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THE USE OF FINANCIAL RATIOS TO PREDICT FINANCIAL DISTRESS IN INDONESIA

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ABSTRACT

This thesis advances our understanding of financial ratios that may predict firms' financial distress. The sample used in this study consist of 192 companies (63 distress companies, 63 non-distress companies from LQ45 and 63 non-distress companies which have similar size to distress companies) for the period of 2004 to 2011. Based on logistic regression results, it is found that more than one models proposed are significant and have a high classification power in predicting financial distress. These results are found for the pair of delisted-LQ45 and the pair of delisted-delisted counterparts. Further analysis also finds that the proposed models have a better performance than Altman Z-Score and Ohlson O-Score in predicting financial distress in Indonesia.

Keywords: financial distress, financial ratios, logistic regression, delisted companies, LQ45 companies, Altman Z-Score, Ohlson O-Score

JEL Classification: E44, G14, O16

INTRODUCTION

This thesis advances our understanding of factors that may predict firms' financial distress. Financial distress—a situation where a firm's operating cash flows is not sufficient to satisfy current obligations—may lead to default on a contract or even a bankruptcy. Inves-tors/creditors must take into account this potential risk before and after making investment and credit decisions. To curtail this risk, it is important for them to build a prediction regard-ing the future of their existing or prospective companies of interest.

The importance of financial distress information has led many academi-cians/practitioners e.g. (Altman, 1968; Ohlson, 1980) conducting researches on this issue. Their researches produce various models and scores to measure financial distress risk of a company. Altman (1968) and Ohlson (1980) use real bankruptcy data as a measure of the financial distress. On the other hand, some other researcher e.g., Pindado, Rodrigues, & Torre (2007) and Pranowo, Achsani, H.Manurung, & H.Manurung (2010) employs negative cash flow, net loss and delisted company as determinants of financial distress.

This study selects delisted company data as the variable used in measuring financial distress. Some researchers (e.g., Almilia, 2004; Brahmana, 2007) argue that the use of de-listed company data better reflects the real condition of financial distress. This might be due to the delisting criteria set by the Jakarta Stock Exchange (No: Kep-308/BEJ/07-2004) are already in accordance with the definition of financial distress. In contrast, negative cash flows and net losses are less appropriate to be used as a proxy of financial distress because either of these variables does not always represent firms' financial distress. For example, a significant amount of investment in a fixed asset or a big drop in sales revenue due to a ca-tastrophe may result

in negative cash flows or net losses for a company. Therefore, it is ar-gued that the delisted data better reflects the financial distress than other negative cash flow and net losses.

Delisted data consists of companies that do not meet the criteria set by the IDX. These companies are delisted from the IDX mainly due to their poor financial condition. According to the regulation issued by PT Jakarta Stock Exchange (No: Kep-308/JSE/07-2004), a company is to be delisted subjected to conditions or events which negatively affect the company either financially or legally and it cannot demonstrate a sufficient indication of recovery.

The focus of this study is to predict company's future financial condition using fi-nancial distress prediction models. This study proposes a new model which is based on de-listed company data. The companies selected are those delisted due to bankruptcy, bad busi-ness continuity, stock suspension, granted disclaimer opinion, and the absence of operational activity. Financial ratios used in previous studies e.g., Atmini (2005) and Campbell, Hilscher & Szilagyi (2010) will be employed in this study in order to obtain better financial distress prediction model. Most of these studies use profitability, liquidity, and solvency in con-structing financial distress prediction model. The results of these earlier studies, which em-ployed identical ratios, are generally inconsistent. This study attempts to further examine the predictive values of delisted company's financial ratios in order to obtain a better financial distress prediction model.

LITERATURE REVIEW AND METHOD

Financial distress can be defined as a declining financial condition that occurs before bank-ruptcy or liquidation (Platt & Platt, 2002). Deng (2006) defines financial distress as an ab-normal financial condition i.e., when a company suffers from a net loss during the last two years or if the company receives an adverse or disclaimer audit opinion. Financial distress risk is a company failure risk in running their business (Altman, 1968). The financial factor is derived from a company's own performance. Financial distress or bankruptcy risk comes before bankruptcy itself. Bankruptcy risk should be used as an alert by all stakeholders so that they can avoid potential loss in the future.

Financial ratio is widely used in financial analysis. Financial ratio analysis can be used as a guide by investors and creditors to help them in making a decision. The ratios ex-amined may indicate company's achievements and prospects. Generally, financial ratio anal-ysis is employed to assess the firms' risks and opportunities in the future. One ratio can be related to the other ratios in order to get a meaningful conclusion regarding a company's fi-nancial health. Generally speaking, financial ratios can be classified into three groups i.e., liquidity, solvability and profitability. The classification of these ratios may lead to easier interpretation of financial ratio analysis. Some studies have been conducted to review the advantage of financial ratios.

Altman (1968) applies multivariate discriminant analysis to derive a linear combina-tion of the ratios which "best" discriminate between financially distressed and non-distressed groups. Altman uses a sample of 33 bankruptcies filed between 1946 and 1965 and matches them with 33 non-distressed firms from the same industry and of similar size. After numerous statistical tests of the interrelations among variables as well as tests of statis-tical significance and predictive accuracy, Altman is able to specify five ratios which are the most significant indicators of distress risk. An overall score, known as Altman Z-Score, can be computed from the following discriminant function:

$$\mathbf{Z = 0{,}012X1 + 0{,}014X2 + 0{,}033X3 + 0{,}006X4 + 0{,}999X5}$$

Where Z = Z-Score (overall index)

$$X_1 = \frac{\text{Working Capital}}{\text{Total Assets}}$$

$$X_2 = \frac{\text{Retained Earnings}}{\text{Total Assets}}$$

$$X_3 = \frac{\text{Earnings Before Tax}}{\text{Total Assets}}$$

$$X_4 = \frac{\text{Market Value of Equity}}{\text{Book Value of Total Liabilities}}$$

$$X_5 = \frac{\text{Sales}}{\text{Total Assets}}$$

The score from the equation above can be interpreted as follows 1) A company faces a high bankruptcy risk if its Z-Score is less than 181; 2) A company faces a low bankruptcy risk if its Z-Score is more than 2,675; and 3) A company with Z-score of 1,81 to 2,675 nei-ther faces high nor low bankruptcy risk (grey area).

Ohlson (1980) uses logistic regression in predicting distress and non-distress firms. In his study, he examines 105 bankrupt companies during the period of 1970 to 1976. The independent variables selected are those which frequently examined in prior literatures. He finds recent company size, financial structure, performance and liquidity as variables that may predict financial distress. Ohlson finally comes up with the following equation, named as O-Score, to measure bankruptcy risk probability:

O-Score = -1,32 - 0,407logX1 + 6,03X2 – 1,43X3 + 0,076X4 – 1,72X5 – 2,37X6 – 1,83X7 + 0,285X8 – 0,521X9

Where $X_1 = \frac{\text{Total Assets}}{\text{GNP Price}}$

$X_2 = \frac{\text{Total Liabilities}}{\text{Total Assets}}$

$X_3 = \frac{\text{Working Capital}}{\text{Total Assets}}$

$X_4 = \frac{\text{Current Liabilities}}{\text{Total Assets}}$

X_5 = dummy (1 if total liabilities > total assets, else 0)

$X_6 = \frac{\text{Net Income}}{\text{Total Assets}}$

$X_7 = \frac{\text{Funds from Operation}}{\text{Total Liabilities}}$

X_8 = dummy (1 net loss for the last two years, else 0)

$X_9 = \frac{\text{Net Income}_t - \text{Net Income}_{t-1}}{\text{Net Income}_t + \text{Net Income}_{t-1}}$

The higher the O-Score, the higher the bankruptcy risk. Ohlson finds that a cutoff of 0.038 can be used to distinguish high and low bankruptcy risk. If the O-Score is less than the cutoff point the bankruptcy risk is high. In contrast, if the O-Score is more than the cutoff point, the bankruptcy risk is low.

Financial ratio may indicate a company's past performance. Stakeholders, especially investors, use an analysis of financial ratios as a tool to predict the feasibility of their in-vestment in the future. The ability of financial ratios to predict companies' future prospect can also be used to predict the financial distress they may confront. Hence, this study formu-lates the first hypothesis as follow:

H1: Financial ratios can be used to predict financial distress

Financial ratios are composed of different types of ratios. Therefore, it is necessary to also look at the financial ratio which has the best ability to predict the financial distress condition in this research.

Altman (1968) uses a sample of 33 bankruptcies filed between 1946 and 1965 and matches them with 33 non-distressed firms from the same industry and of similar size in United States. Similarly Ohlson (1980) uses 105 bankrupt companies during the period of 1970 to 1976 in United States. While Altman and Ohlson employ US data, this study uses Indonesian company's data which may offer different conclusion when analyzed. For this reason, this study is expected to provide a model that may be appropriate to be used to ana-lyzed Indonesian companies that confront financial distress. Hence, this study formulates the second hypothesis as follow:

H2: The models proposed are different from Altman Z-Score and Ohlson O-Score in pre-dicting financial distress for Indonesian companies

This study use purposive sampling method to collect the samples. The criteria of samples are as follows 1) Companies which are delisted due to the reason bankruptcy, bad business continuity, stock suspension on regular market, granted a disclaimer opinion by the auditor and the absence of operational activity; 2) Companies that have complete financial statements for three years prior to delisting period.

Financial statement data for delisted companies are available from 2004 to 2011. In empirical test, financial data of distress companies will be accompanied

by the healthy one. The selections of companies which do not experience financial distress are selected based on the following criteria 1) Companies belong to LQ45 group in the same delisting period and 2) Companies listed on the IDX and have similar size to delisted companies.

The dependent variable in this study is a dummy variable that takes value of 1 for companies experiencing financial distress and 0 for companies not experiencing financial distress. Companies are classified as having financial distress if they are delisted from the Indonesian Stock Exchange and those classified as free from financial distress if they are remain listed on Indonesian Stock Exchange at the same period of time. This study uses fi-nancial ratios as independent variables to predict financial distress. Several financial ratios selected as a result of factor analysis test are 1) Liquidity Ratios, liquidity shows company's ability to meet their long terms obligation to creditor. The ratios would be expected to be critical immediately prior to failure, since only liquid assets can generate cash to cover obli-gations. Some researcher employed these ratios in their study e.g. Almilia and Kristijadi (2003); Murty and Misra (2004); Ohlson (1980); 2) Cash Flow Ratios, Prior studies provided some evidence that operating cash flow-related variables may add to the explanatory power of bankruptcy prediction models e.g., Murty and Misra (2004). This reflects a higher probability of a firm to go bankrupt if it has cash flow problems, compared to a firm which has easier access to its internal finance; 3) Leverage Ratios, that shows the ability of the firm to meet its debts in the long run and the ability to raise new capital through borrowing. A major concern is whether the firm can service its debts or generate enough profit to be able to pay the interest on its loans. Leverage ratios therefore indicate the level of financial risk in addition to the business risk a firm might face; 4) Profitability Ratios, that shows company's ability in generating profit from its operation Most of prior studies suggest that profit-ability has important influence, since companies with low profitability are likely to become less liquid and more highly geared. We initially choose variables to reflect the strength of the company's profitability. This helps to identify whether the earnings are sensitive to changes in a firm's operating health; 5) Efficiency Ratio, that measure how effectively a firm is ex-ploiting its assets. They could also indicate whether a firm is keeping adequate levels of as-sets, which could in turn affect its performance in the long run. Capital-turnover ratio is a standard financial ratio illustrating the sales generating ability of the firm's assets. It is one measure of management's capability in dealing with competitive conditions; 6) Growth Ra-tio, this formula indicates that NIt is net income for the most recent period. The variable in-tended to measure change in net income. Ohlson (1980) is one of the researchers that used this ratio in predicting financial distress.

The data in this study are tested using the following methods: factor analysis, inde-pendent and paired sample t-test, logistic regression, and manual comparison. Firstly, factor analysis is conducted to reduce the number of variables (selecting the most significant va-riables). In this analysis, all variables relation will be observed (inter-dependent variable), so that it will produce a group of many variables into a few variables or factors. In addition to grouping variable becomes smaller, analysis factor is also used to select which factor is the most dominant, which is marked by its factor score. The highest score show the most domi-nant variable.

Independent and paired sample t-test is used to test whether there is a difference in financial ratios examined between LQ 45 and delisted companies; and similar size companies and delisted companies. This test relates the difference between the average values of the ratios in each group to the variability of values of the ratios within each group. The third step is the use of logistic regression. Logistic regression will produce a score to measure the formulated model ability in predicting financial distress. On the next step, the score will be compared to the scores obtained by Altman Z-Score and Ohlson O-Score. Capabilities of the Z-Score and O-Score in predicting financial distress will be performed with the manual cal-culation of scores from each sample. After that, each model score will be compared each other to find which model has the highest ability to predict financial distress.

RESULTS AND ANALYSIS

The sample of this study consists of a total of 189 observations which comprises 63 observa-tions for distress companies, 63 observations for non-distress

companies from LQ 45 and 63 observations for non-distress companies which have similar size to distress companies for the period of 2004 to 2011. Each distress companies will be compared to each of non-distress companies. Hence, these distress companies will be used twice in the analysis.

The financial ratios from each of group of the companies are taken based on prior li-teratures e.g. (Altman, 1968). Each ratio selected presents the financial condition of each sample. Tables below show more detail information about the descriptive statistics of dis-tress and non-distress companies. It indicates mean and standard deviation for all variables which used in this study.

From descriptive statistic results, it can be seen LQ45 company's ratios have a higher ratio value of profitability, liquidity and cash ratios than the ratios of other groups (delisted companies and their counterparts). On the other hand, the leverage ratios of delisted companies are higher than the ratios of other groups (LQ45 and the counterparts of delisted companies). It indicates that the ratios of LQ45 companies reflect a better financial condi-tion than the ratios of delisted companies and their counterparts. Most of all ratios values for similar size companies are in between the ratios value of the delisted and LQ45 companies. Based on descriptive statistic results, it is indicates that the value for growth and efficiency ratio categories for similar size companies are higher than those of delisted and LQ45 com-panies.

Factor analysis is used to reduce number of independent variables employed in this study. The Principal Component Analysis (PCA) method for factor analysis is used to facto-rially arrange the inter-correlation between twenty five variables. This study also conducts PCA method for all variables in one time (non-categorized) in order to ensure the effectiveness of the above classification (twenty five variables into seven groups). After loading fac-tors at 0.50 and rotating them through varimax technique, nine and eight significant variables from pre-categorized and non-categorized variables, respectively, are selected and described in the following table.

This study uses two types of t-test, i.e., independent sample t-test and paired sample t-test. Both of them are used to identify the ratios differences between delisted and LQ45 companies and the ratios similarities between the delisted companies and their counterpart (companies with similar size). The independent sample t-test results indicate that at t-1, half of financial ratios examined are significantly different. Moreover, at t-2 and t-3, more than 50% of financial ratios employed are significantly different. These results demonstrate that the financial ratios data between delisted and LQ45 companies are different, indeed. On the other hand, paired sample t-test results show that at all times (t-1, t-2, and t-3), almost 90% of financial ratios examined are not significantly different. Therefore, it can be concluded that financial ratios data between delisted companies and their counterparts are similar. It sug-gests that the counterpart companies are selected properly.

Table 1
PCA Results

No.	Pre-Categorized Ratio		Non-categorized Ratio	
1	OCF/TL*	Cash	OCF/TL*	Cash
2	S/TA*	Efficiency	S/TA*	Efficiency
3	CL/TA*	Leverage	CL/TA*	Leverage
4	CA/TL*	Liquidity	CA/TL*	Liquidity
5	NI/S*	Profitability	NI/S*	Profitability
6	Return*	Others	Return*	Others
7	RE/TA	Profitability	Ohl	Growth
8	log TA/GNP	Others	MVE/TL	Liquidity
9	Ohl	Growth		

*identical variables selected from two factor analysis

Table 2. Logistic Regression Result for Delisted vs LQ45 Companies at t_{-1}

	LQModel 1 $_{t-1}$		LQModel 2 $_{t-1}$		LQModel 3 $_{t-1}$		LQModel 4 $_{t-1}$		LQModel 5 $_{t-1}$		LQModel 6 $_{t-1}$		LQModel 7 $_{t-1}$	
	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.
Return	5.452	1.000	-2.095	1.000	-0.321	0.401	0.352	0.576	-0.282	0.435	8.784	0.999	0.354	0.541
CLTA	-25.144	0.999	16.871	1.000	9.125	0.142	11.132	0.141	9.619	0.094*	-23.910	0.999	11.838	0.088*
RETA	-10.093	1.000	-14.766	0.999	-1.473	0.271	-2.498	0.190						
CATL	-25.324	0.998	-8.509	0.999	0.227	0.495	0.526	0.249	0.196	0.556	-31.942	0.996	0.480	0.268
NIS	17.082	1.000	15.357	0.999	2.627	0.281	3.727	0.198	2.841	0.209	27.126	0.998	3.952	0.142
logTAGNP	-89.499	0.997	-49.003	0.998							-111.841	0.995		
OCFTL	17.440	0.999	35.985	0.999	-1.089	0.381	0.647	0.738	-1.366	0.267	19.508	0.998	0.266	0.889
STA	-52.836	0.998	-23.837	0.999	0.135	0.890	0.668	0.598	-0.083	0.928	-64.868	0.997	0.358	0.748
Ohl	-7.136	0.999	-11.274	0.998	0.895	0.380	1.620	0.131	0.882	0.370	-11.591	0.999	1.629	0.128
MVETL			-4.577	0.999			-0.777	0.032**					-0.687	0.052*
Constant	-143.325	0.997	-90.413	0.998	-3.423	0.150	-4.301	0.174	-3.728	0.105	-187.591	0.994	-4.972	0.097*
Hosmer and Lemeshow (Sig.)		1.0000*		1.0000*		0.9622*		0.0017		0.9622*		1.0000*		0.1122
Nagelkerke R Square		1.0000		1.0000		0.5984		0.7420		0.5662		1.0000		0.6978
Cox & Snell R Square		0.7500		0.7500		0.4488		0.5565		0.4246		0.7500		0.5233
Daya Classification Listed		100%		100%		85%		90%		90%		100%		85%
Daya Classification Delisted		100%		100%		75%		95%		70%		100%		95%
Overall Classification		100%		100%		80%		93%		80%		100%		90%

Note: *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively

Table 3. Logistic Regression Result for Delisted vs LQ45 Companies at t_{-2}

	LQModel 1 $_{t-2}$		LQModel 2 $_{t-2}$		LQModel 3 $_{t-2}$		LQModel 4 $_{t-2}$		LQModel 5 $_{t-2}$		LQModel 6 $_{t-2}$		LQModel 7 $_{t-2}$	
	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.
Return	-18.494	0.998	-18.231	0.997	-2.899	0.026**	-2.881	0.047**	-1.504	0.045**	-28.659	0.996	-1.491	0.052*
CLTA	-17.044	1.000	-19.005	0.999	7.916	0.067*	8.262	0.080*	6.034	0.097*	-32.121	0.999	6.518	0.081*
RETA	-23.727	0.997	-22.382	0.999	-3.344	0.047**	-3.223	0.063*						
CATL	-11.411	0.999	3.289	1.000	0.004	0.989	0.076	0.796	0.750	0.907	-11.242	1.000	2.639	0.684
NIS	-20.078	1.000	-11.649	0.998	0.708	0.893	1.662	0.760	0.128	0.631	-26.214	0.996	0.191	0.485
logTAGNP	-44.809	0.998	-21.531	0.999							-131.267	0.996		
OCFTL	-19.931	0.999	7.115	0.999	-3.921	0.081*	-3.484	0.147	-3.074	0.108	15.894	0.999	-2.733	0.188
STA	2.703	1.000	-23.655	0.996	-0.441	0.671	-0.767	0.501	-0.596	0.557	-36.127	0.997	-0.728	0.495
Ohl	7.179	0.999	0.182	1.000	1.822	0.075*	2.128	0.045**	1.568	0.132	-29.004	0.999	1.734	0.056*
MVETL			-45.234	0.997			-0.543	0.284					-0.492	0.227
Constant	-87.899	0.998	-88.658	0.998	-1.042	0.595	-0.623	0.756	-1.675	0.400	-274.400	0.997	-1.431	0.468
Hosmer and Lemeshow (Sig.)		1.0000*		1.0000*		0.5542*		0.6683*		0.1697		1.0000*		0.5802*
Nagelkerke R Square		1.0000		1.0000		0.7076		0.7274		0.6262		1.0000		0.6548
Cox & Snell R Square		0.7500		0.7500		0.5307		0.5455		0.4697		0.7500		0.4911
Listed Classification		100%		100%		83%		83%		78%		100%		78%
Delisted Classification		100%		100%		83%		83%		87%		100%		83%
Overall Classification		100%		100%		83%		83%		83%		100%		80%

Note: *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively

Table 4. Logistic Regression Result for Delisted vs LQ45 Companies at t_{-3}

	LQModel 1 $_{t-3}$		LQModel 2 $_{t-3}$		LQModel 3 $_{t-3}$		LQModel 4 $_{t-3}$		LQModel 5 $_{t-3}$		LQModel 6 $_{t-3}$		LQModel 7 $_{t-3}$	
	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.
Return	-2.578	0.999	-2.538	1.000	-1.198	0.183	-1.349	0.174	-0.978	0.214	-0.945	1.000	-0.957	0.220
CLTA	-20.660	0.998	-24.326	0.999	14.728	0.135	14.575	0.166	13.867	0.145	-20.885	0.999	13.065	0.164
RETA	-17.047	1.000	-17.788	1.000	-1.146	0.548	-1.925	0.385						
CATL	-20.117	0.998	-21.618	0.998	2.383	0.116	3.286	0.081*	2.210	0.138	-25.309	0.998	2.759	0.130
NIS	8.753	0.999	8.810	0.999	-16.023	0.274	-20.000	0.217	-14.853	0.338	5.501	1.000	-17.133	0.313
logTAGNP	-57.372	0.997	-60.371	0.999							-65.070	0.996		
OCFTL	-9.202	1.000	30.350	1.000	-15.743	0.048**	-16.091	0.039**	-14.584	0.034**	-16.248	0.999	-13.748	0.034**
STA	-14.666	0.999	-7.480	1.000	0.468	0.740	0.704	0.599	0.629	0.660	-19.511	0.998	0.778	0.574
Ohl	-10.626	0.998	-9.170	0.999	1.746	0.135	2.901	0.121	1.763	0.121	-8.499	0.998	2.424	0.142
MVETL			-2.269	1.000			-0.632	0.358					-0.393	0.540
Constant	-109.156	0.997	-116.837	0.999	-6.134	0.095*	-6.870	0.086*	-6.282	0.086*	-127.638	0.997	-6.760	0.076*
Hosmer and Lemeshow (Sig.)		1.0000*		1.0000*		0.9961*		0.9934*		0.9964*		1.0000*		0.9882*
Nagelkerke R Square		1.0000		1.0000		0.8072		0.8182		0.8006		1.0000		0.8056
Cox & Snell R Square		0.7500		0.7500		0.6054		0.6137		0.6004		0.7500		0.6042
Listed Classification		100%		100%		90%		90%		90%		100%		90%
Delisted Classification		100%		100%		90%		95%		85%		100%		90%
Overall Classification		100%		100%		90%		93%		88%		100%		90%

Note: *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively

Table 5. Logistic Regression Result for Delisted Companies vs Their Counterparts at t_{-1}

	SSModel 1 $_{t-1}$		SSModel 2 $_{t-1}$		SSModel 3 $_{t-1}$		SSModel 4 $_{t-1}$		SSModel 5 $_{t-1}$		SSModel 6 $_{t-1}$		SSModel 7 $_{t-1}$	
	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.
Return	0.129	0.815	0.159	0.780	0.070	0.892	-2.881	0.047**	0.121	0.804	0.000	0.999	0.177	0.741
CLTA	5.671	0.035**	5.491	0.047**	5.804	0.035**	8.262	0.080*	4.647	0.047**	4.960	0.051*	4.584	0.060*
RETA	0.784	0.156	0.728	0.224	0.761	0.174	-3.223	0.063*						
CATL	0.108	0.743	0.109	0.742	0.138	0.665	0.076	0.796	0.177	0.575	0.217	0.504	0.166	0.596
NIS	1.679	0.156	1.632	0.171	1.660	0.173	1.662	0.760	1.340	0.163	1.309	0.203	1.275	0.224
Ohl	-0.246	0.582	-0.219	0.638	-0.201	0.648	2.128	0.045**	-0.124	0.762	-0.078	0.860	-0.130	0.766
logTAGNP	-0.351	0.752	-0.310	0.787							0.563	0.486		
OCFTL	-0.076	0.954	-0.013	0.992	-0.075	0.955	-3.484	0.147	0.517	0.684	0.475	0.710	0.538	0.673
STA	-0.339	0.189	-0.336	0.192	-0.313	0.183	-0.767	0.501	-0.258	0.228	-0.231	0.283	-0.296	0.211
MVETL			-0.050	0.830			-0.543	0.284					-0.130	0.588
Constant	-3.197	0.392	-2.947	0.453	-2.126	0.149	-0.623	0.756	-2.113	0.112	-0.336	0.906	-1.751	0.217
Hosmer and Lemeshow(Sig.)		0.6133*		0.1871		0.8891*		0.6683*		0.8562*		0.9193*		0.1357
Nagelkerke R Square		0.4597		0.4610		0.4575		0.7274		0.3712		0.3834		0.4217
Cox & Snell R Square		0.3448		0.3458		0.3432		0.5455		0.2784		0.2875		0.3163
Listed Classification		70%		75%		75%		83%		85%		85%		85%
Delisted Classification		75%		75%		70%		83%		60%		60%		65%
Overall Classification		73%		75%		73%		83%		73%		73%		75%

Note: *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively

Table 6. Logistic Regression Result for Delisted Companies vs Their Counterparts at t_{-2}

	SSModel 1 $_{t-2}$		SSModel 2 $_{t-2}$		SSModel 3 $_{t-2}$		SSModel 4 $_{t-2}$		SSModel 5 $_{t-2}$		SSModel 6 $_{t-2}$		SSModel 7 $_{t-2}$	
	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.
Return	-0.154	0.582	-0.154	0.595	-0.157	0.566	-0.156	0.582	-0.237	0.347	-0.189	0.493	-0.135	0.627
CLTA	1.449	0.132	1.449	0.139	1.454	0.128	1.454	0.136	1.103	0.188	1.083	0.199	1.065	0.200
RETA	0.480	0.212	0.480	0.244	0.484	0.198	0.483	0.235						
CATL	-0.008	0.973	-0.008	0.973	-0.012	0.957	-0.012	0.958	-0.009	0.967	0.027	0.909	0.013	0.954
NIS	0.278	0.863	0.278	0.864	0.296	0.850	0.295	0.851	0.345	0.799	0.163	0.910	0.155	0.913
Ohl	-0.708	0.151	-0.708	0.153	-0.707	0.151	-0.707	0.153	-0.735	0.142	-0.743	0.141	-0.703	0.154
logTAGNP	0.050	0.961	0.050	0.961							0.435	0.647		
OCFTL	-2.093	0.178	-2.093	0.182	-2.069	0.161	-2.069	0.163	-1.759	0.211	-1.994	0.187	-1.712	0.227
STA	-0.249	0.401	-0.249	0.401	-0.254	0.361	-0.254	0.361	-0.276	0.367	-0.224	0.454	-0.269	0.368
MVETL			0.000	0.999			0.000	0.997					-0.036	0.643
Constant	0.550	0.878	0.550	0.878	0.382	0.678	0.382	0.679	0.467	0.613	1.930	0.563	0.444	0.628
Hosmer and Lemeshow Test (Sig.)		0.1834		0.1835		0.1817		0.1813		0.4246		0.0162		0.0999
Nagelkerke R Square		0.3557		0.3557		0.3556		0.3556		0.3123		0.3170		0.3230
Cox & Snell R Square		0.2668		0.2668		0.2667		0.2667		0.2343		0.2378		0.2423
Listed Classification		70%		70%		70%		70%		70%		74%		70%
Delisted Classification		70%		70%		70%		70%		74%		74%		74%
Overall Classification		70%		70%		70%		70%		72%		74%		72%

Note: *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively

Table 7. Logistic Regression Result for Delisted Companies vs Their Counterparts at t_{-3}

	SSModel 1 $_{t-3}$		SSModel 2 $_{t-3}$		SSModel 3 $_{t-3}$		SSModel 4 $_{t-3}$		SSModel 5 $_{t-3}$		SSModel 6 $_{t-3}$		SSModel 7 $_{t-3}$	
	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.	B	Sig.
Return	0.182	0.551	0.197	0.505	0.181	0.534	0.199	0.478	0.128	0.654	0.128	0.656	0.117	0.681
CLTA	0.046	0.953	0.330	0.725	-0.010	0.989	0.189	0.830	-0.251	0.714	-0.245	0.723	-0.207	0.768
RETA	0.662	0.146	1.191	0.054*	0.637	0.160	1.143	0.062*						
CATL	-0.376	0.258	-0.767	0.060*	-0.342	0.264	-0.711	0.063	-0.273	0.351	-0.277	0.365	-0.446	0.179
NIS	-1.151	0.353	-1.693	0.265	-1.078	0.367	-1.508	0.311	-1.262	0.309	-1.271	0.312	-1.571	0.279
Ohl	-1.375	0.151	-1.101	0.263	-1.411	0.134	-1.207	0.207	-1.465	0.114	-1.461	0.117	-1.388	0.135
logTAGNP	-0.483	0.716	-0.926	0.525							-0.065	0.958		
OCFTL	-5.435	0.101	-9.007	0.047**	-5.870	0.061*	-9.924	0.022**	-5.141	0.069*	-5.082	0.094*	-6.438	0.035**
STA	-0.276	0.448	-0.358	0.526	-0.237	0.479	-0.254	0.584	-0.244	0.478	-0.250	0.492	-0.298	0.518
MVETL			0.726	0.058*			0.709	0.061*					0.383	0.181
Constant	0.193	0.969	-1.547	0.783	1.946	0.136	1.891	0.204	1.744	0.164	1.510	0.746	1.576	0.245
Hosmer and Lemeshow Test (Sig.)		0.2675		0.3008		0.3737		0.6690*		0.1425		0.1406		0.1385
Nagelkerke R Square		0.5236		0.6133		0.5209		0.6058		0.4718		0.4719		0.5141
Cox & Snell R Square		0.3927		0.4600		0.3906		0.4543		0.3539		0.3539		0.3856
Listed Classification		75%		85%		80%		85%		75%		75%		80%
Delisted Classification		70%		80%		65%		75%		65%		65%		70%
Overall Classification		73%		83%		73%		80%		70%		70%		75%

Note: *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively

Based on the result of logistic regression, there are several models founded at each t-1, t-2 and t-3. LQModel indicates each model for LQ45 companies vs delisted companies. On the other hand, SSModel indicates each model for delisted companies vs its similar size companies.

Based on tables above, it is found that more than one models proposed are signif-icant and have a high classification power in predicting financial distress. These results are found for the pair of delisted-LQ45 and the pair of delisted-delisted counterparts. In delisted-LQ45 result sections it can be seen that most of the new models proposed are to pass the goodness of fit test and have a high classification power to predict the dependent variable. Similarly, the same results are also found for the pair of delisted-delisted counterparts.

To accept hypothesis 1, at least one of the models proposed should pass the goodness of fit test and be fairly powerful in predicting financial distress. Although there only less new model proposed that pass the goodness of fit test for the pair of delisted-delisted counterparts, the financial ratios in the model can re-main be used to predict fi-nancial distress. Therefore, from the explanation above, it can be concluded that hypo-thesis1 is accepted.

After calculating Altman Z-Sore and Ohlson O-Sore for each sample, the predic-tive ability of both score in predicting financial distress condition are measured. The models included in this comparison are those that pass goodness of fit test in logistic re-gression analysis. The result of these Altman Z-Score and Ohlson O-Score than be com-pared with new models predictive ability. The results of comparison for those models are presented on the next six tables.

Table 8
LQ 45 (t-1) Classification Table

	Delisted	Listed	Overall
LQModel 1t-1	100%	100%	100%
LQModel 2t-1	100%	100%	100%
LQModel 3t-1	75%	85%	80%
LQModel 5t-1	70%	90%	80%
LQModel 6t-1	100%	100%	100%
Altman	100%	0%	46%
Ohlson	95%	25%	60%

Table 9
LQ 45 (t-2) Classification Table

	Delisted	Listed	Overall
LQModel 1t-2	100%	100%	100%
LQModel 2t-2	100%	100%	100%
LQModel 3t-2	82.6%	82.6%	82.6%
LQModel 4t-2	82.6%	82.6%	82.6%
LQModel 6t-2	100%	100%	100%
LQModel 7t-2	82.6%	78%	80.4%
Altman	100%	0%	49%
Ohlson	100%	22%	61%

Table 10
LQ 45 (t-3) Classification Table

	Delisted	Listed	Overall
LQModel 1t-3	100%	100%	100%
LQModel 2t-3	100%	100%	100%
LQModel 3t-3	90%	90%	90%
LQModel 4t-3	95%	90%	92.5%
LQModel 5t-3	85%	90%	87.5%
LQModel 6t-3	100%	100%	100%
LQModel 7t-3	90%	90%	90%
Altman	95%	0%	49%
Ohlson	100%	30%	65%

Table 11
Similar Size Company (t-1) Classification Table

	Delisted	Listed	Overall
SSModel 1 t-1	75%	70%	73%
SSModel 3 t-1	70%	75%	73%
SSModel 4 t-1	83%	83%	83%
SSModel 5 t-1	60%	85%	73%
SSModel 6 t-1	60%	85%	73%
Altman	100%	10.5%	55%
Ohlson	95%	25%	60%

Table 12
Similar Size Company (t-3) Classification Table

	Delisted	Listed	Overall
SSModel 4 t-3	75%	85%	80%
Altman	94.4%	11.1%	49%
Ohlson	100%	20%	58%

Based on this summary, it is plausible to conclude that the proposed models have a better performance than Altman Z-Score and Ohlson O-Score because the new pro-posed model might be much more suitable for Indonesian companies. The summary of LQ45 presented above indicates that the highest classification power for each classifica-tion groups (delisted, listed and overall) is derived from the new models proposed. Moreover, from delisted counterparts companies' tables, it is also found that the highest classification power for overall classification groups comes from the new models pro-posed. Although the new models do not have a better classification power than Altman Z-Score and Ohlson O-Score in every classification group as shown in tables above, hy-pothesis 2 is remain accepted because the results from the group of LQ45 have better classification power than Altman Z-Score and Ohlson O-Score.

CONCLUSION AND LIMITATION

Based on research question and research objectives presented in earlier section, this study examines whether financial ratios can be used to predict financial distress in Indonesia. Moreover, it is also expected that the new models from this study would be better than Altman Z-Score and Ohlson O-Score models. The conclusions of this study are as follow 1) Financial ratios can be used to predict financial distress in Indonesia. In general, several financial ratios can be simultaneously used to predict financial distress. The power of the combined financial ratios is much higher than that of individual ratio; 2) The new models proposed, Altman Z-Score and Ohlson O-Score have various classification powers in predicting financial distress. See manual comparison results in section 4.5; 3) The new models proposed in this study could better explain the financial distress for Indonesian companies compared to Altman Z-Score and Ohlson O-Score. This may be due to—based on the data employed—the two models are more suitable for US com-panies while the new models are suitable for Indonesian companies; 4) The differences between delisted and LQ45 financial ratios are higher than the differences between de-listed and their counterparts' financial ratios. This may be due to the financial condition of the counterparts of delisted companies are not really healthy; 5) The more different the dependent variable of distress and non-distress companies, the more significant and the higher the classification power of the model formulated. See the logistic regression and manual comparison results in section 4.4 and 4.5.; 6) TA/GNP has a high influence in making the models to become more significant and to have higher classification power in predicting financial distress. On the other hand, MVE/TL has an inconsistent influence in making the models to be better or worse in predicting financial distress. CL/TA is the financial ratio which most frequently shown as a significant ratio in predicting financial distress. The second highest ratio which frequently appears is MVE/TL. See the logistic regression result in section 4.4; 7) Altman Z-Score and Ohlson O-Score have a high clas-sification power in predicting financial distress. But they have less power to separate dis-tress from non-distress companies. See the manual comparison result in section 4.5.

There are also some limitations in this study which are presented below 1) Due to the incomplete year to year data, this study can only use 23 delisted companies during 2004-2011. These are the only data which meet the financial distress characteristic; 2) There are no real bankruptcy data in Indonesia so they cannot be used as the dependent variables. Therefore, this study use delisted companies' data as the dependent variable. For the future study, it is expected that there will be more financial data that can be used to conduct a study of financial distress prediction. Future study may also add indepen-dent variables other than financial ratios. The macro-economic indicator sensitivity from each company could be an interesting additional variable to be examined. Future study may also calculate the cut-off point between the distress companies and non-distress companies score. Hence, a new score like Altman Z-Score and Ohlson O-Score can be formulated.

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