJS health. The transition occurs because when the obligation to follow the insurance is enforced, it will have an impact on increasing the sensitivity of consumers to the price [23].

Despite the slowing growth in health insurance premiums, private insurance companies still benefit from clients of companies that have joined to provide health insurance for their employees.

This happens because the clients of big companies will not lower their health protection standards. Because the level of protection provided by private health insurance is higher than the health BPJS that provides only basic protection. To find out whether this change is significant or not, considering the data used is the result of calculation of non-parametric method of DEA and condition of abnormal data, hence writer tested differences of efficiency value by using the Wilcoxon signed-rank test.

Table V shows the value of company efficiency has decreased. From before the BPJS (2009–2013) and after the application of BPJS (2015–2016). Wilcoxon test results found that changes in the efficiency value between before and after the existence of BPJS are not significant. It can be seen from the significance value greater than 5%. This decrease in efficiency is due to a substantial decrease in investment returns in 2015 compared to previous years,

affecting the value of efficiency. The decline in investment returns is common in joint venture companies.

TABLE V. WILCOXON SIGNED-RANK TEST

Efficiency Average	Before	After	Sig.
CRS_TE	0,954	0,922	0,180
VRS_TE	0,971	0,958	0,655
Scale	0,983	0,962	0,180

Tables VI and VII indicate that local insurance companies gain more benefit than joint venture insurance, as joint venture insurance indirectly improves the efficiency of local firms by stimulating competition in the domestic market. In addition, the decline in the efficiency of joint venture health insurance resulted from the decline in investment returns in 2015. However, this did not occur in local companies, so the efficiency of local companies increased compared to before the application of BPJS.

This is consistent with the findings of Cummins, Rubio-Misas, Vencappa [6] and Eling & Schaper [7]. As business conditions become more challenging, insurance companies will become more depressed, thus causing them to be more efficient. The effects of this competition can only be felt by companies that are still weak, as it is difficult for large or healthy companies to feel the effects [6]. Furthermore, to find out if there is any significant difference of efficiency value between foreign and domestic insurance companies, and considering the data used is the calculation of non-parametric method of DEA and the condition of abnormal data, the author did different tests of the average value of efficiency by using the Mann Whitney U test.

TABLE VI. EFFICIENCY MEASUREMENT OF JOINT VENTURE LIFE INSURERS

Efficiency	Year Before					Average
	2009	2010	2011	2012	2013	
CRS_TE	0,982	0,972	0,992	0,979	0,999	0,985
VRS_TE	0,997	0,994	0,999	1,000	1,000	0,998
Scale	0,985	0,978	0,993	0,979	0,999	0,987
Efficiency	Year After					Average
	2015	2016				
CRS_TE	0,940	0,970				0,955
VRS_TE	0,981	0,990				0,986
Scale	0,958	0,979				0,969

TABLE VII. EFFICIENCY MEASUREMENT OF DOMESTIC LIFE INSURERS

Efficiency	Year Before					Average
	2009	2010	2011	2012	2013	
CRS_TE	0,973	0,990	0,990	0,985	0,992	0,986
VRS_TE	1,000	0,991	0,995	0,987	1,000	0,995
Scale	0,973	1,000	0,994	0,998	0,992	0,991
Efficiency	Year After					Average
	2015	2016				
CRS_TE	0,993	0,998				0,996
VRS_TE	0,993	1,000				0,997
Scale	1,000	0,998				0,999

TABLE VIII. MANN WHITNEY U TEST

Efficiency Average	J.Venture	Domestic	Sig.
CRS_TE	0,976	0,990	0,103
VRS_TE	0,995	0,995	0,826
Scale	0,981	0,995	0,065

Table VIII shows that the results of the efficiency of domestic health insurance from 2009 to 2016 are higher than joint venture health insurance. However, the difference is not significant. In other words, both a joint venture company and a local company can be said to have relatively similar performance.

This agrees with the finding of Leverty, Lin & Zhou [9] and Chen, Powers & Qiu [10], where domestic insurance had a higher level of efficiency than foreign insurance but was insignificant. This difference in yield was due to the difference in market conditions, where in China the new foreign insurance had entered the market in the 2000s, so, domestic insurance was still more dominant than foreign insurance.

While in Indonesia, foreign insurance has been in place for a longer time. For example, Manulife entered Indonesia in 1989, Allianz in 1996, Prudential in 1995, Generali in 1994, and so forth. In addition, joint venture insurance in Indonesia has greater assets than domestic insurance. In 2015, the total assets of joint venture insurance amounted to Rp 134 trillion, while local insurance was only Rp 2.4 trillion (Indonesian insurance statistics 2015). This makes the market situation different from previous findings made in China, where local insurance companies had greater assets than foreign insurance.

V. SUMMARY AND CONCLUSION

This study aims to examine the efficiency performance of Indonesian private health insurance due to the application of BPJS regulation in 2014. The study compares the level of efficiency using DEA output oriented. This study uses financial statements from 18 private insurance firms from 2009 to 2016.

Results of this study show that there are no significant differences in firms' efficiency before and after the application of BPJS regulations. In addition, we find that the efficiency of the joint venture health insurance companies decreased, while local health insurance efficiency increased during the observation periods. This is due to a significant decline in investment returns of the joint venture health insurance companies in 2015. The results of this study are in accordance with the results of Cummins, Rubio-Misas, Vencappa [6], where the efficiency improvements only occur in small companies.

The results of this study have implications for insurance and government managers in policymaking. Competitive environment puts the health insurance industry under pressure to improve efficiency, but an overly competitive environment can reduce the number of companies or make companies hesitate to enter into the industry [7]. Therefore, managers and governments must create synergy between health

insurance companies and BPJS to prevent any adverse competition.

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