EFFICIENCY OF NON-LIFE INSURANCE IN INDONESIA

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ABSTRACT

It is a fact that financial institutions among Asian countries, especially Indonesia, have been dominated by commercial banks. In addition, an insurance market share is only 10 percent of the financial market. Yet, the insurance industry is an important partner for the banking industry. This function is to guarantee the risk of banks in distributing credit and supporting the national economy through the community's fund. This paper evaluates the relative efficiency of 23 Non Life Insurance companies in Indonesia, using Data Envelopment Analysis (DEA) model. DEA is a management evaluation tool that assists in identifying the most efficient and inefficient decision-making units (DMUs) in the best practice frontier. Empirical results show that bigger insurance companies are found to be more efficient than smaller firms. Moreover, companies with captive market and the company's group with non-captive market have relatively the same result. These findings are new empirical contributions to efficiency literature of the insurance industry. The paper also provides policy implications for the Indonesian insurance sector.

Key words: Non life Insurance, Data Envelopment Analysis, Technical Efficiency.

INTRODUCTION

Although financial institutions among Asian countries, especially in Indonesia, have been dominated by commercial banks and insurance market share is only 10 percent of the financial market, the insurance industry is an important partner for the banking industry. The industry's function is guaranteeing the risk of banking in distributing credit and also supporting the national economy through its function as the collector of the community's fund as well as protecting the business world from risks.

The insurance company must also be able to compete in the global market with various competitors like the fellow insurance company and bank as the partner but at the same time as the competitor. The assessment concerning the performance of the insurance company in Indonesia is, often, discussed and presented, especially using the calcula-

tion of the level of solvency such as: Risk Based Capital (RBC) and financial ratios.

The insurance industry uses various financial ratios but these measures are insuffient for performance evaluation, though, they produced important information. For the insurance companies, the use of a simple profit analysis could be misleading (Oral and Yolalan, 1990 and Berger and Humphrey, 1992). Consequently, scholars adopted the parametric and non-parametric approaches to evaluate efficiency and productivity. Furthermore, Mahadevan (2003) divided parametric and non parametric approaches into two parts: frontier and non frontier. Several results of the two approaches showed positive relations between the performance of finance and efficiency (Li et. al, 2001; Karim, 2001; Barr, et. al., 2002, Abidin and Cabanda 2006).

To date, there has been no study done to

examine the insurance industry in Indonesia using two models: DEA and the linkage model using an econometric Tobit model. Moreover, a thoughtful understanding of the performance of the insurance company's absolute efficiency is needed with the increasingly competitive insurance industry. Consequently, this study is the first attempt to measure insurance performance both in theory and practice, using the combined DEA and the efficiency linkage with the financial performance.

The primary aim of this study is to examine the efficiency performance of non life insurance companies in Indonesia over the period 2005-2007. This study may provide more valuable information for the use of policy formulation and improvement of insurance's management performance.

THEORITICAL FRAMEWORK
Evaluation of efficiency and productivity using DEA has become a popular method by many scholars around the world. However the banking industry has been the most frequently evaluated and measured sector compared to the insurance industry. As to date, from the authors' knowledge, there is no study that has evaluated the insurance industry in Indonesia.

Abidin and Cabanda (2006) assessed the efficiency of bank performance in Indonesia during pre and post financial crisis using DEA and financial ratios. There was robust and consistency result between efficiency performance (DEA) and financial ratio. Specifically, they found that foreign banks were efficient than domestic banks and bigger banks tend to be more eficienct than small ones.

Using a cross-country analysis, Vencapa et. al., (2009) used stochastic frontier analysis to measure and decompose productivity growth in European insurance over period 1995-2003. They concluded that life insurers have slighty higher technical efficiency than non life companies and life and non life insurance companies have been capable of generating some growth from scale economies

and enhancement in technical efficiency.

Eling and Luhnen (2008) also studied combination of DEA model and SFA model. They examined 4,372 life and non life insurance companies from 98 countries for the period 2002 to 2006. Their result showed Denmark and Japan had the highest average efficiency while the Philippines was the least efficient. It was also found that mutual companies were more efficient than stock companies.

Using DEA from a financial intermediation approach, Brockett (2005) investigated the efficiency of 1,524 insurance companies which consist of 1,114 stocks and 410 mutual companies in 1989. They found out stock companies are more efficient than mutual companies, and agency is more efficient than direct marketing.

Hwang and Kao (2006), moreover, utilized the two stage data envelopment analysis. In the first stage they measured marketability and the profitability at the second stage. The sample of the study was 24 non life in Taiwan for the period 2001-2002. An interesting finding was that company which had efficiency in the traditional one stage could never achieve efficiency both in the marketability and profitability stages. Moreover they found no different values for efficiency between domestic and foreign and with different sizes or scales.

Huang et al (2007) made a study on Taiwan life insurance companies using DEA and Tobit regression over the period 1996-2003. Their findings showed that family controlled was more efficient than foreign branch office. They concluded that proportion of directors and supervisors shareholding generally has positive relation with efficiency but not statistically significant.

RESEARCH METHOD
Data Sample and Period
There are 88 non life insurance companies in Indonesia that is recorded in insurance directory at the end of 2008. This study covers 23 insurance companies only due to complete financial data availability that comprised of

13 large and 10 medium sizes. Out of 23 companies, 14 companies have captive market and nine (9) with non captive market. The data are mostly taken from annual reports of insurance companies in 2005, 2006 and 2007 as well as from *Assosiasi Asuransi Umum Indonesia* and the data for financial ratios in 2007 were gathered from Insurance directory, Bisnis Indonesia.

Research Model

Some scholars have argued that financial ratio measures are very simple estimates of cost efficiency and productivity (Oral and Yolalan, 1990; Berger and Humphrey, 1992). They stated that accounting ratios might be inappropriate for describing the actual efficiency. In the light of criticisms against the inadequacy of financial ratios as a measure of performance, the DEA model has been adopted as a general measurement of efficiency.

DEA is formulated from the simple formula available in linear programming that is as follows (Denizer dan Dinc, 2000):

$$\text{Maximize } h_j = \frac{\sum_{r=1}^{s} u_r y_{rj}}{\sum_{i=1}^{m} v_i x_{ij}} \quad (1)$$

$$\text{Subject to } \frac{\sum_{r=1}^{s} u_r y_{rj}}{\sum_{i=1}^{m} v_i x_{ij}} \leq 1 \quad \text{for } j = 1 \dots n$$

$v_i \geq 0$ for $i = 1 \dots m$, and $u_r \geq 0$ for $r = 1 \dots s$
where:

h_j = was the value of the insurance efficient j;

r = output;

i = input ;

u_r = was the output r that was produced by the insurance company j;

y_{rj} = the number output r, was produced by the insurance company, was counted from $r = 1$ to s;

v_i = was the weight input i that was produced by the insurance company j; and

x_{ij} = the number input i, was produced by the insurance company, was counted from $i = 1$ to m.

In DEA, there are two scale assumptions; they are constant returns to scale (CRS), and variable returns to scale (VRS). The latter introduced by Banker, Charnes and Cooper (1984) and covers both increasing and decreasing returns to scale. CRS is assumption at an optimal scale may not be appropriate for the insurance industry since its nature is is very competitive. There are some constraints on the operations that may cause the insurance industry to be not operating at optimal scale. Therefore, in this study we use output-orientated VRS formulation of DEA. The measure of DMU's efficiency ranges from zero to one, values less than 1 indicate that the DMU (insurance) is operating at less than full capacity given the set of multiple inputs.

Equation (1) was developed further in accordance with the VRS concept (Coelli and Rao, 2003) as follows:

$$\max_{\phi, \lambda} \phi, \quad (2)$$
$$st\text{-}\phi y_i + Y\lambda \geq 0,$$
$$x_i \text{-} X\lambda \geq 0,$$
$$II'\lambda = 1$$
$$\lambda \geq 0,$$

where :

y_i was the vector of output quantities for the i-th companies;

x_i was $K \times 1$ vector of input quantities for the i-th companies;

Y was $N \times M$ matrix of output quantities for all N companies;

X was $N \times K$ matrix of input quantities for all N companies; and

λ was $N \times 1$ vector of weights

ϕ was scalar.

Lastly, we use Tobit regression model to investigate the linkage of financial performance (ROA, ROE, and NIM) and value of DEA as a dependent variable. Tobit regression is suitable and not the OLS regression, because it can account for truncated data (Coelli et. al, 1998 and Hwang and Kao, 2006). DEA productivity indices have a significant proportion of scores equal to one.

Table 1
Efficiency Summary of Insurance Companies

Name Insurance	2005	2006	2007	Market	Company Scale	Ownership
Lippo General. tbk	0.436	0.435	0.439	Captive	Large	Listed private
Panin Insurance. tbk	1.000	1.000	1.000	Captive	Large	Listed private
Tugu Pratama Indonesia	0.792	1.000	0.884	Captive	Large	Private
Wahana Tata	0.312	0.373	0.377	Captive	Large	Private
Jasa Indonesia. BUMN	1.000	1.000	1.000	non captive	Large	Government
Adira Insurance	0.323	0.307	0.270	Captive	Large	Private
Asuransi Allianz Utama Indonesia	0.609	0.480	0.497	non captive	Large	Private
Asuransi Astra Buana	0.560	0.642	0.710	Captive	Large	Private
Askrindo. BUMN	0.078	0.077	0.086	non captive	Large	Government
Asuransi Central Asia	0.342	0.402	0.504	Captive	Large	Private
Asuransi MSIG Indonesia	1.000	0.960	0.593	Captive	Large	Private
Asuransi Sinar Mas	0.833	0.972	1.000	Captive	Large	Private
Tokio Marine Indonesia	0.605	1.000	1.000	Captive	Large	Private
Ramayana. tbk	0.269	0.311	0.389	non captive	Medium	Listed private
Bina Dana Artha. tbk	1.000	0.620	0.236	non captive	Medium	Listed private
Dayin Mitra. tbk	0.356	0.619	0.709	Captive	Medium	Listed private
Tri Pakarta	0.235	0.243	0.285	Captive	Medium	Private
Bumida	0.246	0.248	0.259	non captive	Medium	Private
Asuransi AIU Indonesia	1.000	0.467	0.437	non captive	Medium	Private
Askrida	0.311	0.382	0.364	Captive	Medium	Private
Asuransi Jasaraharja Putera	0.201	0.241	0.286	Monopoli	Medium	Government
Asuransi Jaya Proteksi	1.000	1.000	0.996	Captive	Medium	Private
Asuransi Permata Nipponkoa Indonesia	1.000	1.000	1.000	Captive	Medium	Private
Geometric mean	0.587	0.599	0.579			

Variables

Although several studies have evaluated efficiency among insurance companies, there has been undetermined insurance's input and output. In order to measure efficiency performance of 23 non life insurance companies in Indonesia, this study used non life insurance variables that employed in previous studies (Hawang and Kao, 2006 and Huang and Lai, 2007). Outputs selected were premium income (direct and reinsurance premium); net underwriting income and investment income. Inputs used were business and administration expense, and marketing expense. Whereas for Tobit regression we used value of DEA as dependent variable and independent variables are Earning after tax to total assets (ROA), Earning after tax to Equity (ROE), and Earning after tax to total net premium income (NPM).

DATA ANALYSIS AND DISCUSSION

The results are reported in Table 1, the average efficiency of 23 insurance companies increased from 2005 (0.587) to 2006 (0.599) but declined in 2007 (0.579).

The result indicates that the best practice efficiency, with a value 1 was obtained by more 22% (5 of 23 companies) at the end of 2007. Efficiency decreased compared to 2005, where 7 of 23 insurance firms have the best practice performance. On the other hand, more than half of sample firms (13 of 23 companies) never made it to the frontier over the test period.

Furthermore, 20 insurance companies belong to the private (include joint venture), and only 3 government owned. Among 5 insurances with a value of 1 were companies of large scales. This result is consistent with the findings of some studies of the relative efficiency to companies size that bigger tends to be more technically efficient than smaller (Bos and Kolari , 2005 and Abidin and Cabanda, 2006). In contrast most insurance companies which have captive markets

Table 2
Linkage between Profitability Ratios and DEA Performance

Variables Dependent : DEA	Coefficient	P- value
Independent		
C	0.5135	0.0000
ROA	-0.0076	0.2506
ROE	0.0060	0.3051
NPM	0.0008[*]	0.0776

( ) Indicates p-value. *, ** significant at 0.10, 0.05 probability level, respectively.

had values less than 1 while 2 of 3 insurance firms owned by government had also values less than 1. Those results are not consistent with some studies.

The Tobit regression was used to test the association between the value of DEA as dependent variable and all profitability financial ratios: Return on asets (ROA), Return on equity (ROE), and Net premium margin (NPM) as independent variables in 2007. Scholars attested that Tobit regression is more appropriate and the best method than OLS regression (Coelli, 1998). This is because the value of dependent variable the DEA score has limited outcome or always equal to one.

Table 2 shows the existence of a linkage between DEA and profitability performance. There are two profitability ratios (ROE and NPM) that have positive relations with value of DEA while ROA has a negative relation. However, NPM is found only ratio to have a positive significant impact on DEA at 10% probability level. The Results affirm that there are no significant associations between value of DEA and ROA and ROE, except NPM. This implies that an increase in NPM increased the efficiency as a whole.

CONCLUSION, IMPLICATION, SUGGESTION AND LIMITATION

In reference to efficiency performance of insurance companies in Indonesia over the period 2005 to 2007, it can be judged as the following. The performance of insurance companies is a concern by the managers, the community, and the decision-makers. Financial ratios have been used frequently as performance measures for insurance companies, but still very few studies that considered efficiency measures.

Results from the DEA measurement indicate that captive market, listed companies, and government ownership did not influence the efficiency performance. Further, bigger insurance companies were found to be efficient than smaller companies.

Based on Tobit regression, it indicates that there was a positive relation between profitability and value of DEA, except ROA. The policy implication of this is that policymakers can gain insights on how to measure efficiency of the insurance industry aside from traditional accounting method (financial ratios).

The limitation of analysis on efficiency is derived from the sample and the choice of insurance companies' output-input mix. At present, there is no consensus in the measurement of company's output–input mix and the future studies will also adopt the parametric method to capture other factors for evaluating the performance of Indonesian insurance industry. This is the limitation of this present research.

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