The Determinants of Credit Risk in Malaysia

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Abstract

The aims of this study are to investigate the determinants of credit risk and to examine the impact of earnings management on credit risk prediction. The results showed that the liquidity ratio was significant in determining credit risk before and after earnings management was adjusted. Meanwhile, the productivity ratio was significant in the unadjusted model, while the profitability ratio was significant in the adjusted model. The overall percentage of correct prediction showed that the unadjusted model predicted better than the adjusted model. This study provides knowledge about the effect of earning management on bankruptcy prediction.
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1. Introduction

Credit risk refers to the risk of an economic loss from the failure of counterparty to meet its contractual obligations (Jorion, 2009) and nowadays, it is becoming very pervasive. Basel Committee (2001) has identified credit risk as the dominant risk for banking sector. Credit risk is associated with the core business of banks, which involve loan lending and deposit activities. Palubinskas and Stough (1999) found that bad loans, lack of banking skills, lack of regulation, deposit insurance, mismanagement and corruption were the factors that caused bank failures. Meanwhile, Andrade and Kaplan (1998) found that the primary cause of distress was firm's high leverage while poor firm performance and poor industry performance do not contributed much in explaining distress. They also found that operating and net cash flow margins declined significantly after the firms fell into distress and rebound in the year before distress is resolved. In addition, Andrade and Kaplan (1998) discovered that distressed firms will cause costly investment cuts and depressed asset sales. The cost of financial distress is estimated to reach as high as 10-20 percent of the total firm

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value. A prior study done by Kaplan and Stein (1993) also found that high debt levels led to higher likelihood of bankruptcy.

Opler and Titman (1994) explained that highly levered firms tend to lose substantial market share to their healthy counterparties and experienced lower operating profits when the industry was undergoing downturn. They also discovered that stock returns of highly levered firms were lower than their less levered competitors when the industry is in distressed. Purnanandam (2008) highlighted three major costs resulted from financial distress. First, financially-distressed firm may lost its customers, suppliers and key employees. Second, financially-distressed firm have higher tendency to violate its debt covenants or failed to meet its obligations. Lastly, financially-distressed firm may need to surrender their positive net present values (NPV) projects due to high external financing cost. From the above discussion, it was obvious that market participants would need to pay a huge compensation for mishandling the credit risk. Thus, it is imperative that a more sophisticated model be developed to measure and control for credit risk.

One of the mostly used and generally accepted methods in managing credit risk is the default prediction model using financial ratios. Over the years, financial ratios have been applied and its accuracy has been proven to determine financial status of a firm. It has also been used to predict financial distress or bankruptcy by market participants. Due to its ease of application and understanding, it is still being used today by investors and analysts. However, since these financial ratios rely heavily on accounting figures, there are several issues questioning its predictive power. According to Basu (1997), accounting figures can affect a firm's position due to the asymmetric practice of reporting such as conservatism principles in recording the loss and gain of the firm. Leuz, Nanda and Wysocki (2003) conducted a study on the systematic differences in earnings management using 31 countries. They highlighted that Malaysia, Hong Kong and Singapore had the worst earning management compared to other common law countries (law system that formed based on decisions in cases by judges). Besides, Cho, Fu and Yu (2012) deemed that the existence of earning management using accounting figures and the changes in accounting principles have made the conventional Z-score model failed to consider earning manipulations that may exist among firms. Therefore, based on their study, earnings management adjustment should be made on the financial figures used in calculating bankruptcy tendency.

As an emerging country, credit risk management plays a crucial role to uphold the confidence of investors to invest in Malaysia. According to Bank Negara Malaysia (BNM) (2008), a sound measurement of corporate sector soundness may have an impact on the stability of financial system for a country. Based on BNM report, the bankruptcy cases in Malaysia (including bankruptcy cases for public listed companies, private companies and individual) has increased to 2366 cases in July of 2013 (highest since 1998), which increased by 467 cases compared to 1899 cases in June of the same year. In other words, the incremental of bankruptcy cases reflected that more and more companies fail to repay their debt and continue their business. Thus, this phenomenon of increasing number of bankrupt firms should be taken into account by all market players in order to derive a more sophisticated tool to predict the bankruptcy probability. Therefore, a forward looking model that can predict the level of credit risk that leads to corporate failure can prevent investors from making wrong judgment on their investment decisions and help the corporation to review its business strategy. In addition, it can also help credit providers to mitigate and manage such threats. As a consequence, the credit risk will be maintained at a secure level.

Thus, this study aims to investigate whether the accuracy rate in predicting financial distress using financial ratios will increase after the adjustment is made on the earnings management portions. By adding the abnormal accrual as one of the variable, this study helps in determining potential bias among accounting figures. Furthermore, the findings are useful and it provide empirical evidence to credit providers, investors, corporations and even regulators about the importance and the effect of earning management.

2. Literature Review

Credit is usually referred to borrowing and lending of money. Basically, it refers to a loan that is granted to a borrower or a financial instrument (i.e. fixed coupon bond) that involves pre-determined fixed payments and is made over a set time period. According to Anita (2008), credit risk is defined as the potential loss of valuable assets caused by probable deterioration in the creditworthiness of counterparty or its inability to meet contractual obligations. It has been identified as the dominant risk for banking firms as the core business of banks are loan lending and deposit activities (Basel Committee, 2001). Furthermore, securities firms may face credit risk as well due to their involvement

in derivatives market, borrowing or lending securities and making margin loans to customers. Thus, credit risk depends on the ability of borrowers to generate sufficient cash flows through operation, earnings, or asset sales to meet their future interest and principle payment of the outstanding debt.

Asquith, Gertner and Scharfstein (1994), showed that companies response to distress by doing bank debt restructurings, public debt restructurings and asset sales. On average, financial distressed firms would need to sell 12 percent of their assets in order to implement their restructuring plans such as payoff senior private debt. Honohan (1998) stressed that when a bank failed or distressed, losses will be incurred by depositors, government, other creditors of banks and banks' shareholders. Moreover, the distressed condition may leads to a contagious panic which may cause bank runs and causing a domino effect in the banking industry. Beside, deposit freezing due to bank failure may cost the banks more as they need to pay the depositors with interest. It is obvious that market participants would need to pay a huge compensation for their mishandling of credit risk. Thus, it is crucial that a more sophisticated model be developed to measure and control for credit risk.

Default prediction model has become one of the oldest and major tools that have been used to predict the probability of default. Empirical studies on default prediction are dated back to 1960s, pioneered by Beaver and Altman (Hol, Westgaard & Wijst, 2002). It started with a univariate discriminant analysis developed by Beaver in 1966 and is expanded by Altman (1968) towards multivariate discriminant analysis (MDA) which is still being applied today through the famous Z-score model.

Since then, researchers have attempted to develop other methods in predicting the probability of default. Instead of the traditional discriminant analysis, the literature on default prediction has increased to encompass various method of default prediction such as Cox proportional hazards model (Henebry, 1996), logit analysis (Ohlson, 1980; Barros, Ferreira & Williams, 2007), neutral network (Tam and King, 2001) and option-pricing model (Charitou et al., 2013). Altman and Saunders (1998) suggested that there were significant improvements in credit risk measurement literature over the last 20 years. Based on past researches, Table 1 summarized the key financial indicators that have shown significant relationship with financial failure or bankruptcy, which includes profitability ratio, leverage ratio, productivity ratio and liquidity ratio.

Table 1. List of financial ratios used in previous study.

Author(s)	Year	Significance of financial ratio(s) in determine financial distress or bankruptcy.
Altman	1968	Profitability, productivity, liquidity, leverage and activity ratios.
Keasey and McGuinness	1990	Profitability and efficiency ratios.
Fons and Viswanathan	2004	Interest coverage and leverage ratios.
Thai and Abdollahi	2011	Liquidity, profitability, leverage and cash flow ratios.
Tykvová and Borell	2012	Liquidity, profitability and solvency ratios.
Yap, Munuswamy and Zulkifflee Mohamed	2012	Cash flow to total debts ratio and total debts to total assets (liquidity ratio), retained earnings to total assets (profitability ratio) and cash to current liabilities (solvency ratio).
Korol	2013	Earnings before interest and tax to total assets (profitability ratio), net profit to total asset (activity ratio), total liabilities to total assets (debt ratio), working capital to total assets (liquidity ratio) and total revenues from sales to total assets (activity ratio).

Financial reporting plays a crucial role in providing information that is useful to present and potential investors and creditors to help them to make decision on investments, credits and trading activities (Spiceland, Sepe & Tomassini, 2007). There are many accounting professions that prepare guidelines or known as accounting standard to assure the quality of accounting report. For example, the Malaysian Accounting Standard Board (MASB) was established to develop and issue accounting and reporting standards within the country in order to promote high quality accounting and reporting standards that is consistent with international standards (MASB, 2013). However, even

though there are series of guidelines that help in standardizing and guiding the practices of accounting reports, the possibility of accounting distortions, especially the earning management behavior still exist (Roychowdhury, 2006; Yang, 2013).

Jackson and Pitman (2001) defined earnings management as the manipulation of accounting numbers within the limit and scope of the Generally Accepted Accounting Principles (GAAP). Studies have been conducted to determine the factors that contribute to corporate failure and accounting fraud was found as one of the factors. According to Yap *et al*. (2012), if a collapse of a firm cannot be detected earlier, this may due to the firm did not disclose true and adequate information about their financial condition. Besides, this also reflects that the accounting standards and other regulations or legal requirement may not be enough to ensure fair and transparent disclosure. Meanwhile, Shen, Huang, Hassan and Iftekhar (2012) found that the effect of financial ratios on credit ratings is significantly affected by the level of information asymmetries. They also suggested that for banks to improve the credit rating, the information asymmetry in the country should be reduced.

Thus, corrective actions should be taken to adjust the company information biases in order to prevent poor decision making and improve company performance. As a result, the objective of this study is to determine whether the accuracy of predicting financial distress would be increased if earnings management portions are adjusted particularly in the emerging market as previous studies (such as in Cho *et al.*, 2012) were focusing on developing market.

3. Method

The sample comprises of distressed and non-distressed companies listed in Bursa Malaysia. The list of financially-distressed companies was obtained from the PN 17 list from Bursa Malaysia. It was then paired with healthy companies based on its industry and size. As of 9th September 2013, there were 26 firms listed in the PN 17 list. The financial data was collected from the Thomson Reuters DataStream. The study was conducted to cover the period from 2006 to 2012. The final sample consists of 30 companies, which is made of 15 financially-distressed firms and 15 healthy companies from four sectors. The sectors are trading and services (10 companies), industrial products (12 companies), consumer products (4 companies) and construction (4 companies).

Four financial ratios were selected as the independent variables. The ratios were liquidity ratio (working capital / total assets), productivity ratio (retained earnings / total assets), profitability ratio (earnings before interest and taxes / total assets) and leverage ratio (book value equity / total liabilities. The model before the earnings management adjustment was constructed as in (1):

$$Unadjusted = \lambda_0 + \lambda_1 x_1 + \lambda_2 x_2 + \lambda_3 x_3 + \lambda_4 x_4 \tag{1}$$

Where:
x_1 = Liquidity ratio
x_2 = Profitability ratio
x_3 = Productivity ratio
x_4 = Leverage ratio

Since this study aims to examine the effect of earning management in financially-distressed companies, firstly, the model has to be adjusted. Following Cho *et al.* (2012), earnings management is adjusted as shown in (2):

$$
\begin{aligned}
\text{Adjusted} = \lambda_o + \lambda_1 & [(\text{Working capital} - EM) / (\text{Total asset} - EM)] + \\
\lambda_2 & [(\text{Retained earnings} - EM) / (\text{Total asset} - EM)] + \\
\lambda_3 & [(\text{Earnings before interest and taxes} - EM) / (\text{Total asset} - EM)] + \\
\lambda_4 & [\text{Equity} / (\text{Total liabilities} - EM)]
\end{aligned}
\tag{2}
$$

Where:
EM = earnings management

In order to calculate the earnings management, the total accruals have to be determined. Normally, researchers used the discretionary accrual to study the effect of accounting changes to bankruptcy prediction (Kothari, Leone &

Wasley, 2005; Cho *et al.*, 2012). They estimated the amount of earning that deviated from the expected figure by assuming that it is subjected to accounting manipulation. Three steps were used in the calculations.

The total accruals before adjustment are calculated as in (3):

$$TA_{it} = EBXI_{it} - CFO_{it} \tag{3}$$

Where:
TA_{it} = total accruals for firm i in year t
$EBXI_{it}$ = earnings before extraordinary items for firm i in year t
CFO_{it} = cash flow from operations for firm *i* in year *t*

Next, after calculating total accruals for each firm in every industry and year, it will be regressed to determine the value of total accruals by year and industry as in (4):

$$TA_{it} = \beta_0 + \beta_1(\Delta Sales_{it} - \Delta AR_{it}) + \beta_2 PPE_{it} + \varepsilon_{it} \tag{4}$$

Where:
$\Delta Sales_{it}$ = change in sales revenue for firm *i* in year *t*
ΔAR_{it} = change in account receivables for firm *i* in year *t*
PPE_{it} = plant and equipment for firm *i* in year *t*

Finally, the betas derived from the regression analysis as in Equation (4) (classified by year and industry) were replaced in order to determine the abnormal accruals or earning management (EM) portions, as shown in (5):

$$EM_{it} = TA_{it} - [\beta_0 + \beta_1(\Delta Sales_{it} - \Delta AR_{it}) + \beta_2 PPE_{it}] \tag{5}$$

where the β values are the parameters estimates from Equation (4).

The logistic regression analysis was conducted by using both the unadjusted (Model 1) and adjusted model (Model 2). Logistic regression was suitable to describe and to test the relationship between a categorical outcome variable and one or more categorical of predictor variables (Peng, Lee & Ingersoll, 2002). This method has also been applied by other researchers to determine model accuracy in predicting firm failure or bankruptcy (Ohlson, 1980; Cho *et al.*, 2012).

4. Analysis of results and discussion

4.1 Descriptive analysis

The descriptive analysis was utilized to describe the main features of data used in this study. Measurements that have been used to obtain the descriptive statistics include mean, median and standard deviation. This study aims to determine the most appropriate model to predict financial distress among Malaysian public listed firms. Thus, the descriptive statistics for both unadjusted and adjusted models were calculated to describe the variability and dispersion, before and after the adjustments. The results for descriptive statistics are shown in Table 2.

Table 2. Descriptive statistics

Statistics	Unadjusted	Adjusted
Mean	3.8464	3.5732
Median	3.4795	3.5409
Std. Deviation	4.5342	5.1507

Table 2 shows that the mean values differ for both models. The mean value of unadjusted model was slightly higher than the adjusted model. The differences of 0.2732 suggested a downward trend in predicting financial distress using

both unadjusted and adjusted models. Accordingly, subsequent to the adjustment, the risk of distress increases. This increment reflects a higher probability of being classified as financially-distressed firm. Alternatively, it could also be said that earnings management has a biased effect on financial distress prediction and using an unadjusted model as a proxy will reduce distress risk. However, the standard deviation is higher for the adjusted model which indicates that the percentage of misclassification for bankruptcy is higher using the adjusted model.

4.2 Logistic regression

This study seeks to analyse the determinants of bankruptcy and to determine whether there is an improvement in the accuracy rate of distress prediction after the earnings management adjustment. These objectives are attained by using logit regression and its results are shown in Table 3.

Table 3. Logit regression for the unadjusted and the adjusted model

Variables	Unadjusted		Adjusted	
	B	Sig.	B	Sig.
X1	-5.979	.001**	-4.710	.002**
X2	3.152	.046*	1.023	.336
X3	-7.930	.116	6.924	.044*
X4	-.222	.622	-.717	.160
Constant	.985	.053	1.349	.011

**. Correlation is significant at the 0.01 level (2-tailed)
*. Correlation is significant at the 0.05 level (2-tailed).

Table 3 shows that liquidity was an important determinant of bankruptcy in both models (before and after adjustment for earnings management) where it was significant at 1% level. Another important variable in the unadjusted model is was the profitability ratio. It was measured by retained earnings/total assets, and it was significant at 5% level. Productivity ratio was significant at 5% level in the adjusted model, but was insignificant in the unadjusted model. The results for liquidity ratio corresponds to previous studies, that working capital to total assets ratio (liquidity ratio) was one of the significant factor to determine firm failure or bankruptcy (Thai and Abdollahi, 2011; Tykvová and Borell, 2012; Korol, 2013).

The results indicated that working capital to total assets (X_1) was negatively related to probability of distress. This result was similar to previous study where it suggested that a highly-liquid company had a lower probability of distress. However, the profitability ratio was positively related to probability of distress. This result contradicted with expectation since it reflected that firms with higher profit were prone to bankruptcy. Similar pattern was perceived for productivity ratio, it was negatively-related to financial distress under the adjusted model. The result also indicated that leverage was not a determinant of distress. The coefficient from the unadjusted model seemed to correspond to the expectation while the coefficient from the adjusted model, especially the productivity ratio was distorted.

Next, the accuracy rate for both models was examined. The results were compared and were displayed in Table 4. The results in Table 4 depicted that the percentage of correct classification for distressed firms was 76.7 percent using both models. In addition, the results suggested that the type 1 error for both models; which was an error in misclassifying distressed firm as non-distressed, is 23.3 percent. Similar result was also obtained by using adjusted model. This implied that both models had the same accuracy rate in predicting distressed firm. The correct classification percentage for distressed firm in this study was considered high, since Cho *et al.* (2012) obtained around 43 percent to 53 percent for correct classification percentage in their study.

On the other hand, under the Type II error (misclassifying the non-distressed firm as distressed firm), the unadjusted model performed better (16.7 percent) than the adjusted model (26.7 percent). This might be due to the accrual based method which was used in this study to calculate earnings management portion. According to Kothari *et al.* (2005), using accrual based method for calculation of abnormal accruals can decrease the Type I error. However, at the same time, the Type II error might increase. Thus, the Type II error for adjusted model was higher.

Koh (1991) stated that Type I error was more costly as misclassifying distressed firm might cause losses in business volume, losses in firm's reputation and potential lawsuits. Wahlen, Stickney and Baginski (2011) also stressed that Type I error was more costly than a Type II error as investor might lost the full amount they invested while Type II

error might cost investors in term of opportunity cost for their investment. The results showed that both models had similar type I error while the unadjusted model had a lower type II error. Nevertheless, the overall results showed that the unadjusted model had a higher accuracy rate compared to the adjusted model, and therefore it suggested that the unadjusted model was better and appropriate in predicting financial distress in Malaysian market.

Table 4. Accuracy rate for adjusted and unadjusted model

Classification Table								
Observed	Unadjusted				Adjusted			
	Predicted				Predicted			
	Distressed or non-distressed			Correct (%)	Distressed or non-distressed			Correct (%)
	Non-distressed	Distressed	Total		Non-distressed	Distressed	Total	
Non-distressed	25	5	30	83.3	22	8	30	73.3
Distressed	7	23	30	76.7	7	23	30	76.7
	Overall percentage			80	Overall percentage			75

This result contradicted with the results from Cho *et al.* (2012) where they found that the bankruptcy prediction model had improved its prediction power after the earnings management is adjusted. The reason might be due to the scope of study where Cho *et al.* (2012) focused on developing countries, while this study focused on the emerging market, particularly Malaysia. However, the study about the impact of earnings management on the bankruptcy prediction is still considered rare in the literature.

5. Conclusion

The escalating bankruptcy cases in Malaysia have also urged the development of a more sophisticated model in managing credit risk. The aim of this study was to determine whether earnings management adjustments could improve the accuracy rate for financial distress prediction using financial ratios. The first part of the analysis looked at the determinants of bankruptcy under the unadjusted model and the adjusted model by considering earnings management. For the unadjusted model, liquidity ratio and profitability ratio were significant while for the adjusted model, liquidity ratio and productivity ratio were significant. The second part of the logistic regression explained the percentage of correct classification for distressed and non-distressed firms. Both models had similar accuracy rate in predicting distressed firm, under Type I error. On the other hand, for Type II error, the unadjusted model performed better than the adjusted model. This phenomenon might be caused by the accrual based method used to calculate earnings management portion. The adjustment for earnings management portions failed to increase the accuracy rate in predicting financial distress firms among publicly listed firms in Malaysia. Therefore, investors and other market players that participate in Malaysian market may apply the unadjusted model to predict firm failure. This could make their credit risk management more efficient and improve their decision making process. As a consequence, their credit risk exposure will be reduced and profit gain might be enhanced.

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