Good Corporate Governance and Predicting Financial Distress Using Logistic and Probit Regression Model

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ABSTRACT

The study aims to prove whether GCG is able to predict the probability of companies experiencing financial difficulties. Financial ratios that traditionally used for predicting bankruptcy remains used in this study. Besides, this study also compare logit and probit regression models, which are widely used in research related accounting bankruptcy prediction. Both models will be compared to determine which model is more superior. The sample in this study is the infrastructure, transportation, utilities & trade, services and hotels companies experiencing financial distress in the period 2008-2011.

The results show that GCG and other three variables control i.e DTA, CR and company category do not proven significantly predict the probability of companies experiencing financial difficulties. NPM, the only variable that proved significantly distinguishing healthy firms and distress. In general, logit and probit models do not result in different conclusions, both of the model confirm the goodness of fit of models and the results of hypothesis testing. In terms of classification accuracy, logit model proves more accurate predictions than the probit models.

Key words: good corporate governance, financial distress, financial ratio, logistic regression, probit regression

INTRODUCTION

Implementation of GCG consistently will support firm's performance and reduce the likelihood of financial distress. Fich & Slezak (2007) and Daily & Dalton (1994) proved that the implementation of GCG keep companies from financial distress and make companies sustain. Sulistyanto dan Prapti (2003) found that companies which implement GCG consistently also enjoy positive response from their investors and creditors. Companies'image are also contributed by GCG implementation.

McKinsey in one of its survey conducted jointly with the World Bank, Park and Institutional Investor Magazine in 2000 (in Coombes & Watson, 2000), reveals that companies which implement a high standard of CGC will further attract investors and keep investor in the capital market. Investors believed that their investment will be protected in well-managed companies. Investor trust will have a positive impact on the availability of working capital, while creditor confidence will impact on the decrease in the cost of debt (Ashbaugh et.al, 2004; Byun, 2007; Bhojraj & Sengupta, 2003). Furthermore, Elloumi & Gueyie (2001); Supatmi (2007); Huang & Zhao, (2008); Fich & Slezak (2008); Ward & Foster (1997), Yin & Tsui (2004) and Sengupta & Faccio (2011) proved that the probability of financial difficulties of implementing GCG, is lower than companies that do not implement GCG.

The objective of this article is to observe the role of corporate governance in predicting the likelihood of companies experiencing financial distress. The majority of research on the prediction of financially distress companies usually used financial ratios as predictor variables. On the other hand the implementation of GCG which has more than a decade in Indonesia needs to be empirically proven its benefits to the company, especially its role in saving the company from financial difficulties.

Another aim of this article is to compare two regression models namely logistic and probit regression, to see whether logit or probit model is actually better to predict, since the two models widely used in accounting research. Logit model using the cumulative logistic function (logistic CDF), while probit model using the normal CDF. Theoretically the difference between the two models lies in the tail of the curve, where the curve probit (normal CDF) reaches the axes more quickly than the logit curve (logistic CDF). In practice, the choice of probit or logit models lies on the convenience of mathematical calculation and availability of application programs. Based on the two issues above, logit is generally preferred over probit (Gujarati 2004).

LITERATURE REVIEW AND HYPOTHESIS

Financial Distress (FD)
Financial distress is the result of deterioration in a company's business, which can be caused by several things, for example, poor management, unwise expansion, fierce competition, too much debt, court lawsuit and unfavorable contracts (Emery, Finnerty & Stowe 2007). Meanwhile, Hofer (1980) and Whitaker (1999) define financial distress as a condition in which company had negative net income for several consecutive years.

While Almilia (2004) defines financial distress as a condition experienced delisted due to negative net income and book value of equity. Plat and Plat (2002) defines financial distress as a step decrease in financial condition that occurred prior to the bankruptcy or liquidation. In this study companies is grouped as experiencing financial distress if it has negative retained earnings and net income during the two sequential years. Companies included in the group of healthy companies are numbered 0, while number1 for the company that includes in the unhealthy group or experiencing financial distress.

Good Corporate Governance

Corporate governance is important to shareholders because of the information asymmetry in which shareholders can not directly observe the actions of management thus potentially creating problems of moral hazard and adverse selection (Ashbaugh, et.al 2004). Corporate governance represents a set of mechanisms aimed to reduce agency costs resulting from the existence of information asymmetry. Attribute indicates that the company is implementing good corporate governance can be seen from an organizational structure that accommodates oversight mechanisms accountable, transparent and impartial. The existence of independent board of commissioners, audit committees, and institutional ownership is seen as a positive attribute that would secure the interests of both shareholders and other stakeholders.

In this study the application of GCG is measured by determining the score, this study will use a method similar with FCGI, the difference lies in the aspects assessed. GCG assessed from three aspects: the board, audit committee and ownership structure. The weight to the third aspect considered the results of previous studies that prove that the structure of ownership, both institutional and managerial has a significant influence on the level of supervision and performance management. Furthermore GCG score is calculated based on the value of every aspect of GCG by the following formula:

$$GCG\ score = \left[\left(\frac{OS}{TOS} \times 40\%\right) + \left(\frac{BD}{TBD} \times 35\%\right) + \left(\frac{AC}{TAC} \times 25\%\right)\right] \quad (1)$$

where:
OS : ownership sructure score
TOS : overall ownership structure score
BD : board of directors score
TBD : overall score of board of directors
AC : audit committee score
TAC : overall audit committee score

Financial Ratio

According to Brigham and Daves (2003), signs of potential financial distress is usually apparent in the financial ratio long before the company actually failed. Researchers, generally use this ratio to predict the probability of a company going bankrupt. Financial ratios used in the study is selected based on results of previous studies in which financial ratios have been proven consistently as predictor variables. There are three financial ratios using in this study. Net profit margin is to measure the profitability of the company. It measure the efficiency in the use of company assets and manage its operations. Net profit margin is defined as follows:

$$Net\ Profit\ Margin = \frac{Net\ Income}{Sales} \tag{2}$$

Net profit margin is very useful for comparing the performance of companies within the same industry. A high net profit margins indicates a company has better control over costs than its competitors.

Current ratio is the ratio used to measure a company's ability to pay its short-term liabilities with current assets. Current ratio is defined as follows:

$$Current\ Ratio = \frac{Current\ Assets}{Current\ Liabilities} \tag{3}$$

A high current ratio indicates a good liquidity, means a better guarantee on short-term debt. But if it is too high, the effect on earning power is also not good, because not all working capital utilized but also indicates a lack of efficiency in the use of cash and other current assets (Ross, Westerfield, and Jordan 2008).

Debt to asset ratio is a ratio used to measure how much of the company's assets funded by debt. Debt to asset ratio is defined as follows:

$$Debt\ to\ Asset\ Ratio = \frac{Total\ Debt}{Total\ Asset} \tag{4}$$

The higher this ratio, the greater the amount of debt used to generate profit and the higher level of debt and financial leverage. If the ratio is above 1, meaning all assets funded by debt, and would be quite harmful to the company if the loan is due (Gitman 2009).

Hypothesis

GCG score indicates the level of implementation of GCG in an enterprise. The higher the score GCG means the BOC function, the Audit Committee and Ownership Structure have done a good job so that opportunities to commit fraud management will minimized. It lead company to achieve its goal, enable to creates positive net income and retained earnings, in turn allows company to avoid financial distress. Gompers, et al (2003) found that companies that implement GCG will experience increased performance. Daniri in Nuswandari (2009) found that the implementation of good corporate governance can reduce the likelihood of financial distress. Therefore, the hypothesis is :

H_1 The higher the GCG score, the lower the possibility of companies experiencing financial distress

Net Profit Margin Ratio is used to calculate the extent to which the company's ability to generate net income in certain sales levels (Bastian & Suhardjono, 2006). The higher this ratio showed an increase in sales of the company is greater than the expenses incurred. It enables company to keep positive net income and retained earnings so that the likelihood of financial distress is reduced. Based on the above, the second hypothesis can be stated as follows:

H_2: The higher the NPM ratio, the less likely the company experienced financial distress.

Almilia (2004) showed that the ratio of DTA has positive and significant impact on financial distress, meaning that the higher the ratio the more likely DTA companies experiencing financial distress. Iramani (2008) also concluded similar results where the DTA significant effect on financial distress and prove that DTA companies experiencing

financial distress is higher than healthy companies. Based on the above, the third hypothesis can be stated as follows:

H_3: The higher Debt to Total Assets Ratio, the more likely the company experienced financial distress.

Companies that have a low current ratio less than one means or suggests that a company's current assets are insufficient to meet short-term obligations maturing, therefore the possibility to experience financial difficulties is greater than a company that has a high current ratio. Several studies have shown that the current ratio negatively affect the financial distress and can be used to predict the financial distress of a company. The studies include research by Almilia and Kristijadi (2003); Beaver (1966) the Platt and Platt (2002). Based on the above, the fourth hypothesis is proposed:

H_4: The higher the current ratio, the less likely the companies experienced financial distress.

In this study, samples are also categorized by industry groups namely (1) the business sector of infrastructure, transportation and utilities as category 1 and (2) the business sector trade, services and investment as category 2. To see whether the industrial sector can differentiate whether the company will experience financial distress or not, then proposed the following hypothesis

H_5 : The industry group was able to distinguish the possibility of companies experiencing financial distress.

RESEARCH METHOD

Model Analysis

Model analysis used to predict financial distress based on above hypotheses, each of model is formulized as follows:

Logit model of equation is:
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Ln P/(1-P)= β₀- β₁GCG – β₂NPM + β₃DTA – B₄DTA – β₅Cateogory + uⱼ
(5)
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While probit model of equation is :
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p = Φ(β₀– β₁GCG – β₂NPM + β₃DTA – β₄CR – β₅Category + uⱼ)          (6)
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This study analyzed the relationship between these variables. The definition of each is as follows
a. Financial distress: a company categorized as financial distress company, if it has the Negative Negative Net Income and Retained Earnings. Companies included in the category of financial distress given code (1) and code (0) is for healthy companies.
b. GCG is proxied by the board of directors, audit committee and ownership structure.

Board of director is measured by:
   - Composition of board of commissioners of the board of director

- Number of independent board of directors.

Audit committee is measured by:
- Composition of independent audit committee of total audit committee. Komposisi komite audit independen terhadap total komite audit;
- The number of audit committee;
- The competency of audit committee.

Ownership structure is measured by:
- The portion of managerial ownership
- The portion of institutional ownership.

Each measure given point 1 if met, if not met, then given 0 points. To obtain a total score of GCG then used the formula :

$$GCG\ score = \left[\left(\frac{OS}{TOS} \times 40\%\right) + \left(\frac{BD}{TBD} \times 35\%\right) + \left(\frac{AC}{TAC} \times 25\%\right)\right] \ (1)$$

c. NPM : *portion of net income to total sales.*
d. DTA : *portion of debt to total asset*
e. CR: *portion of current asset to current liabilities.*
f. Category: industrial sector, 1 = infrastructure, transportation and utility, 2 = commercial, services and hotel.

Research Sample

The sample in this study is a company experiencing financial distress in the period 2008-2011, in infrastructure, transportation and utilities sector and trade, services and hotels sector. The number of eligible companies totaling 111 companies. To determine the status of the company in a state of financial distress or not, is used the above criteria, that is companies have a negative net income and retained earnings during two consecutive years. This study only uses the data 1 year before the company experiencing financial distress. Data in 2007 to predict the year 2008, the data in 2008 to predict the year 2009, the data in 2009 to predict the year 2010, and the data in 2010 to predict 2011.

DISCUSSION AND FINDING

Descriptive Statistic
The hypotheses are tested using two statistical tests, namely logistic regression and probit regression. The use of the two statistical tests is to find out which methods is more accurate to test the hypothesis. There are 111 eligible companies, 100 companies are used as samples and selected using random sampling, the remainder will be used to test the accuracy of the model. Based on 100 samples selected, descriptive statistical is analyzed, and found that there are some extreme value of CR compared to the average value of CR of sample company. To reduce the potentially disturbing results, then companies that have an extreme value of CR excluded from testing. There are 4 companies that are not included in the testing because of the extreme value of CR, and 1 company with NPM extreme values is also excluded from the sample, so the number of samples remaining 95 companies consisting of 64 healthy companies and 31 unhealthy

companies. Descriptive statistical runs once again after all samples with extreme values are excluded, results as shown in Table 1.

Table 1. Descriptive Statistic

	FD	Min	Max	Mean	Std Dev
GCG	0	0.2500	1.0000	0.5964	0.1743
	1	0.2000	0.8250	0.5818	0.1425
	all	0.2000	1.0000	0.5911	0.1654
NPM	0	-1.7212	0.7473	0.0366	0.2580
	1	-1.8865	0.1803	-0.1912	0.4780
	all	-1.8865	0.7473	-0.4540	0.3529
DTA	0	0.0500	0.9123	0.5013	0.2129
	1	0.0400	2.2005	0.6863	0.4380
	all	0.0400	2.2005	0.5660	0.3046
CR	0	0.0800	6.7420	1.8530	1.4490
	1	0.0621	4.1420	1.3700	1.0700
	all	0.0621	6.7420	1.7007	1.3531

The mean score GCG of healthy and unhealthy companies does not differ much. On average, GCG score of all sample companies are high, that is 0.59 from the highest score 1. The NPM ratio for the unhealthy companies show negative numbers, while the average NPM of healthy companies is positive albeit small. The ratio DTA of the unhealthy companies slightly higher compared with healthy companies, although in general average DTA ratio is quiet high, that is 0.566. Meanwhile, the average value of the CR of group healthy and unhealthy companies do not differ much and the mean of CR of entire sample firms is quiet high.

Goodness of fit

Prior to further analyze and interpret the test results, it is important to know the goodness of fit of the model predictions.

Table 1. Sumarry of Goodness of Fit (p-value in parantheses)

	Logitistic Regression	Probit Regression
Log-likelihood	-51.964	-52.173
	(0.007)	(0.008)
Hosmer-Lemeshow	4.14	10.281
	(0.844)	(0.246)

Logistic regression model shows the log-likelihood of -51,964 with p-value 0007, significance under $\alpha = 0.05$ means the model fit. Test the accuracy of models can also use the Hosmer and Lemeshow Test. Unlike the common goodness of fit test, in Hosmer and Lemeshow Test, to see if the empirical data conform to the model, the value of the Hosmer-Lemeshow p must be above 0.05 (for $\alpha = 0.05$). In this test Hosmer-Lemeshow 4.140 with p-value 0844> of 0.05 indicates that the model fit.

Test the feasibility of using probit regression models shows almost the same results with preceding model, ie log-likelihood -52,173 with p-value = 0.008, mean model fit, while the Hosmer-Lemeshow shows 10.181 with p-value = 0.2486, above 0.05 confirms that the feasibility of this model are met.

Results of Hypothesis Test

Summary of test results using logistic and probit regression (Table 2), showed consistent results, although the figures of estimated parameters are different**.**

Table 2. The estimated parameters (standard error and p value in parentheses)
Logistic Regression vs Probit Regression

Predictor	Logistic Regression	Probit Regession
Constant	0.1753	0.03580
	(1.5426)	(0.9082)
	(0.910)	(0.969)
GCG	-1.5605	-0.8046
	(1.7307)	(1.002)
	(0.367)	(0.422)
NPM	-2.4159	-1.1988
	(1.0910)	(0.0535)
	(0.027) *)	(0.025)
DTA	1.37360	0.7639
	(0.8881)	(0.5109)
	(0.122)	(0.135)
CR	-0.3127	-0.2025
	(0.243)	(0.1485)
	(0.2680)	(0.173)
Kategori (2)	-0.5556	-0.2844
	(0.6278)	(0.3667)
	(0.376)	(0.438)

*) signifikan pada $\alpha = 0.05$

To compare the results of the two models above, Amemiya (in Gujarati 2004), suggested to multiply the logit parameter estimates by 0625 so the estimated parameter will closer with the estimated logit. However, because the two models give consistent results, though the number of estimated parameters are not the same, then the suggestion of Amemiya is not necessary.

Table 2 shows that of the five proposed hypotheses, only hypothesis 2, which proven, the higher the NPM ratio the less likely the firm will experience financial distress, NPM coefficient significant at $\alpha = 0.05$. These results were consistent in both models either logit or probit. The four other hypothesis is not proven significantly to predict the likelihood of companies experiencing financial distress. All coefficient either logit or probit produce direction according to the relationship hypothesized.

GCG variable is not able to predict the likelihood of companies experiencing financial distress, because the average score GCG between healthy companies and

distress did not differ much (Table 1). Companies are classified as unhealthy GCG proved to have a high enough score the same as a healthy company. Sylvia and Siddharta (2005) suggests that the implementation of good corporate governance in Indonesia is only done to comply with any formal or regulation but not to enforce good corporate governance (GCG) in the company. Besides that mechanisms of an organizational structure is not ineffective oversight function, so that the high corporate governance scores have no effect on the performance of the organization and the possibility of being healthy or unhealthy organization.

Coefficient of DTA using logit and probit is 1.37360 and 0.7639 consecutively (Table 2) fit the relationship predicted, that is positively related to corporate financial difficulty, unfortunately the coefficient is not significant. DTA mean for healthy firms is lower than the unhealthy firms, but it does not sharply differ with the mean across the sample DTA, that is 0.5660 (Table 1). Kasmir (2008) stated that the ratio of DTA healthy companies is under 35%, whereas this research shows that the DTA ratio of healthy company exceeds 35%, and not too different from the unhealthy company. That is why the DTA does not significantly predict the probability of healthy and unhealthy companies. Research by Almilia and Kristijadi (2003) and Widarjo and Setiawan (2009) also failed to prove the DTA effect on the possibility of firms experiencing financial distress

Current ratio (CR), is also not able to predict whether the company experiencing financial distress or not. Although resulting coefficient fits the relationship predicted. CR profiles that are categorized as healthy and unhealthy indicate numbers that are not too different, even the CR ratio unhealthy companies still above 1 (Table 1), meaning that on average companies in the unhealthy group are not experiencing liquidity problems. This is reasonable because these companies should provide sufficient short-term funds, in order to remain able to sustain its operations. It is intended to delay the threat of bankruptcy or dissolved.

Moreover, opportunities to experience financial difficulties do not differ between the industrial sector, it is evident that the coefficient is not significant using either logit or probit models

Accuracy Classification Test (in sample and out sample)

Logit and probit equation model obtained from previous testing, both models have met the feasibility of this model, as in the analysis in the above section. To find out which model is better, then the model equations applied to the samples tested and compared with empirical data (in samples and out sample).

Logit model of equation is:

```
Ln P/(1-P) = 0.1753 - 1.5605GCG - 2.4159NPM + 1.37360DTA -
             0.3127DTA - 0.5556 Kategori
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While probit model of equation is :

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p = Φ(0.03580 - 0.8046GCG - 1.1988NPM + 0.7639DTA - 0.2025CR -
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0.2844 Kategori)
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In sample

In this section the model logit and probit equations applied to the data to test the 95 eligible data, the sample group consisted of 64 healthy companies and 31 sample groups of distress (unhealthy). The results are presented in tables 3 and 4, respectively for the logit and probit. Test classification accuracy using a sample that was tested produces a quite high classification accuracy rate. Logit in this case is better than the probit because of the level of classification accuracy of 77.89%, compared with 71.58% using probit

Table 3. Test the accuracy of classification: Logit Model (in sample)

Observed	Predicted FD		Percentage correct
	0	1	
FD			
0	64	0	100.00
1	21	10	32.00
Total percentage correct			77.89

Table 4. Test the accuracy of classification:Probit Model (in sample)

Observed	Predicted FD		Percentage correct
	0	1	
FD			
0	64	0	100.00
1	27	4	12.90
Total percentage correct			71.58

Out sample

To see whether the level of accuracy of classification are consistent on the sample that was not tested, the next model of the regression equation applied to the remaining samples were not tested a total of 11 samples, consisting of 5 healthy companies (0) and 6 unhealthy companies (1). The results are presented in tables 5 and 6.

Table 5. Test the accuracy of classification: Logit Model (out sample)

Observed	Predicted FD		Percentage correct
	0	1	
FD			
0	5	0	100.00
1	5	1	16.67
Total percentage correct			54.55

Table 6. Test the accuracy of classification: Probit Model (out sample)

Observed	Predicted FD		Percentage correct
	0	1	
FD			
0	5	0	100.00
1	6	0	0.00
Total percentage correct			45.55

The results prove that the accuracy of the classification of the out samples lower than in samples tested. The small of data of not tested samples, likely contribute to the relatively low accuracy. However, both the classification accuracy test results confirm that the logit models are superior to the probit model, with the higher percentage classification of accuracy.

CONCLUSION AND LIMITATION

The main objective of this research is to prove the contribution of GCG to predict companies financial distress. The results show that GCG and other three variables control i.e DTA, CR and company category do not proven significantly predict the probability of companies experiencing financial difficulties. NPM, the only variable that proved significantly distinguishing healthy firms and distress.

In general, logit and probit models do not result in different conclusions, both of the model confirm the goodness of fit of models and the results of hypothesis testing. In terms of classification accuracy, logit model proves more accurate predictions than the probit models. Therefore, this results suggest that logit model is superior than the probit model and better to consider using of logit model in the next research.

Data to predict financial distress only one year before distress occurred and not compared with two or three year before, could potentially limit an adequate explanation. Industrial sector selected based on the availability of data may not representative enough to infer the real condition how the variables hypothesized actually influnce the posibility of financial distress.

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