Asian Academy of Management Journal. **6(1)**: 99-118 (2001)

PREDICTING CORPORATE FAILURE IN MALAYSIA: AN APPLICATION OF THE LOGIT MODEL TO FINANCIAL RATIO ANALYSIS

Mohamed Sulaiman
Ohio University,
Ang Jili and Ahmadu Umaru Sanda
Universiti Sains Malaysia

ABSTRACT

A logit model that distinguishes between Malaysian firms that did and those that did not seek for court protection from their creditors is tested empirically in this research. Three factors were found to have significant discriminating power; debt ratio, interest coverage, and total asset turnover. The logit model was able to classify accurately 80.7 per cent of the firms in the estimation sample and 74.4 per cent in the hold out sample.

INTRODUCTION

The Malaysian economy had seen remarkable growth performance for more than a decade. During the decade 1987-1997 the economy performed extremely well with gross domestic product recording an average growth rate of more than 8 per cent per year. This rapid growth has brought with it substantial improvements in the living standards as manifested by a number of indicators such as increases in per capita income, life expectancy, literacy rate, reduction in unemployment, and absolute poverty. The growth, achieved in part through an export-promotion strategy, also has increased the country's dependence on the global financial system and therefore its vulnerability to the vagaries of the global environment.

On July 2, 1997, the Thai authorities removed the pegging of the Baht to the US dollar and this served as an important event that marked the beginning of a prolonged financial crisis. The crisis spread to the neighboring countries with Indonesia, Korea, Malaysia, and the Philippines. Thailand was especially severely affected. Though Malaysia was not as badly hit by the crisis as some of its neighbors, the country's economy also suffered severe setbacks. An important feature of the crisis' effects on the Malaysian economy has been the remarkable decline in profits of Malaysian companies, and, consequently in the emergence of the problem of non-performing loans. As a result, 26 KLSE-listed companies were unable to service their debt and sought for protection from the court against their creditors. This research considers those companies that sought for court protection

as "failed" companies and those that did not as "non-failed" ones. The aim here is to compare the financial ratios of the two categories of companies and to examine whether or not the ratios can be used to predict corporate failure.

Financial ratios have been used to compare a firm's financial data at different points in time or with other firms. They are often employed to provide a clue to a number of questions concerning the financial health of the firm. Broadly speaking, financial ratios provide information about profitability, leverage, liquidity and efficiency of the firm. Profitability ratios help to provide a clue to the firms' ability to generate profit per each unit of sales. Leverage ratios provide information concerning the extent to which the firm finances its investment using funds from sources other than the firm's owners. Liquidity ratios give an indication of whether or not the firm has sufficient cash or near cash to pay its obligations when they are due. Efficiency ratios help to determine the extent to which the firm is using its resources to generate sales.

This paper employs the logit model to predict corporate failure in Malaysia. The data was obtained from the Kuala Lumpur Stock Exchange Companies Annual Handbook. Appendix 1 shows the list of companies used in the research that comprises companies that have and those that have not sought for court protection. Appendix 2 is a list of companies that have sought for court protection and the dates that they were given such protection. The paper is organized as follows. Section II is the literature review, surveying previous research conducted in this area. Section III provides a description of the financial ratios used in this paper while section four presents the results. The final section, section V, discusses the findings, emphasizing their implications for Malaysian companies.

LITERATURE REVIEW

In 1966, Beaver showed that corporate failure could be predicted with the help of quantitative techniques and financial ratio analysis. Using a sample of 79 failed firms and 79 non-failed firms, he used a paired samples technique, and 30 financial ratios for the period 1954 to 1964. Beaver compared the mean values of the ratios for the two groups of the firms and found that failed and non-failed firms differed significantly with respect to six financial ratios. A major weakness of the Beaver's study in that it was based on a univariate, not multivariate, analysis.

Hong (1983) developed a theoretical model to distinguish among three categories of financially distressed firms; firms that file for bankruptcy and then successfully reorganize, firms that file for bankruptcy but ultimately liquidate, firms that continue operating without filing for bankruptcy. Hong posited that a firm's "intangible asset" i.e. the difference between the values of the firm, as a going concern and its value in liquidation, would be the major explanatory factor

affecting the eventual outcome. The larger the firm's intangible asset, the more likely that a firm has sustainable economic value that will permit it to survive rather than to be liquidated. Hong also hypothesized that industrial classification, size and the level of free (unsecured) assets would be significantly independent variables.

Hong restricted the empirical analysis to firms that successfully reorganized and those that liquidated. Her sample consisted of 28 liquidated and 71 successfully reorganized firms that had filed bankruptcy petitions during the period 1970-1979. "Success" was firms whose reorganization plans had been confirmed and "failure" was firms that had been adjudicated bankrupt (liquidated) by the court. She constructed three logit models, one each for the three most recent year's financial statements prior to the filing of the bankruptcy petition. For all three years in the intangible asset and size variables were insignificant and, contrary to expectations, were negatively related to the probability of successful reorganization. The most important discriminatory variable was free assets, which was positively related to successful reorganization and was statistically significant in each year. Hong's study was limited to testing hypotheses about the importance of individual variables, and therefore she did not analyze the classification accuracy of multivariate models.

LoPucki (1983) conducted an exploratory study of 41 firms that petitioned the Bankruptcy Court of the Western district of Missouri during the first year after the effective date (October 1 1979) of the new Bankruptcy Code. "Successes" in his study were defined as firms having confirmed reorganization plans that continued to exist for approximately three years subsequent to the date of filing the bankruptcy petition. "Failures" were those firms that had ceased operating before February 1983.

LoPucki did not attempt to build a model with discriminatory power but rather simply examined relationships between the outcome of the reorganization process and several individual variables. This includes type, size, and age of the business, the existence of the creditor opposition to the reorganization plan, and geographical location. The following results were found: manufacturing firms had significantly higher success rate; age was not significantly related to success; successful firms were more often the targets of creditor opposition; and the geographical location was not significant explanatory variable.

Altman (1968) developed a model that involved two groups, bankrupt and non-bankrupt firms. The sample for bankrupt firms consisted of firms that fled for bankruptcy petition during the period 1964-1965. He used 22 financial ratios all of which were categorized under 5 broad groups namely, liquidity, profitability, solvency, leverage and activity ratios. Five out of the 22 ratios were eventually taken to form a discriminant score of Z value as follows:

$$Z = 1.2\ X_1 + 1.4\ X_2 + 3.3\ X_3 + 0.6\ X_4 + .999\ X_5$$

Where
X1 = (net working capital ÷ total assets)
X2 = (retained earnings ÷ total assets)
X3 = (earnings before interest and taxes ÷ total assets)
X4 = (total market value of stock ÷ book value of debt)
X5 = (sales ÷ total assets)

Altman concluded that the Z-score could be used to classify firms into non-bankrupt category if they scored more than 2.99; bankrupt ones if they scored less than 1.81. Altman's study indicates that bankrupt firms suffer from losses; poor sales, and lack of working capital funds. Altman's model was subjected to testing. The model had a good predictive power, with 94 per cent of firms in the initial sample correctly classified. However, when the model was used on data two years to bankruptcy, its accuracy rate declined to 72 per cent.

Kaveri (1980) addresses the question: could a few ratios be empirically selected to significantly indicate improvement or detererioration in its financial health of a borrowing company? His analysis involves various states of financial health: good, near good, not so bad or bad. He uses Multiple Discriminant Analysis (hereafter, MDA) to analyze 22 financial ratios of a sample of 520 small industrial firms in India. Kaveri reports five ratios as being significant in discriminating between the three categories of firms. The ratios are: current ratio, stock/cost of goods sold; current assets/net sales; net profit/total capital employed; and net worth/total outside liabilities. These five ratios were classified by Kaveri as belonging to the following ratio categories: working capital, turnover, asset usage, profitability and financial stability.

Kaveri's model had a lower accuracy rate than that of Altman. When Kaveri used 16 ratios some of which were not significant, the accuracy rate was low - 61.67 per cent. The accuracy rate of the model improved when five ratios were selected based upon their significance and used for prediction purposes. As found in earlier studies, the accuracy rate diminished as time period before the event increased. For example, when data for one year before the event was used, the prediction accuracy rate was 76 per cent. The two and three years before the event, the accuracy rate declined to 69 and 66.67 per cent respectively.

Altman and McGough (1974) applied the model that Altman (1968) developed in 1968 to twenty-eight firms that failed during the period 1970-73. The predictors were computed from data one year prior to bankruptcy. In the 1968 study Altman reported a misclassification rate of approximately 5 per cent for failed firms. The same model applied to the second group of firms yielded a misclassification rate of 18 per cent.

Ohlson (1980) used a logit model to predict corporate bankruptcy using data for US firms comprising 105 bankrupt and 2058 no bankrupt firms. His findings revealed that four factors derived from financial statement were statistically significant for purposes of assessing the probability of bankruptcy: i) size, ii) the financial structure of a measure of leverage; iii) some performance measures; iv) some measures for current liquidity.

Blum (1969) developed a theoretical model to discriminate between failed and non-failed companies. Using a sample of 115 each for failed and non-failed companies, Blum employed 12 financial ratios and obtained an accuracy rate between 93 to 95 per cent. However, he observed a decline in accuracy rate to 80 per cent when the model was used for prediction three years to bankruptcy.

THE FINANCIAL RATIOS UTILIZED

This research considers eleven financial ratios, which are divided into the four broad categories mentioned above. There are four profitability ratios; three leverage ratios; and two each for liquidity and efficiency ratios. No attempt has been made to develop exotic ratios; the important criterion for ratio selection is simplicity. The ratios used in this research are explained in Table 1.

Table 1: The Financial Ratios Utilized

Profitability Ratios	
GPMARGIN	Gross profit margin, defined as profit before tax divided by turnover. The higher the value of this ratio the better the financial health, hence a positive relationship is expected.
NPMARGIN	Net profit margin, defined as net profit divided by turnover. The higher the value of this ratio, the better the financial health of the company. Thus, a positive relationship is expected.
ROE	Return on equity, defined as profit for the period divided by shareholder's funds. A positive relationship is expected because the higher the value of this ratio the better for the company.
ROA	Return on assets, defined as after tax income divided by total assets. A positive relationship is expected, as higher values of this ratio tend to be associated with stronger financial positions.
Leverage Ratios	
DBTRATIO	Debt Ratio, defined as total liabilities divided by total assets. A negative relationship is expected because the greater the value of this ratio, the weaker the financial health.
LEVERAGE	Leverage, obtained by dividing current assets by shareholders' funds. The greater the value of this ratio, the weaker the financial health, implying a negative relationship is expected.
INTCOVER	Times interest earned ratio, obtained by dividing profit before tax by annual interest expenses. One would expect a positive relationship as the greater value of this ratio, the better the financial health.
Liquidity Ratios	
CRATIO	Current Ratio, defined as current assets divided by current liabilities. A positive relationship is expected because the greater the value of this ratio, the better the financial health.
ACIDTEST	Acid test ratio, obtained by dividing the difference between current assets and inventories by current liabilities. A positive relationship is expected between the value of this ratio and the financial health of the company.
Efficiency Ratios	
FIXOVER	Fixed asset turnover, obtained by dividing sales by net fixed assets. A positive relationship is expected as higher values to the ratio imply greater ability of the management to generate sales per unit of fixed assets.
TOTOVER	Total asset turnover, defined as sales divided by total assets. A positive relationship is also expected because higher values of this ratio suggest greater ability of the management to generate sales per each unit of its assets.

A profile analysis of the data supports the hypotheses regarding the signs. Table 2 is a comparison over time of the financial ratios of the failed and non-failed

companies. From the table, a number of observations can be made. First, all but one of the hypotheses concerning the positive or negative relationship is not rejected. For example, the overall mean values of the gross profit margin is higher for non-failed (17.18) than failed companies (1.188). In fact, the disparities between the two groups appears to be more glaring with regard to the net profit margin as the non-failed companies recorded a mean of 10.97, well above that of the failed companies (-4.21). Thus, from the table, in comparison with the failed companies, non-failed companies have higher profitability ratios, lower leverage ratios, higher liquidity ratios, and higher efficiency ratios. The exception is with regard to fixed asset turnover where, surprisingly, the failed firms have higher average value (4.727) than non-failed ones (2.86).

The second aspect of the results in Table 2 is the steady deterioration over time in the ratio of the failed companies in comparison with those of non-failed ones. For example, in 1991, the gross profit margin of failed companies was 76.02 per cent of that of the non-failed companies, falling to only 23.05 per cent in 1996. Similarly, the debt ratio of failed companies was 32.9 per cent higher than that of non-failed companies in 1991, but by 1996 the difference had risen to 89.32 percent.

Table 2 : Comparing Over Time the Financial ratios of Failed and Non-Failed Firms

Financial Ratio	1991	1992	1993	1994	1995	1996	ALL
Gross Profit Margin							
Non-failed	11.7155	11.93	14.47	38.81	16.841	15.806	**17.189**
Failed	8.9063	-0.2569	5.228	4.812	-13.195	3.6433	**1.1887**
Net Profit Margin							
Non-failed	10.7344	6.661	6.275	19.14	11.869	15.757	**10.973**
Failed	16.877	-4.097	3.86	4.692	-37.198	-1.2053	**-4.217**
Return on Shareholder's Equity							
Non-failed	0.1413	0.0644	0.0677	0.1398	0.1255	0.126	**0.1073**
Failed	0.122	0.0071	-0.2076	0.1917	0.0561	0.011	**0.033**
Profit Assets Ratio							
Non-failed	0.0701	0.0387	0.0308	0.0966	0.0731	0.067	**0.0602**
Failed	0.034	-0.014	0.0433	0.0375	-0.0012	0.0033	**0.0164**
Debt Ratio							
Non-failed	46.8959	41.95	33.77	28.9	35.778	44.243	**38.164**
Failed	62.3237	67.28	64.56	66.92	71.104	83.761	**70.3**
Assets Equity Ratio							
Non-failed	2.1318	2.047	1.76	1.503	1.745	2.219	**1.8857**
Failed	1.4775	1.517	1.014	3.01	4.3254	4.1957	**2.7911**
Interest Coverage							
Non-failed	11.3302	7.491	11.73	25.79	20.722	8.8301	**13.998**
Failed	2.7689	1.951	1.521	4.59	3.8747	1.7536	**2.8071**
Current Ratio							
Non-failed	1.2136	1.519	1.989	2.178	2.1424	1.735	**1.8382**
Failed	0.9461	1.077	1.129	1.586	1.4617	1.1647	**1.2554**
Acid Test Ratio							
Non-failed	0.7738	1.043	1.09	1.69	1.4622	1.3123	**1.2276**
Failed	0.243	0.5715	0.4563	0.8421	0.8423	0.6976	**0.6404**
Fixed Asset Turnover							
Non-failed	3.7184	4.764	2.408	2.04	1.668	3.2236	**2.8617**
Failed	4.1145	6.371	9.371	4.304	2.5141	2.9052	**4.7272**
Total Asset Turnover							
Non-failed	0.9607	0.7066	0.6389	0.4945	0.6548	0.6303	**0.6792**
Failed	0.4498	0.4512	0.5282	0.4588	0.4117	0.3502	**0.4361**

FINDINGS

Discriminant Analysis

Financial ratios give an indication of financial strength of a company. The limitations of ratio analysis arise from the fact that the methodology is basically univariate; that is, each ratio is examined in isolation. The combined effects of several ratios are based on solely on the judgment of financial analyst. Therefore, to overcome these shortcomings of ratio analysis, it is necessary to combine

different ratios into a meaningful predictive model. The discriminant analysis and logit or probit models have been used to construct an index that allows classification of an observation into one of the several a priori groupings.

Though it is essentially a multivariate analysis, the discriminant analysis begins with an analysis of variance to assess the differences between means of financial ratios of companies that have and those that have not sought for court protection. Table 3 below shows the results from the univariate analysis. It should be noted that because there are two groups, the t-ratios could be calculated as square roots of the respective F-ratios. From the results in Table 3, it is evident that failed and non-failed firms differ significantly with respect to seven of the eleven ratios: gross profit margin, return on equity, debt ratio, leverage, interest coverage, acid test, and asset turnover.

Table 3: Test for Equality of Means

Independent variables	Wilk's Lambda	Univariate F-ratio	Significance
GPMARGIN	0.94	5.12	0.03
NPMARGIN	0.97	2.15	0.15
ROE	1.00	0.22	0.64
ROA	0.94	4.61	0.03
DBRATIO	0.69	32.95	0.00
LEVERAGE	0.94	4.68	0.03
INTCOVER	0.84	13.80	0.00
CURATIO	0.96	2.72	0.10
ACIDTEST	0.93	5.88	0.02
FIXOVER	1.00	0.02	0.88
TOTOVER	0.91	7.19	0.01

The results from Table 3 above have an important limitation: they are based upon a univariate analysis that takes one independent variable at a time. The discriminant analysis therefore, proceeds with a multivariate analysis so that the dependent variable can be related to a set of independent variables. As the objective of this research is to identify the financial ratios with the highest ability to discriminate between firms that have and those that have not sought for court protection, a step-wise procedure was adopted. Table 4 below shows the results of the MDA.

Table 4: Discriminant Analysis Results

Variable	Wald	Sig.
Debt Ratio	.69478	.0000
Total Assets Turnover	.63666	.0000
Percent correctly predicted	**Estimation**	**Holdout**
Failed	82.2	76.9
Non-failed	80.0	74.1
Overall	81.1	75.4

From Table 4 above, it is clear that two ratios were selected by the MDA: debt ratio and total assets turnover. Eighty-two percent of failed firms and eighty percent of non-failed ones were correctly predicted in the estimation sample. This implies an overall prediction accuracy of 81.1 in the estimation sample. The estimates were then used to predict failure in the holdout sample. In the holdout sample, 76.9 percent of failed and 74.1 percent of non-failed firms were correctly classified, giving overall classification accuracy rate of 75.4 in the holdout sample.

Ohlson (1980) notes a number of shortcomings of the Multiple Discriminant Analysis. First, he notes that the discriminant analysis is based upon the assumption that the group dispersion matrices are equal across all groups. Relaxation of this assumption, he argues, affects the significance test for the differences in-group means. The second shortcoming of the MDA noted by Ohlson is the requirement that the variance-covariance matrices of the predictor variables should be the same for both groups of failed and non-failed companies. Third, Ohlson notes that the requirement that the predictor variables be normally distributed "mitigates against the use of dummy variables". Finally Ohlson criticizes the "matching" procedure used in MDA. He argued that "failed and non-failed firms are matched according to criteria such as size and industry, and these tend to be somewhat arbitrary".

The Logit Model

In view of the aforementioned limitations of the MDA, a logit regression was run. Following Ohlson (1980) the logit model is given by:

$$f(\beta) \equiv \sum_{i \in s_1} \log P(X_i, \beta) + \sum_{i \in s_2} \log (1 - P(X_i, \beta))$$

Where:

X_i	is a vector of predictors for the i^{th} observation
β	is a vector of unknown parameters
$P(X_i, \beta)$	is the probability of bankruptcy for any given X_i and β
P	is some probability function, $0 \leq P \leq 1$

The logit model handles a very special case of regression. In the ordinary least square regression (OLS), the dependent variable is required to have a range of values and so does not handle situations where the dependent variable takes on limited or, in the extreme, only two values. In this research, the dependent variable takes only two values, namely failure or non-failure. Thus, the application of OLS is not feasible and an alternative, such as the logit model, is required. Hence the application of the logit model. The logit model was estimated using the enter method that takes all the ratios in the estimation. The application of this procedure to the estimation of the logit model gave results shown in Table 5.

The results in Table 5 below show when all the eleven ratios were included into the logit estimation, four of them were found to be significant at 10 percent or better: debt ratio, interest coverage, current ratio, and total asset turnover. Moreover, 86 percent of failed and 76.3 percent of non-failed companies were correctly classified in the estimation sample, giving an overall classification accuracy rate of 81.8 percent. When the result from the estimation sample were used to classified, while for the non-failed firms the rate was only 57.1 percent.

Table 5: Logit results (Enter Method)

Variable	Estimate	Wald	Sig.
Gross Profit Margin	0.0151	0.0862	0.7691
Net Profit Margin	- 0.0107	0.0399	0.8416
Return on shareholder's	3.3003	0.2166	0.6416
Profit Assets Ratio	- 21.0408	1.2834	0.2573
Debt Ratio	- 0.1458	7.6708	0.0056***
Assets Equity Ratio	0.0392	0.0050	0.9433
Interest Coverage	0.1258	2.7305	0.0984*
Current Ratio	- 1.6062	3.0728	0.0796*
Acid Test Ratio	2.1138	2.6014	0.1068
Fixed Asset Turnover	0.1800	2.4718	0.1159
Total Assets Turnover	2.8576	5.0253	0.0250**

Percent Correctly	**Estimation**	**Holdout**
Failed	86.05	84.62
Non-Failed	76.29	57.14
Overall	81.82	72.34

*** Significant at 1%
** Significant at 5%
* Significant at 10%

What may have accounted for the deterioration in the classification rate of non-failed firms in the hold out sample, despite the presumed advantage of the logit over the discriminant analysis? To help answer this question, an alternative estimation procedure, forward stepwise method, was adopted. This procedure enables predictor variables to be entered based upon their contribution to the likelihood - ratio statistics. Thus, variables that do not contribute significantly to the statistics are not entered by the procedure. The results from this technique are given in Table 6.

Table 6: Logit Results (Stepwise Method)

Variable	Estimate	Wald	Sig.
Debt ratio	-.0881	11.3544	.0008***
Interest Coverage	.1026	4.2562	.0391**
Total Asset Turnover	2.3721	5.7214	.0168**
Constant	2.2782	3.1867	.0742*

Percent correctly predict	**Estimation**	**Holdout**
Failed	86.05	84.62
Non-failed	74.29	61.90
Overall	80.77	74.47

***Significant at 1%
** Significant at 5%
* Significant at 10%

The results in Table 6 show that three out of the eleven ratios were selected by the stepwise procedure as having significant discriminating ability: debt ratio, interest coverage and total asset turnover. In addition, 86 per cent of failed firms and 74 per cent of the non-failed ones were correctly classified in the estimation sample. When the estimates were used to classify the holdout sample, 84.6 per cent of the failed and 61.9 per cent of non-failed firms were correctly classified.

DISCUSSION

The results obtained in this study show that the logit model, which has an edge over the discriminant model for, among others, making no requirements upon the distribution of the data, predicts corporate failure better than does the former model. The logit model predicts 80.7 per cent of the firms in the estimation sample and 74.4 percent in the hold sample. In addition, three financial ratios namely debt ratio, interest coverage, and total asset turnover were found to have significant discriminating power in the logit model. To put the discussion in context, as summary is given below of the mean values of the significant ratios.

Table 7: Mean Values of Significant Financial Ratios

	Failed	**Non-failed**
Debt Ratio	70.3009	38.1648
Interest Coverage	2.8071	13.9989
Total Assets Turnover	0.4361	0.6792

Table 7 shows that failed companies have huge debt ratios, with their total liabilities averaging 70 per cent of their total assets. This is almost double the proportion for the non-failed companies whose debt ratio stood at 38.1 per cent.

This finding appears to reecho those of Altman (1968), Beaver (1970), Ewert (1968) and Blum (1969), who reported that debt ratios had significant predictive ability. Thus, in line with Altman, Beaver and Ewert cited above, this study emphasizes the importance of debt ratio as a predictor of failure. The implication is that non-failed firms are able to keep their debt at reasonably low levels while the sick ones are unable to do so. It may well be that the latter category are unable to halt the deterioration in the value of their assets to prevent a steady rise in their debt ratio.

Closely related to the above finding is that, as shown in Table 7 above, interest coverage has a significant predictive ability. The mean value of time interest earned ratio for non-failed firms is 13.9, well above that of failed firms (2.8). Blum (1969) found a similar ratio (cash flow over total debt) to have significant ability to predict failure. It is interesting to note that the findings reported here show that two leverage ratios (i.e. debt ratio and time interest earned ratio) are both significant in predicting corporate failure. The results, therefore, differ from those of earlier authors to the extent that leverage plays a key role in predicting failure. This suggests that a key determinant of corporate failure in Malaysia is the extent of leverage. Non-failed companies are able to keep profit levels from failing to critical levels and are able to keep their external obligations within tolerable range. It is important, however, to note that the results reported by different researchers are not directly comparable due to differences in methodology, and the nature of data. For example, different authors define failure differently. Moreover, financial data differ because of differences in accounting methods.

Keeping these limitations in mind, it is pertinent to emphasize the importance of total assets turnover in predicting corporate failure in Malaysia. From Table 7 above, non-failed companies have a mean value of 0.6792 while the failed ones have a mean of 0.4361. This implies that non-failed firms in Malaysia on average generate sales worth more than 67.9 per cent of their total assets, while for the failed companies; the ratio is less than 44 per cent. The importance of total assets turnover in predicting corporate failure corroborates the findings of Altman (1968) who found the ratio to have a significant predictive ability.

Overall, the results of this study suggest that to reduce the prospect of failure, Malaysian companies should strive to keep their external obligations low in comparison with their profits and assets. Thus, in order to be successful (at least in the sense of not going into debt default) Malaysian companies should strive to reduce their gearing either by raising their profits or by reducing their debt or both.

The government of Malaysia has taken measures to address the problem of non-performing loans and to inject liquidity into the banking system. It remains to be seen whether the failed companies (and indeed the non failed ones) would learn from the experience of failure by keeping their financial ratio outside the fringes of

bankruptcy. The results of this study and the implications derived there from should, however, be taken against the backdrop of their limitations - the sample is small owing to the small number of companies that went into default or applied for court protection in Malaysia. Further research is required that make use of a larger sample when it is available so that the results could be more generalisable.

REFERENCES

Altman, E.I. (1968). Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy. Journal of Finance, Vol. 23, pp.589-609.

Altman, E. And T. McGough (1974). Evaluation of a Company as a Going Concern. Journal of Accountancy(December).

Altman E.I. (1969). Corporate Bankruptcy Potential, Stockholder Returns and Share Valuation. Journal of Finance, Vol. 24 (December), pp.887-900.

Beaver, W.H. (1966). Financial Ratios as Predictors of Failures. Empirical Research in Accounting pp. 71-111.

Blum, M. (1969). The Failing Company Doctrine. Unpublished Ph.D. dissertation, Columbia University.

Casey, C.J., V.E. McGee and C.P Stickney (1986). Discriminating Between Reorganized and Liquidated Firms in Bankruptcy. The Accounting Review, Vol.LXI No. 2, pp. 249-262.

Ewert, D. (1968).Trade Credit Management: Selection of Accounts Receivable Using Statistical Model. Unpublished Ph.D. dissertation, Stanford University.

Haugen, R.A. and L.W. Senbet (1978). The Insignificance of Bankruptcy Costs to the Theory of Optimal Capital Structure, Journal of Finance, (23 May), pp. 383-93.

Hong S.C. (1983). A Bankruptcy Outcome: Model and Empirical Test. Working paper, University of California at Berkeley, (March).

Kaveri, S.P. (1980). Financial Ratios as Predictors of Borrowers, Health Sultan Chand & Sons, New Delhi.

LoPucki, L.M. (1983). The Debtor in Full Control-Systems Failure under chapter 11 of Bankruptcy Code?. American Bankruptcy Law Journal, Vol. 571, pp. 99-126.

Ohlson, J.A. (1980). Financial Ratio and the Probabilistic Prediction of Bankruptcy. Journal of Accounting Research, Vol. 18, No. 1 (Spring), pp. 109-131.

Altman, E. I. (1968). Financial Ratios, Discriminant Analysis and The Prediction of Corporate Failure. Journal of Finance, 22 (September), pp. 589-609.

_____ (1984). Introduction: Company and Country Risk Models. Journal of Banking and Finance, 8 (2), pp. 151-152.

_____ (1984). The Success of Business Failure Prediction Models: An International Survey. Journal of Banking and Finance, 8 (2), pp. 171-198.

_____, Baidya, T. K. N. and Dias, L. M. R. (1979). Assessing Potential Financial Problems for Firms in Brazil. Journal of International Business Studies, 10 (2), pp. 9-24.

_____, Haldeman, R. G. and Narayanan, P. (1977). Zeta Analysis: A New Model to Identify Bankruptcy Risk of Corporations. Journal of Banking and Finance, 1, pp. 9-24.

_____, Marco, G. and Varetto, F. (1994). Corporate Distress Diagnosis: Comparisons Using Linear Discriminant Analysis and Neural Networks (The Italian Experience). Journal of Banking and Finance 18 (May), pp. 505-529.

Beaver, W. H. (1966). Financial Ratios as Predictors of Failure. Journal of Accounting Research, 4 (Supplement), pp. 71-111.

Begley, J., Ming, J. and Watts, S (1995). Bankruptcy Classification Errors in the 1980's: An Empirical Analysis of Altman and Ohlson's Models. Unpublished Manuscript. University of British Columbia.

Blum, M. (1974). Failing Company Discriminant Analysis. Journal of Accounting Research 12 (Spring), pp. 1-25.

Campbell, S. V. (1996). Predicting Bankruptcy Reorganisation for Closely Held Firms. Accounting Horizons, 10 (3), pp. 12-26.

Deakin, E. B. (1972). A Discriminant Analysis of Predictors of Business Failure. Journal of Accounting Research, 10 (Spring), pp. 167-179.

_____ (1976). Distributions of Financial Accounting Ratios: Some Empirical Evidence. The Accounting Review, (January 1976), pp. 90-96.

_____ (1977). Business Failure Prediction: An Empirical Analysis. In E. I. Altman & A. W. Sametz (Eds.) Financial Crises: Institutions and Markets in A Fragile Environment, New York, John Wiley and Sons, pp. 72-88.

Hair, J. S., Anderson, R. E., Tetham, R. L. and Black W. C. (1995). Multivariate Data Analysis 4th edition. New Jersey, Prentice Hall.

Kharbanda, O. P. and Stallworthy, E. A. (1985). Corporate Failure: Prediction, Panacea and Prevention. London, McGraw-Hill.

Mossman, C. E., Bell, G. G., Swartz, M. and Turtle, H. (1998). An Empirical Comparison of Bankruptcy Models. Financial Review, 33 (2), pp. 35-55.

Ou, J. A. and Penman, S. H. (1989). Financial Statement Analysis and the Prediction of Stock Returns. Journal of Accounting and Economics, 11, pp. 295-329.

Palepu, K. G. (1986). Predicting Takeover Targets: A Methodological and Empirical Analysis. Journal of Accounting and Economics, 8, pp. 3-35.

Platt, H. D. and Platt, M. B. (1990). Development of A Class of Stable Predictive Variables: The Case of Bankruptcy Prediction. Journal of Business Finance and Accounting, 17 (1), pp. 31-51.

_____ (1991). A Note on the Use of Industry-Relative Ratios in Bankruptcy Prediction. Journal of Banking and Finance, 15 (December), pp. 1183-1194.

So, J. C. (1987). Some Empirical Evidence on the Outliers and the Non-normal Distribution of Financial Ratios. Journal of Business, Finance and Accounting, 14 (4), pp. 483-496.

Zmijewski, M. E. (1984). Methodological Issues related to the Estimation of Financial Distress Prediction Models. Journal of Accounting Research, 22 (Supplement), pp. 59-82.

Appendix 1: List of Companies in the Sample

AJINOMOTO (MALAYSIA) BERHAD	AJI
ASSOCIATED KOALIN INDUSTRIES BERHAD	AKI
ALUMINIUM COMANY OF MALAYSIA BERHAD	ALCOM
ARAB-MALAYSIAN DEVELOPMENT BERHAD	AMDB
ANCOM BERHAD	ANCOM
ANTAH HOLDINGS BERHAD	ANTAH
AOKAN PERDANA BERHAD	AOKAM
CARLSBERG BREWERY MALAYSIA BERHAD	CBERG
CHEMICAL COMPANY OF MALAYSIA BHD	CCM
COMPUTER FORMS (MALAYSIA) BERHAD	CFM
CEMENT INDUSTRIES OF MALAYSIA BERHAD	CIMA
CYGAL BERHAD	CYGAL
DAIBOCHI PLASTIC AND PACKAGING INDUSTRY BERHAD	DAIBOCHI
DAMANSARA REALTY BERHAD	DBHD
DNP HOLDINGS BERHAD	DNP
ESPRIT GROUP BERHAD	ESPIRIT
FIMA CORPORATION BERHAD	FIMA
GENERAL CORPORATION BHD	GCORP
GRAND UNITED HOLDINGS BHD	GUH
HEXZA CORPORATION BERHAD	HEXZA
HO HUP CONSTRUCTION COMPANY BERHAD	HOHUP
IJM CORPORATION BERHAD	IJM
INTRIA BERHAD	INTRIA
INNOVEST BERHAD	IVEST
JUTAJAYA BERHAD	JUTAJAYA
KANZEN BHD	KANZEN
KAMUNTING CORPORATION BERHAD	KCB
KUMPULAN EMAS BERHAD	KEMAS
KEMAYAN CORPORATION BERHAD	KEMAYAN
KUALA LUMPUR INDUSTRIES HOLDINGS BERHAD	KLIH
KECK SENG (MALAYSIA) BERHAD	KSENG
KUCHAI DEVELOPMENT BERHAD	KUCHAI
LONG HUAT GROUP BERHAD	LHUAT
MAGNUM CORPORATION BERHAD	MAGNUM
MALAKOFF BERHAD	MALAKOF
MALAYSIA PACKAGING INDUSTRY BHD	MAYPACK
MBF LAND BERHAD	MBFLAND
MENANG CORPORATION (MALAYSIA) BERHAD	MENANG
METACORP BERHAD	META
METROJAYA BERHAD	METROJ
MALAYSIAN HELICOPTER SERVICES BHD	MHS
MALAYSIAN INTERNATIONAL SHIPPING CORPORATION	MISC
MUN LOONG BHD	MLOONG
MALAYSIA MINING CORPORATION BHD	MMC
MALAYSIAN OXYGEN BERHAD	MOX
MALAYSIAN PACIFIC INDUSTRIES BERHAD	MPI

Appendix 1: List of Companies in the Sample (continued)

MALAYSIAN RESOURCES CORPORATION BHD	MRCB
MATSUSHITA ELECTRIC COMPANY (MALAYSIA) BHD	MSHITA
MULPHA INTERNATION BHD	MULPHA
MALAYAWATA STEEL BHD	MWATA
ORIENTAL HOLDINGS BHD	ORIENTAL
OYL INDUSTRIES BHD	OYL
PARK MAY BHD	PARKMAY
ASIAN PAC HOLDINGS BHD	PEGI
PERAK CORPORATION BHD	PERAKCORP
PERLIS PLANTATIONS BHD	PERLIS
PJ DEVELOPMENT HOLDINGS	PJBHD
PSC INDUSTRIES	PSCI
RAHMAN HYDRAULIC BHD	RAHMAN
RESORTS WORLD BHD	RESORTS
SARAWAK ENTERPRISE CORPORATION BHD	SARAWAK
SELANGOR DREDGING BHD	SDRED
SUNGEI WAY HOLDING	SGWAY
SOUTH MALAYSIA INDUSTRIES BHD	SMI
TAIPING CONSOLIDATED BHD	TAIPING
TASEK CEMENT BHD	TASEK
TAN CHONG MOTOR HOLDINGS	TCHONG
TENCO BHD	TENCO
TIME ENGINEERING BHD	TIME
TIMBERMASTER INDUSTRIES BHD	TMASTER
TRACTORS MALASIAN HOLDING BHD	TRACTOR
TECHNOLOGY RESOURCES INDUSTRIES BHD	TRIND
SISTEM TELEVISYEN MALASIA BHD	TV3
TRADEWINDS (MALASIA) BHD	TWINDS
UNITED ENGINEERS (MALASIA) BHD	UE
WEMBLEY INDUSTRIES HOLDINGS BHD	WEMBLEY
WESTMOUNT LAND (ASIA) BHD	WHB
WORLDWIDE HOLDINGS BHD	WTHB
WING TIEK HOLDINGS BHD	WTHB

Appendix 2: Companies that have sought of Court Protection

Name of Company	Date Obtained	Expiry Date
Westmont Industries Bhd	04.02.98	29.08.98
Wing Tiek Holdings Bhd	23.03.98	22.06.98
Espirit Group Bhd	16.04.98	14.11.98
Wembley Industries Holdings Bhd	24.04.98	6 months after
Bescorp Industries Bhd	19.05.98	17.07.98
Aokam Perdana Bhd	18.04.98	4 months after
SCK Group Bhd	20.06.98	3 months after
Associated Kaolin Industries Bhd	14.07.98	6 months after
Uniphoenix Corp. Bhd	19.06.98	6 months after
Autoways Holdings Bhd	22.05.98	6 months afterKuala
Lumpur Industries Holdings Bhd	08.06.98	31.03.98
Malaysia General Investment Corporation	12.06.98	08.12.98
Timbermaster Industries Bhd	16.06.98	6 months after
Tenco Corp. Bhd	25.06.98	31.03.99
Perdana Industries Holding Bhd	29.06.98	6 months after
Abrar Corp. Bhd	30.06.98	31.03.99
MBf Holding Bhd	08.07.98	6 months after
Time Engineering Bhd	14.07.98	9 months after
Arab-Malaysian Corporation Bhd	17.07.98	31.10.98
South Peninsular Industries Bhd	16.07.98	31.10.98
Cygal Bhd	04.08.98	--
Promet Bhd	27.07.98	6 months after
Menang Corporation (M) Bhd	10.08.98	6 months after
Kemayan Bhd	12.08.98	12.05.99
Taiping Consolidated Bhd	30.07.98	6 months after
Arensi Holdings Bhd	12.08.98	9 months after

Source : The Star August 25,1998