

Prediction of Financial Distress Companies in the Consumer Products Sector in Malaysia

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Abstract

This study attempts to predict financial distress companies in the consumer products sector in Malaysia using financial distress companies as the dependent variable and financial ratios as the independent variables. Logit Analysis was used as the analysis procedure because financial ratios do not have to be normal if it is used. It is also suitable when the dependent variable is binary in nature. Furthermore, it can also provide the probability of a company being financially distress. In addition, it can also provide us with the sign of the independent variable(s). This study found that the independent variables that can be used to predict financial distress companies in the consumer products sector in Malaysia were debt ratio, total assets turnover ratio and working capital ratio. The findings from the internal validation showed that the prediction model provided a more than 50% chance that the model is accurate for five years before distress. Furthermore, the findings from the external validation showed that the model might be able to be used outside the estimation time period because the overall percentage accuracy were higher than 50% for five years before distress.

Keywords: Bankruptcy; financial distress; consumer products sector; Malaysia

Abstrak

Kajian ini dibuat untuk untuk meramal syarikat bermasalah dalam sektor barangan pengguna di Malaysia dengan menggunakan syarikat bermasalah sebagai pemboleh ubah bersandar dan nisbah kewangan sebagai pemboleh ubah tidak bersandar. *Logit Analysis* digunakan sebagai kaedah analisis kerana nisbah kewangan tidak perlu *normal* jika ianya digunakan. Ia juga sesuai jika pemboleh ubah bersandar berada dalam keadaan *binary*. Tambahan pula, ia boleh memberikan kebarangkalian sesebuah syarikat menjadi syarikat bermasalah. Selain daripada itu, ia juga boleh memberikan *sign* pemboleh ubah tidak bersandar. Kajian ini mendapati bahawa pemboleh ubah tidak bersandar yang boleh digunakan untuk meramal syarikat bermasalah dalam sektor barangan pengguna di Malaysia adalah nisbah hutang, nisbah pusingganti jumlah aset dan nisbah modal kerja. Dapatan dari *internal validation* menunjukkan bahawa model ramalan mampu memberikan lebih daripada 50% peluang yang model itu adalah tepat untuk tempoh lima tahun sebelum syarikat menghadapi masalah. Tambahan lagi, dapatan dari *external validation* menunjukkan bahawa model itu boleh digunakan di luar masa jangkaan kerana *overall percentage accuracy* adalah lebih daripada 50% untuk lima tahun sebelum syarikat menghadapi masalah.

Kata kunci: Bankruptcy; financial distress; sektor barangan pengguna; Malaysia

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1.0 INTRODUCTION

Prediction of financial distress companies have been one of the most popular area of research in finance. The ability to predict financial distress is important to the companies themselves, to the potential and current investors and to the stock market regulators. In Malaysia, the stock market regulator is Bursa Malaysia and to deal with financial distress companies, Bursa Malaysia had introduced Practice Note No. 4/2001 (PN4) on 15 February 2001 and Practice Note No. 17/2005 (PN17) on 3 January 2005. PN17 was further amended on 5 May 2006 to

improve the ways that Bursa Malaysia deal with listed financial distress companies.

However, the literature has shown that no studies have been conducted in predicting financial distress companies in the consumer products sector in Malaysia. Furthermore, most of the previous studies that were conducted in the area of prediction of financial distress did not conduct any validations in their studies. Some of the previous studies only conducted either internal or external validations only in their studies. This is due to unavailability of data.

This study aims to develop financial distress prediction model in the consumer products sector in Malaysia using

financial ratios and Logit Analysis. The consumer products sector is one of the largest sectors in Bursa Malaysia besides industrial products sector and trading and services sector. Previous studies in Malaysia combined consumer products and industrial products sectors and consider them as representing the manufacturing sector (Chin, 2005; Fauzias & Chin, 2001; Zulkarnain & Karbhari, 2004; Zulkarnain, Mohamad Ali, Annuar, & Zainal Abidin, 2001). The performance of the prediction model is evaluated based on its overall percentage accuracy through estimation sample, its classification ability through internal validation and its prediction ability through external validation.

The rest of the paper is organized as follows. Section 2 discusses the literature review of financial distress prediction. Section 3 explains the independent variables, data collection and data analysis procedures that are used in this study. Section 4 provides the findings of the study from using Logit Analysis and finally, Section 5 summarizes the findings of the study and provides some suggestions for future research.

2.0 LITERATURE REVIEW

Earlier studies on the prediction of bankruptcy and financial distress had used statistical models such as Multiple Discriminant Analysis (MDA) and Logit Analysis. In general, bankruptcy and financial distress prediction models have been successful in classifying companies as bankrupt/non-bankrupt or financial distress/non-financial distress by using multivariate statistical techniques. Multivariate statistical techniques have become very popular among researchers with the availability of modern computer facilities and due to its ability to deal with several variables simultaneously (Ganesalingam & Kuldeep, 2001).

A number of studies had been conducted in the mixed sector in Malaysia using MDA (Chin, 2005; Karbhari & Zulkarnain, 2004; Mohamed, Ang, & Sanda, 2001; Nur Adiana, Rohani, & Abd. Halim, 2007). Mohamed *et al.* (2001) conducted internal validations only in their study while Chin (2005) and Karbhari and Zulkarnain (2004) conducted external validations only in their study. Nur Adiana *et al.* (2007) did not conduct either internal or external validations in their study. The lack of validations in previous studies is due to unavailability of data.

Besides studies in the mixed sector, other previous studies in Malaysia had been conducted in the manufacturing sector using MDA (Chin, 2005; Fauzias & Chin, 2001; Karbhari & Zulkarnain, 2004; Zulkarnain & Karbhari, 2004; Zulkarnain, *et al.*, 2001). Zulkarnain *et al.* (2001) conducted internal validations only in their study while Chin (2005) and Karbhari and Zulkarnain (2004) conducted external validations only in their study. Fauzias and Chin (2001) did not conduct either internal or external validations in their study. The lack of validations in previous studies is due to unavailability of data.

MDA works on the assumptions that the group dispersion (variance-covariance) matrices are equal for failed and non-failed companies and the population must be distributed in a multivariate fashion. However, it had been found that these assumptions are often violated by the data set under study and MDA procedure will only be optimal if the normality conditions are met (Karels & Prakash, 1987). They concluded that MDA do not necessarily provide better results if the ratios that are used depart from the normality assumptions.

Due to the weaknesses of MDA, a number of studies had been conducted in the mixed sector in Malaysia using Logit Analysis (Low, Fauzias, & Yatim, 2001; Mohamad Isa, Annuar, Shamsheer, & Taufiq, 2005; Mohamed, *et al.*, 2001; Mohamad Isa, 2004; Nur Adiana, *et al.*, 2007; Tew & Enyilina, 2005). Low *et al.* (2001), Mohamed *et al.* (2001), Mohamad Isa (2004), Mohamad Isa *et al.* (2005) and Tew and Enyilina (2005)

conducted internal validations only in their study whereas Nur Adiana *et al.* (2007) did not conduct either internal or external validations in their study. The lack of validations in previous studies is due to unavailability of data. Besides the mixed sector, Fauzias and Chin (2001) had also conducted a study in the manufacturing sector in Malaysia using Logit Analysis. However, they did not conduct either internal or external validations in their study due to unavailability of data.

Logit Analysis may be preferable in bankruptcy and financial distress prediction studies where it is not only classification that is required but rather the probability of occurrence of failure (Barnes, 1987). Logit Analysis provides the probability of occurrence of an outcome described by a dichotomous (or polytomous) dependent variable using coefficients of the independent variables (Zavgren, 1985). In addition, Logit Analysis does not require the independent variables to be multivariate normal and they have the ability to determine the significance of individual variables. Furthermore, Logit Analysis does not have the same demanding assumptions as MDA (Keasey & Watson, 1991).

Numerous studies had been conducted to identify the determinants of bankruptcy and financial distress. In general, the determinants of bankruptcy and financial distress can be divided into four main groups of financial ratios that are asset management (activity or efficiency) ratios, leverage ratios, liquidity ratios and profitability ratios. Financial ratios are calculated using items from the Income Statements and Balance Sheets. The four main groups of financial ratios that are used in this study is based on a previous study in Malaysia (Mohamad Isa, 2004).

The literature shows that no studies have been made in the consumer products sector in Malaysia. A recent survey on previous studies on the prediction of financial distress companies showed that there is a lack of studies on prediction models for companies in individual sectors due to the unavailability of data (Aziz & Dar, 2006). Suggestions had also been made to study the ability of prediction models to predict financial distressed companies in individual sectors in Malaysia (Chin, 2005; Karbhari & Zulkarnain, 2004; Zulkarnain & Karbhari, 2004).

Furthermore, the literature shows that previous studies did not conduct any validations at all or they conducted minor internal and/or external validations in their study. This is mainly due to unavailability of data. In general, it was difficult to conduct internal and external validations due to the lack of companies being financially distressed. Therefore, this study hopes that by using a bigger sample of financial distress companies in the consumer products sector, we are able to conduct internal and external validations in order to further improve the validity of the financial distress prediction models in the consumer products sector in Malaysia.

3.0 METHODOLOGY

Section 3 is divided into four sub-sections. Section 3.1 explains the independent variables that are used in this study along with the hypothesis while Section 3.2 explains the population and the sample selection of this study. Section 3.3 and 3.4 describe the data collection and data analysis procedures that are used in this study respectively.

3.1 Independent Variables and Hypothesis

Most researchers selected financial ratios as predictor variables based on their popularity and predictive ability in the previous bankruptcy research studies (Altman, 1968; Beaver, 1966; Ohlson, 1980). Other criterions that were used to choose financial ratios were their simplicity and relevancy to the local environment (Low, *et al.*, 2001; Mohamed, *et al.*, 2001). In this

study, we select the financial ratios that have been found to be useful in at least ten previous studies on the prediction of financial distress companies.

Leverage ratios represent the proportion of capital of a company that is raised by fixed interest borrowings. A company that has a high level of borrowings is considered to be highly geared while a company that is mainly financed by equity capital is said to be lowly geared. A highly geared company has to generate more income in order to pay its obligations and debts and vice versa. Therefore, this study expects that there is a positive relationship between leverage ratios as represented by the debt ratio and financial distress.

Asset management or activity ratios represent the relationship between a company's level of operations and the assets that are required to sustain its operating activities. It shows the ability of a company in using its assets effectively in order to generate sales. High activity ratios show that a company is able to generate a high amount of sales per unit ringgit of sales and vice versa. Thus, this study expects that there is a negative relationship between asset management or activity ratios as represented by the total assets turnover ratio and financial distress.

Liquidity ratios represent the ability of a company to pay its debt when it comes due. High liquidity ratios show that a company is able to pay its debt when it comes due and vice versa. Hence, this study expects that there is a negative relationship between liquidity ratios as represented by current ratio, quick ratio and working capital ratio and financial distress.

Profitability ratios represent a measure of return on a company's investment and it also shows the health of a company. High profitability ratios show that companies are profitable and vice versa. Therefore, this study expects that there is a negative relationship between profitability ratios as represented by net income to total assets ratio and financial distress.

3.2 Population and Sample Selection

The population of this study are companies listed as financial distress by Bursa Malaysia under the requirements of PN4, PN17 and Amended PN17 respectively from 15 February 2001 until 31 December 2010. Standard practice in financial distress prediction studies involves pooling data across different years in order to obtain a sufficiently large sample of bankrupt companies for analysis (Mensah, 1984). Therefore, this study also pool data for five years before a company was listed as financial distress by Bursa Malaysia under the requirements of PN4, PN17 and Amended PN17 respectively.

This study uses two types of samples that are the basic or estimation sample and the holdout or validation sample. The estimation sample is used to develop the prediction models while the holdout sample is used to evaluate the predictability of the model developed (Doumpos & Zopounidis, 1999).

The estimation sample includes approximately half of the companies that were listed in the PN4 category from 15 February 2001 until 2 January 2005. This was the last day before PN17 was introduced on 3 January 2005. Approximately half of the companies that were listed in the PN4 category from 15 February 2001 until 2 January 2005 are used as holdout sample for internal validation purposes. All companies that were listed under PN17 and Amended PN17 from 3 January 2005 until 31 December 2010 are used as holdout sample for external validation purposes.

The model is tested for internal and external validity before any generalisations can be made. Internal validity refers to whether an experiment's conclusion is warranted and the conclusion is justified. Therefore, they should first discriminate effectively in-sample. However, external validity refers to whether the results of an experiment can be generalised beyond

the specific situation. Therefore, in order to provide value to practitioners, models must also predict well out-of-sample (Karbhari & Zulkarnain, 2004; Zulkarnain & Karbhari, 2004; Zulkarnain, *et al.*, 2001).

3.3 Data Collection Procedures

Financial statements for financial distress companies and non-financial distress companies were collected for the five fiscal years prior to being listed under the PN4, PN17 and Amended PN17 categories by Bursa Malaysia. The five years relative to the financial distress date are defined as year's t-1, t-2, t-3, t-4, and t-5 that are consistent with previous studies. It would produce a serious bias if ratios were calculated for one reporting period prior to financial distress for the whole sample (Nam & Taehong, 2000).

Every year prior to financial distress is denoted as year's t-1, t-2, t-3, t-4, and t-5 in order to facilitate the presentation and discussion of the results. The "first year before financial distress" or "t-1" is defined as the year that was included in the most recent financial statement prior to the date that the company was considered to be financially distressed. The "second year before financial distress" or "t-2" is the fiscal year before the first year. The third, fourth and fifth years are similarly defined. The financial statements of the non-financial distress companies were obtained for the same fiscal years as those of their financial distress mates.

The list of companies listed under PN4, PN17 and Amended PN17 were obtained from the Media Releases and Companies Announcements from the Bursa Malaysia website (www.bursamalaysia.com) from January 2001 to December 2010. The annual reports of the selected companies were obtained from Datastream database that can be assessed through the website of Perpustakaan Tun Abdul Razak, Universiti Teknologi Mara and also Annual Companies Handbook (various editions).

3.4 Data Analysis Procedures

Logit Analysis is used in this study. It is an alternative parametric approach to MDA that has been widely used in financial distress prediction to overcome MDA's limitations (multivariate normality and equality in dispersion matrices among groups). Logit Analysis provides the probability of occurrence of an outcome described by a dichotomous (or polytomous) dependent variable using coefficients of the independent variables. The developed Logit Analysis model has the form of the cumulative logistic probability function.

In contrast to the difficult interpretation of the Z-score in MDA, Logit Analysis results in a value that can be interpreted as the conditional probability of failure. If this value, $P(Z)$, instead of the logistic cumulative function, is placed into the normal cumulative probability function, the model is called a probit model. Due to the non-linearity of the model, coefficients are often estimated by the maximum likelihood method instead of the least squares method (Laitinen & Kankaanpaa, 1999).

The value of the probability $P(Z)$ is always between 0 and 1 with all values of Z , i.e. instead of resulting in a group membership like the MDA model, it generates the probability of a group membership since its value changes between 0 and 1. If Z approaches minus infinite, $P(Z)$ approaches zero, and if it approaches plus infinite, $P(Z)$ approaches the value of 1. When the value of Z is 0, the probability of failure $P(Z)$ is 0.5, which is a commonly used critical value in classifying financial distressed and non-financial distressed companies. If misclassification costs for both error types are used when defining the critical value, it is often lower than 0.5 (misclassification costs for the Type I error are usually estimated to be higher than those of the Type II error) (Laitinen & Kankaanpaa, 1999). Based on the probability, a company is

classified as financially distressed or non-financially distressed, using a cut-off probability. Maximum likelihood estimation procedures are employed to determine the parameters.

Under Logit Analysis, the dichotomous dependent variable is simply the logarithm of the odds that a particular event (financial distress / non-financial distress) will occur. That is, here modelling of the 'log odds' of belonging to a group is pursued, rather than modelling the group membership itself. Although it would be possible to model the odds, it is simpler to model the log (natural log, ln) of the odds [$\ln(\text{odd}) = \ln(P / 1 - P)$]. This transformation into natural log, allows the dependent variable to take any value between negative infinity and positive infinity. In this way, the dependent variable becomes continuous too, rather than discrete.

In order to present the idea, let us start by considering the following model:

$$Y_i = \alpha + \beta_1 X_{i1} + \beta_2 X_{i2} + \mu \quad (\text{Equation 1})$$

where,

X_i = the explanatory variable (s)

$Y_i = 1$ if the event occurs (say a company is financially distressed)

$Y_i = 0$ if the event does not occur (say a company is not financially distressed)

Now, Equation 1 can be written in the logistic regression functional form as:

$$\ln(P/1-P) = \alpha + \beta_1 X_{i1} + \beta_2 X_{i2} + \mu \quad (\text{Equation 2})$$

Hence, the probability that an event may occur, company become financial distress in this case, is given by:

$$P = \frac{1}{1 + e^{-(\alpha + \beta_1 X_{i1} + \beta_2 X_{i2} + \dots + \beta_n X_{in})}} \quad (\text{Equation 3})$$

Equation 3 is estimated using Maximum Likelihood method. Assuming that 1 indicates financial distress, the greater the resulting decimal fraction is above 0.5 (which implies an equal chance of a company being financially distressed or non-financially distressed), the higher chance there is of the subject company being financially distressed. It should be stated that the negative coefficients of ratios in the developed logit model indicate that these ratios are negatively correlated with the probability of financial distress (they decrease the risk of financial distress), while the ratios with positive coefficients have a positive effect on the probability of financial distress (they increase the risk of financial distress).

In order to get reliable results in Logit Analysis, it is necessary to find major explanatory financial ratios that can discriminate between the two groups. The stepwise procedure is applied to finalize the appropriate explanatory variables to be used in the maximum likelihood estimate. The score and p-value of the ratios must be statistically significant. An overall significance test of the variables based on likelihood ratio is also done to confirm the significance of the variables. Maximum likelihood estimates of the variables should also be obtained (Nam & Taehong, 2000).

Optimal p (weights) can be estimated where the likelihood value is maximized. The probability of bankruptcy is obtained by substituting p into the cumulative probability function. If the calculated probability from the Logit Analysis model is over 0.5, the company is classified as financial distress, otherwise as non-financial distress (Nam & Taehong, 2000; Nur Adiana, *et al.*, 2007; Ohlson, 1980).

Pearson correlation analysis procedure is used to test for multicollinearity. The rule of thumb that are used in this study is that the correlations among the independent variables ranging from -0.80 to 0.80 would not cause a problem of multicollinearity (Gujarati, 1995). However, before Pearson correlation analysis procedure is conducted, a t-test is run to test

whether there is significant difference between the independent variables for the financial distress and non-financial distress companies. Only independent variables that are significantly different are selected for testing of multicollinearity.

The cut-off probability is determined using the basic or estimation sample. A 0.5 cut-off point is used because data on Malaysia's average cost of bankruptcy is not available (Chin, 2005). This is consistent with previous studies on the prediction of financial distress and bankruptcy (Fauzias & Chin, 2001; Low, *et al.*, 2001; Mohamad Isa, *et al.*, 2005; Mohamad Isa, 2004; Nam & Taehong, 2000; Nur Adiana, *et al.*, 2007; Ohlson, 1980; Tew & Enyilina, 2005).

Companies that are financially distressed are matched with non-financially distressed companies that are selected within the criteria that they are from the same industry or sector as the financial distress companies and they are approximately similar in terms of total asset size (Alkhatib & Al Bzour, 2011; Lakshan & Wijekoon, 2012; Li, 2012; Monti & Garcia, 2010; Wang & Campbell, 2010). These criteria will be set as control factors to guarantee the lowest amount of bias in choosing the basic or estimation sample that is employed in the development of the financial distress prediction model (Chin, 2005; Karbhari & Zulkarnain, 2004; Zulkarnain & Karbhari, 2004). The construction of the matched sample based on industry or sector and company size based on total assets will enhance the validity and reliability of the analysis. This is because if the matched sample consisted mostly of big companies without matching in terms of size, the prediction accuracy of the model will be overstated due to the sample bias (Nam & Taehong, 2000).

Logit Analysis (the stepwise procedure) is used in this study to predict financial distress companies in the consumer products sector in Malaysia. The analysis is conducted using Statistical Package for Social Sciences (SPSS) Version 16.

4.0 FINDINGS

This section is divided into three sub-sections. Section 4.1 describes the findings in the estimation sample while Sections 4.2 and 4.3 explain the findings in the internal and external validations respectively.

4.1 Estimation Sample

The data for the consumer products sector includes a total of 20 companies involving 10 PN4 companies and 10 non-PN4 companies for the period from 2001 to 2005. Table 1 shows that the mean for all accruals-based ratios for the PN4 companies are lower than the mean for all accruals-based ratios for the non-PN4 companies. Based on the t-test analysis as shown in Table 1, total assets turnover ratio, current ratio and net income total assets ratio are significantly different at 1% level while debt ratio, quick ratio and working capital ratio are significantly different at 5% level. Therefore, all accruals-based ratios are included in the next analysis that is the Pearson correlation test for multicollinearity.

Table 1 Means of accruals-based ratios

IV	PN4	Non-PN4	t-value	p-value
DR	2.3183	4.8295	-2.193	0.033**
TAT	0.4827	1.0312	-7.183	0.000***
CR	0.7966	1.6178	-4.199	0.000***
QR	0.5879	0.9876	-2.23	0.030**
WCR	-1.7657	0.1624	-2.466	0.017**
NITA	-0.6596	0.078	-3.126	0.003***

***statistically significant at 1% level

**statistically significant at 5% level

Based on Pearson correlation test for multicollinearity, quick ratio is excluded from the next analysis that is the stepwise Logit Analysis due to its high multicollinearity with current ratio (0.94). Therefore, the independent variables that are chosen in the stepwise Logit Analysis are debt ratio, total asset turnover ratio, current ratio, working capital ratio and net income to total assets ratio. The findings of the Pearson correlation test are shown in Table 2.

Table 2 Pearson correlation test

IV	DR	TAT	CR	QR	WCR	NITA
DR	1					
TAT	0.06	1				
CR	0.14	0.26	1			
QR	0.03	0.08	0.94***	1		
WCR	-0.49	0.29	0.31	0.23	1	
NITA	-0.32	0.23	0.35	0.26	0.73	1

*** statistically significant at 1% level

Stepwise logit analysis was conducted to evaluate the impact of a number of independent variables on the likelihood that companies will be financially distressed. The final model contains three independent variables that are debt ratio, total assets turnover ratio and working capital ratio. The final model was statistically significant whereby the chi-square value is 89.266 with three degrees of freedom and $p < 0.005$. This indicates that the model was able to distinguish between financially distressed and non-financially distressed companies.

The chi-square value for the Hosmer and Lemeshow test of this model is 13.83 with a significance level of 0.086 that is greater than 0.05 which indicate support for the model. The Cox & Snell R Square and the Nagelkerke R Square values for this model are 0.59 and 0.787 respectively. It means that 59% and 78.7% of the variability is explained by this set of variables. The model correctly classified 89% of overall cases or also known as the percentage accuracy in classification which is higher than the 50% when the analysis was conducted without any of the independent variables that are used in the model. The classification table is shown in Table 3.

Table 3 Classification table

Observed	Predicted Distressed		Percentage Correct
	0	1	
Distressed	0	44	88.0
	1	5	90.0
Overall Percentage			89.0

As shown in Table 4, only three independent variables made a statistically significant contribution to the model. The three independent variables are debt ratio, total assets turnover ratio and working capital ratio. This is based on the Wald test that is a test that shows the contribution or importance of each of the predictor or independent variables. Variables that contribute significantly to the models should have significance value of less than 0.05 (Pallant, 2007). Based on Table 4, debt ratio, total assets turnover ratio and working capital ratio have negative B coefficient values. This means that companies in the consumer products sector in Malaysia with high debt ratio, total assets turnover ratio and working capital ratio are less likely to be in financial distress.

Table 4 Estimation results of Logit Analysis

IV	B	S.E	Wald	df	p-value
DR	-0.036	0.011	10.122	1	0.001***
TAT	-4.611	1.359	11.514	1	0.001***
WCR	-8.486	2.319	13.385	1	0.000***
Constant	6.131	1.47	17.394	1	0.000***

***statistically significant at 1% level

Therefore, based on Table 4, the equation for the consumer products sector using accruals-based ratios only is:

$$P = \frac{1}{1 + e^{-(6.131 - 0.036X_1 - 4.611X_2 - 8.486X_3)}} \quad \text{(Equation 4)}$$

Where,

- X1 = Debt ratio
- X2 = Total assets turnover ratio
- X3 = Working capital ratio

As an example, assume that the values of debt ratio, total assets turnover ratio and working capital ratio for a company that can be considered under the consumer products sector category are 0.23, 0.64 and 0.08 respectively. By inserting those values in Equation 4, the value of P is 0.84 which is greater than 0.5. Therefore, in this example, the company has the possibility of going into financial distress. Equation 4 will be used for internal and external validation purposes.

The independent variables that had been found to be significant in the consumer products sector in Malaysia are debt ratio, total assets turnover ratio and working capital ratio. In this study, the debt ratio, total assets turnover ratio and working capital ratio have negative B coefficient values. Based on the literature, no previous study stated specifically that the study was conducted on predicting financial distressed companies in the consumer products sector. Therefore, the findings of this study cannot be compared with any other previous study. The negative B coefficient values for the total assets turnover ratio and working capital ratio are also consistent with the hypothesis of this study which stated that there is a negative relationship between total assets turnover ratio and financial distress and between working capital ratio and financial distress. However, the negative B coefficient value for the debt ratio is inconsistent with the hypothesis of this study which stated that there is a positive relationship between debt ratio and financial distress. This study would like to suggest that the debt ratio has a negative B value because Malaysian companies in the consumer products sector depends too much on debt and if they were low on debt ratio, there will be a higher probability of those companies going into financial distress.

The findings show that accruals-based ratios can be used to predict financially distressed companies in the consumer products sector in Malaysia. The accruals-based ratios that are significant are debt ratio, total assets turnover ratio and working capital ratio.

4.2 Internal Validation

The data for internal validation purpose for the consumer products sector includes a total of 10 companies involving five PN4 companies and five non-PN4 companies for the period from 2001 to 2005. The findings for internal validation is summarised in Table 5 to show the trend of the overall percentage accuracy from t-5 to t-1. Table 5 shows that in general, the overall percentage accuracy for the consumer products sector using accruals-based ratios only is less than 50% in t-4 (40%) but it exceeds 50% in other time periods. However, the findings of this study cannot be compared with the findings of previous studies because none of the previous studies specifically stated that they were conducted on the consumer products sector using accruals-based ratios only.

Table 5 Overall percentage for the consumer products sector

	t-5	t-4	t-3	t-2	t-1
Overall Percentage	70.00	40.00	60.00	90.00	80.00

4.3 External Validation

The data for external validation purpose for the consumer products sector includes a total of 20 companies involving 10 PN17 companies and 10 non-PN17 companies for the period from 2005 to 2010. The findings for external validation is summarised in Table 6 to show the trend of the overall percentage accuracy from t-5 to t-1. Table 6 shows that in general, the overall percentage accuracy for the consumer products sector using accruals-based ratios only is more than 50% in all time periods. However, the findings of this study cannot be compared with the findings of previous studies because none of the previous studies specifically stated that they were conducted on the consumer products sector using accruals-based ratios only.

Table 6 Overall percentage for the consumer products sector

	t-5	t-4	t-3	t-2	t-1
Overall Percentage	60.00	60.00	50.00	60.00	70.00

5.0 CONCLUSION

This study develops a prediction model of financial distress companies in the consumer products sector in Malaysia using accruals-based or financial ratios such as debt ratio, total assets turnover ratio, current ratio, quick ratio, working capital ratio and net income to total assets ratio. They were chosen on the basis that they had been found to be useful in at least ten previous studies.

This study found that the most useful ratios for the prediction of financial distress companies in the consumer products sector in Malaysia were debt ratio, total assets turnover ratio and working capital ratio. The values of the three ratios in Equation 4 must be carefully considered so that the company does not go into financial distress. The values in Equation 4 should not go over 0.5 and if it does, there is a possibility that the company will go into financial distress.

The findings from the internal validation of this study showed that the prediction model provided a more than 50% chance that the model is accurate for five years before distress. Furthermore, the findings from the external validation of this study showed that the model might be able to be used outside the estimation time period because the overall percentage accuracy were higher than 50% for five years before distress.

This study would like to suggest that future studies should be conducted on the prediction of financial distress companies in other individual sectors in Malaysia. In addition, cash-flow-based ratios and macroeconomic variables should be considered as the independent variables in predicting financial distress companies in Malaysia.

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