

# Predictors of Financially Distressed Small and Medium-Sized Enterprises: A Case of Malaysia

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**Abstract.** This study aims to investigate factors contributing to financial distress among manufacturing SMEs. By employing the logistic regression, we find that age, size, debt ratio, sales to total assets and net income to share capital could predict financially distressed SMEs for the 4-year prior to distress model. However, 3-year prior to distress, more variables, namely age, size, debt ratio, short-term to total liabilities, current ratio and EBIT to total assets, are found to be significant. As companies are nearer to distress situation, less number but important variables emerged. Two year prior to distress, age, debt ratio and EBIT to total assets remained significant while one year prior to distress, only debt ratio could predict financially distressed companies. This ratio is found to be consistently significant in all periods.

**Keywords:** Small-Medium Sized Enterprises, Financial Distress.

## 1. Introduction

Over the last four decades, corporate failure prediction models were constructed based on sample of large firms where financial data were more easily accessible. Information on smaller, privately held firms, on the other hand, was more difficult to acquire. Hence, only a small number of researches on this section of business entities had been initiated by [1] in the United States and [2] in the United Kingdom. In Malaysia, published works on corporate failures have been concentrating on listed companies [3]-[5]. Most of these studies were using bankruptcy prediction models such as the univariate analysis, multiple discriminant analysis and the logit model. However, there was no study in Malaysia that utilised any of these models to find factors that lead to failure of SMEs in Malaysia. This could be due to the difficulty in accessing the annual report and information of SMEs. Recognising the contributions of SMEs towards economic growth and job creation, it is important to ensure that the company survived. Many studies have shown that the failure rate among SMEs is very high [6], [7]. Despite the support given by government and many other agencies, the failure rate among SMEs keeps on increasing. Hence, there is a need to identify an appropriate model that could predict financially distressed SMEs. Given the context discussed above, the purpose of this study is to identify factors that could predict corporate failures among Malaysian SMEs in the manufacturing sector.

## 2. Failure Prediction of SME

Most studies on SME utilized qualitative data as it is difficult to obtain financial information from SME's. [8] was among the first that utilized qualitative data to predict financial distress among SMEs. His work had been tested and replicated by other researchers outside the US market such as in Croatia [9], Netherlands [10], Chile [11], and Singapore [12]. [8], [9] and [5] found that staffing was a significant predictor while [8], [9] found that education was also significant. Meanwhile, [10], [11] showed that managerial expertise was significant in explaining distress among SMEs. However, [13] showed that non-financial data could only marginally predict the success and failure of small firms. This would mean financial data would still need to be considered.

To date, there were only a few studies that have successfully utilised financial data to predict distress among SMEs [1], [14]-[17]. These studies used many ratios to predict failure, as there was no specific guideline in selecting variables. Factors such as liquidity ratios, profitability ratios and leverage ratios which

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were significant in studies on large firms seem to blend well in SMEs. If we were to look at [14], they used short-term debt to equity book value, cash to total assets, EBITDA to total assets, retained earnings to total assets, and EBITDA to interest expense in their study. By using 120 failed and 1890 non-failed US firms from 1994 to 2002, their result confirmed that the prediction accuracy could be enhanced by 30 percent if a prediction model specific to SMEs was used on the holdout sample.

[15] provided further evidence of failure prediction of SMEs for the German market. They used the logit analysis on a sample consisted of 40,154 firm-year observations from 1992 to 2002. Equity ratio, growth of equity ratio, external equity financing, return on sales, return on sales growth, depreciation ratio, and temporary liquidity problems, size of firm, location of firm headquarter, business sector, and legal form of business were significant predictors of failure. Their model had an accuracy rate of 85 percent to predict failure among the SMEs. This is similar to [16] where the estimated probability of default produced an accuracy rate of about 85 percent for the Italian SMEs. The results showed that debt was positively related to failure. In term of liquidity, firms with greater cash flows were less likely to default. Furthermore, profitability (EBITDA and ROI) was important in estimating failure among SMEs which was generally similar to large firms. ROE was found to be insignificant in explaining failure. This could be due to the small portion of equity to finance SMEs as funds were largely came from debt financing provided by banks. This is consistent to [15] where they found that the equity ratio of SMEs in Germany was relatively low and relied on self financing, family, friends and business associates.

### **3. Research Design**

The sample consists of both distressed and non-distressed SMEs during the period 2000 to 2010. The list of distressed companies was obtained from the Companies Commission of Malaysia (CCM). Distressed companies were matched against healthy companies that have an almost similar total asset within plus minus ten percent. Financial data for both groups were collected from CCM. We focused on companies in the manufacturing industry because this sector contributed 27.6 percent of the country's GDP [18] and 76.7 percent of the country's total exports for 2006 [19]. The final dataset contained 278, 234, 162 and 58 distressed and healthy companies for the respective 4-year, 3-year, 2-year and one year prior to distress. Ten percent of this sample was used as the holdout sample to test on the prediction model. In order to find the predictors of financially distressed SMEs, the logit model was used [20], [21]. A forward stepwise method is adopted in the logistic regression so as to cater for the lack of theoretical basis in selecting the independent variables [22]. Nine variables used in this study were as follows: age, log total assets, log share capital, total liabilities to total assets, short term liabilities to total assets, liquidity, sales to total assets, earnings before interest and tax to total assets, and net income to share capital. These ratios were selected based on the popularity of their usage in the literature and the predictive success stated in previous research.

### **4. Analysis of Results**

Descriptive results show that age and total liabilities to total assets have a significant mean difference at the 5 percent level between the healthy and distressed companies 4-year prior to distress status; whereas current ratio and net income to share capital are found to be significant at the 10 percent level. Three years prior to distress, age, current ratio, earnings before interest and tax (EBIT) to total assets, and net income to share capital are found to be significantly different between the healthy and distressed companies. However, total liabilities to total assets are no longer significant. As we move closer to 2-year and 1-year prior to distress, total liabilities to total assets, earnings before interest and tax to total assets and net income to share capital are identified to have significant mean differences between the two groups. Distressed companies rely heavily on debt which is approximately 137 percent, 166 percent and 247 percent in the respective 4-year, 2-year and 1-year prior to distress; whereas for non-distressed companies, it only shows 81 percent, 84 percent and 73 percent during those respective years. Liquidity is also following a similar pattern. Distressed companies have a much lower liquidity than non-distressed companies which is 1.17 times versus 3.33 times, 0.85 times versus 2.19 times and 0.65 times versus 1.41 times for the 4-year, 3-year and 1-year prior to distress. Distressed companies were having difficulties to meet short-term obligations. For SMEs, age is found to be very significant in differentiating the two groups for three periods. The average age of distressed

companies is about 13 to 17 years whereas non-distressed companies have been in operation about 18 to 20 years. If we were to look at basic earning power (earnings before interest and tax to total assets), the mean of non-distressed companies is positive (4 percent, 2 percent, 2 percent and 2 percent) whereas distressed companies are showing a negative value (17 percent, 19 percent, 32 percent and 45 percent) throughout the respective 4-year, 3-year, 2-year and 1-year prior to distress. SMEs in Malaysia rely a lot more on short term liabilities with an average of 91 percent for distressed companies and 86 percent for non-distressed companies. Pearson correlations were then executed among the independent variables. The results shows that the pairwise correlations among the variables were uniformly low ranging from 0.004 to 0.652 and most of them are insignificant except for several ratios: age against share capital; total assets against share capital; total assets against total liabilities/total assets; total assets against short term liabilities/total liabilities; total assets against sales/total assets; total assets against net income/share capital; share capital against sales/total assets; share capital against net income/share capital; total liabilities/total assets against earnings before interest and taxes/total assets; and earnings before interest and taxes/total assets against net income/share capital. The low correlation indicates that multicollinearity is not a problem to this study.

Results of the stepwise logistic regression are presented in Table 1. Total liabilities to total assets (debt ratio) are the only significant variable that could predict financially distressed SMEs throughout the 4-year, 3-year, 2-year and 1-year prior to distress. This result reinforces the descriptive finding of Malaysia SMEs' dependency on liabilities. The 2-year prior to distress model shows that there are four predictors found to be significant in detecting financially distressed SMEs. These are age, size (share capital), debt ratio and return on assets. A significant negative coefficient for age suggests that the longer the existence of a company, the healthier is the company. This is supported by [23] where he found young companies have a higher probability of failure than established companies because they have a higher tendency to lose money and thus generate insufficient profits to finance operational growth. He further explained that young companies are expected to take more debt if the owners have limited personal resources. This could also lead a company into financially distress situation if the owners are unable to pay their obligation. Our result concurs to Shane's finding where the higher the debt, the more distress the Malaysian SMEs. The expected sign of debt ratio's coefficient and its significance is also consistent to [16].

Table 1: Stepwise Logistic Regression Analysis for Estimation Sample

Variable	4-year prior		3-year prior		2-year prior		1-year prior	
	Coefficient	Change in -2 Log Likelihood	Coefficient	Change in -2 Log Likelihood	Coefficient	Change in -2 Log Likelihood	Coefficient	Change in -2 Log Likelihood
Age	-0.206	59.553 (0.000)**	-0.164	433.731 (0.000)**	-0.221	37.247 (0.000)**		
Log (Total assets)	1.176	17.831 (0.000)**	1.166	14.955 (0.000)**				
Log (share capital)					0.790	4.292 (0.038)**		
Total liabilities to total assets	0.635	21.447 (0.000)**	0.218	4.744 (0.029)**	0.373	4.180 (0.041)**	3.120	19.612 (0.000)**
Short term liabilities to total liabilities			2.357	5.135 (0.023)**				
Liquidity			-0.479	8.290 (0.004)**				
Sales to total assets	0.072	4.818 (0.028)**						
Earnings before interest and tax to total assets			-4.179	13.002 (0.000)**	-7.128	24.942 (0.000)**		
Net income to share capital	-0.094	4.212 (0.040)**						
Constant	-5.512 (0.007)**		-7.233 (0.007)**		1.888 (0.436)		-3.183 (0.006)**	
Hosmer and Lemeshow test	11.851 (0.158)		11.552 (0.172)		6.879 (0.550)		9.547 (0.298)	

\*\*significant at  $\alpha=0.05$

Three year prior to distress, there are additional variables that are found to be significant. These are size (total assets), short term liabilities to total liabilities and current ratio. SMEs in Malaysia show that the bigger the size of a company, the higher is the probability to go into distress. This could again be associated with the reliance on liabilities to support the business as we could see that the mean debt ratio is 543 percent for distressed companies. Our result concurs to [15]. The heavy use of short term liabilities which on average is 91 percent of the total liabilities has also contributed to SMEs failure. A positive coefficient of the variable shows that the higher is the short term liabilities to total liabilities, the higher is the chances of SMEs going into distress. As for current ratio which is measuring a company's liquidity, a significant negative coefficient indicates that the lower the ratio, the more distress the company. This is consistent to [16], [24]. The 4-year prior to distress shows an almost similar result to the 3-year prior to distress model except that short term liabilities, liquidity and return on assets are no longer significant. However, sales to total assets and net income to share capital are found to be significant predictors of financially distressed SMEs. Generally, as companies move closer to distress situation, less number, but important variables are identified to predict financially distressed SMEs. In terms of accuracy rate, 1-year and 2-year prior to distress provide the highest accuracy where the holdout sample carries an accuracy rate of 90 percent and 87.5 percent respectively. This is close to the accuracy rate reported by [14]-[16] that showed a respective 87.2 percent, 85 percent and 85 percent. The 3-year and 4-year prior to distress accuracy rate dropped to 79.2 percent and 77.5 percent for the estimated sample and 75 percent and 66.5 percent for the holdout sample. As we move further away from the distress situation, the accuracy rate of the model decreases.

## 5. Conclusion

This study presents new empirical evidence on predictors of financially distressed small and medium-sized enterprises in the manufacturing sector for the period from 2000 through 2010. The results indicated that some of the variables are consistently significant throughout the four periods while others are more prominent at a certain period before distress situation. Debt ratio is always significant in distinguishing between distressed and non-distressed firms for all periods. This is further reinforces in the logistic regression where debt ratio is significant to predict financially distressed SMEs throughout all periods. SMEs in Malaysia rely heavily on liabilities to support total assets. More importantly the dependency on short term liabilities has made it worst for these companies. On the other hand, age seemed to be significant during the earlier periods but not one year prior to distress. The findings indicate that financially distressed SMEs could be detected as early as four years before they go into distress. Hence, preventive measures could be initiated by potentially distressed SMEs to avoid possible adverse situation. Credit providers would be able to use the models to detect financially distressed borrowers and to evaluate potential SMEs. Better credit decision making could help reduce non-performing loan among the SMEs.

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