An Investigation of Financial Soundness of Listed Manufacturing Companies in Sri Lanka: an Application of Altman's Model

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Abstract

The financial position of listed companies is an issue that every stakeholder is concerned about very much. The management of the companies tries every means to improve the company's financial position, and hopes to maintain good trends in the future. Investors also pay close attention to companies' financial position and the investment decisions they make are based on this. The study is about the investigation of financial soundness of listed manufacturing companies for a period of 5 years, i.e. from 2003 to 2007. The test of soundness as revealed by Z score (Altman's model) showed that the selected companies were on the verge of failure. In order to save the companies from total bankruptcy, their financial position should be improved without any further delay. To this aim, therefore, the necessity of qualified trained and experienced management personnel, government realistic measure, participative management, supply of adequate working capital, setting realistic goals, rectifying the accountability, motivating the achievement of performance and imposing penalty for non-achievement must be ensured in the sample of selected listed companies. Hence, the appropriate authority should take immediate measures for the removal of bankruptcy.

Keywords: *financial soundness, Altman's model, listed manufacturing companies*

JEL Classifications: *M0, M4, M41*

Introduction

Managers, stockholders, lenders and employees are concerned about their firm's financial condition (Bum, 2007). The job security of managers and employees is not assured should their firms struggle financially. Stockholders' equity position and lenders' claims are not guaranteed as well. Government, as a regulator in a competitive market, has concerns about the consequences of financial distress for firms, and it controls capital adequacy through the regulatory capital requirement (Mingo, 2000). This shared interest among manager, employee, investor, and government creates continual inquiries and recurrent attempts to answer an incessant question about how we predict financial distress, or what the credit risk of firms reveals (Bum, 2007)

Despite numerous attempts to predict bankruptcy, three decades after Altman's seminal study (1968), financial distress prediction research has not reached an unequivocal conclusion. We believe that the lack of consensus in the study of financial distress prediction is partially

attributable to the nature of the explanatory variables, as studied for three decades. Before Merton's (1974) proposal was applied to financial distress, most studies had used financial ratios as explanatory variables, and the sole dependence on discrete types of variables had been inevitable.

The financial distress literature has been focused on finding explanatory variables that have discriminating power to differentiate financially distressed companies from financially sound companies, at least one year prior to bankruptcy. Initiated by Beaver (1966), Altman (1968), and Ohlson (1980), academic studies to measure financial vulnerability continued for three decades. Beaver found that the cash flow to debt ratio was the best single ratio predictor of distress in his univariate discriminating analysis (Bum, 2007).

Literature Review

A model for predicting bankruptcy sets out to establish a relationship between failure and a number of financial ratios that can be calculated from a firm's annual report. Timely prediction of bankruptcy is important for all parties involved: shareholders, managers, workers, lenders, suppliers, clients, the community and the government (Dimitras, Zanakis and Zopounidis, 1996). Bankruptcy models are useful to those stakeholders that are able to take action to prevent failure. Researchers often state explicitly that they want to produce an early-warning model, but in other studies it seems also likely that a model that can predict failure as early as possible (for example, in year 4 or year 5 prior to failure) is aimed for. In many studies, the model produced is based on the annual report from year 1 prior to failure (e.g. Altman, 1968; Altman, Eom, Kim, 1995; Richardson, Kane, Lobingier, 1998 and Lennox, 1999).

There are few articles on this subject in the literature. Altman, Haldeman and Narayanan (1977) present the ZETA model, which is a model based on annual reports from year 1 prior to failure (i.e. a year-1 model). Models based on year 2, year 3, year 4 and year 5 were also considered. Of the five models, the year-1 model proved to have the best overall performance in the 5-year period prior to failure (the detailed results for all five models are not given in the paper).

Beaver (1966) first used empirical methods to study corporate financial crisis. Beaver showed that 'cash flow to total debt ratio is the best variable to explain financial crisis, then would be the ratio of total debt to total assets, net income to total assets, working capital to total assets and current ratio.' Altman (1968) put forward the well-known z-score model. Altman used 22 financial ratios and multiple discriminating analyses to select five financial ratios with best explanatory ability: 'working capital /total assets', 'retained earnings /total assets', 'earnings before interest and taxes / total assets', 'market value equity / book value of total debt' and 'sales / total assets'. Altman et al., (1977) proposed a zeta model to improve the z-score model. The results clearly showed that there were seven variables which could appropriately explain the enterprise bankruptcy prediction compared to the others: return on assets, stability of earnings, debt service, cumulative profitability, liquidity, capitalization and size.

The study of Ou (Ou, 1990) showed that the non-profit data in financial annual report contain information indicating which direction corporate profits change to in the following year. Ou first set up the candidate variables set composed of 61 independent variables in two steps (the first step was to use single variable model Logit to select 13 variables being significant on level of 10%; the second step was to use multi-variable model Logit to estimate these 13 variables, then kept those significant at the level of 10%). Finally, the last eight variables were selected: percentage growth in the 'inventory / total assets', percentage growth in the 'net sales / total assets', change in 'dividends per share' relative to that of the previous year, percentage growth in 'depreciation expense', percentage growth in the 'capital expenditure/ total assets' ratio, with a 1-year lag, the accounting rate of return, change in rate of return relative to the previous year's rate of return.

Lam (2004) selected 16 financial statement variables based on previous studies in the forecast of financial performance: current assets/current liabilities, net sales/total assets, net income/net sales, (long-term debt+short term debt)/total assets, total sources of fund/ total uses of fund, research expense, pre-tax income/net sales, current assets/common shareholders' equity, common shares traded, capital expenditure, earnings per share (EPS), dividend per share, depreciation expense, tax deferral and investment credit, market capitalization and relative strength index. Kiviluoto (1998) also drew on previous research in the forecast of the company's financial performance, chose four financial indicators: operating margin, net income before depreciation and extraordinary items, net income before depreciation and extraordinary items of the previous year and equity ratio.

Chen (2000) used financial ratios in companies' annual reports to study the forecasting issues in the Chinese stock market. Chen selected six financial ratios as explanatory variables: current ratio, total debt / total assets, sales / total assets, net income on total assets, net income on equity and net income / sales (not related to the cash flow ratios). In forecasting financial distress of Chinese listed companies, Wu and Lu (2001) firstly chose 21 financial indicators, then used stepwise regression method to analyse them and finally found six variables with wealthy information: growth in net income, return on total assets, current ratio, long-term debt / equity, working capital /total assets and sales / total assets.

Wu and Zhang (2005) found that industry factors and the corporate size played a great role in affecting the financial distress: cost of financial distress increased when the enterprise in financial distress stood in a poor business environment, and the asset size of enterprises had a positive relationship with financial distress cost. Zhang C, Zhang YP, Zhang YC Chen, and Wan (2006) selected 15 financial indicators to forecast EPS: equity per share, dividend pay-out ratio, dividend per share return on net assets, retained earnings ratio, current ratio, quick ratio, total debt / total assets, long-term debt / total assets, sales / accounts receivable, sales / inventory, gross margin ratio, net income / sales, return on investment and return on equity.

Based on the literature, various studies have been conducted in the context of financial position or performance; however, there are no sufficient studies on financial soundness in the listed companies in Sri Lanka. Hence, in an attempt to fill in this research gap, the present study is initiated on an investigation of financial soundness of listed manufacturing companies in Sri Lanka: An Application of Altman's Model in Sri Lanka.

Objectives

The study covers the specific objectives as stated below:

1. To analyse the financial soundness of listed manufacturing companies via Altman model;

2. To recognize the financial soundness of listed manufacturing companies in Sri Lanka;

3. To suggest some line of actions for solving problems.

Methodology

Scope

The scope of the study is the listed manufacturing companies on Colombo Stock Exchange (CSE), Sri Lanka. Thirty one companies are listed under manufacturing sectors[1]. Hence, out of thirty one, only ten companies are randomly selected for the purpose of this study. The

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[1] *Handbook of Listed Companies* (2007). Colombo Stock Exchange, Colombo, Sri Lanka: 19.

companies include: (1) Abans Electrical Ltd (ABANS); (2) Acl Cables Ltd (ACL); (3) Acme Printing and Packaging Ltd(ACME); (4) Central Industries Ltd (CIND); (5) Dankotuwa Porcelain Ltd (DPL); (6) Dipped Products Plc (DIPP); (7) Kelani Cables Ltd (KCAB); (8) Lanka Aluminium Industries Ltd (LALU); (9) Parquet (Ceylon) Ltd (PARQ); (10) Printcare PLC (CARE).

Data Sources

In order to meet the objectives of the study, data was collected from secondary sources mainly from the financial reports of the selected companies, which were published by Colombo Stock Exchange in Sri Lanka.

Reliability and Validity of the Data

Secondary data for the study was drawn from audit accounts (i.e., income statement and balance sheet) of the concerned companies; therefore, this data may be considered reliable for the purpose of the study. Necessary checking and cross checking were done while scanning information and data from the secondary sources. All these efforts were made in order to generate validity data for the present study. Hence, the researcher satisfied the content validity criterion.

Tool of Data Analysis

In this context MDA model as developed by Altman (1970) may be considered worthwhile. The model can provide some rough idea about the financial soundness of the selected listed manufacturing companies in Sri Lanka. He developed the following equation for judging the financial soundness of an enterprise.

$$Z = 0.012X_1 + 0.014X_2 + 0.033X_3 + 0.006X_4 + 0.999X_5$$

where:

$X_1 \equiv$ Working capital/Total assets,

$X_2 \equiv$ Retained earnings/Total assets,

$X_3 \equiv$ EBIT/Total assets,

$X_4 \equiv$ Market value of equity/Book value of total debt, and

$X_5 \equiv$ Sales/Total assets.

Z = Overall Index

In order to test the overall financial soundness of the sample listed companies it needs to calculate the ratios of Working Capital to Total Assets, Earning before Interest & Taxes to Total Assets, Market Value of Equity to Book Value of Total Debt and Sales to Total Assets.

Results and Discussions

Table1 below shows the position of these ratios. It depicts the selected listed companies' average position of the ratios of Working Capital to Total Assets, Earning before Interest and Taxes to Total Assets, Market Value of Equity to Book Value of Total Debt and Sales to Total Assets.

Table 1. Positions of selected ratios of listed manufacturing companies

Companies / Ratios	ABANS	ACL	ACME	CIND	DPL	DIPP	KCAB	LALU	PARQ	CARE
Working capital/ Total assets	0.051	0.332	-0.126	0.501	0.210	0.179	0.470	0.266	-0.395	0.129
Retained earnings/ Total assets	0.053	0.867	0.020	0.098	-0.092	0.059	0.112	0.092	-0.028	0.042
Earnings before interest and taxes/ Total assets	0.102	0.153	0.126	0.160	-0.075	0.090	0.166	0.203	0.050	0.105
Market value of equity/ Total debt	0.620	0.811	0.216	0.427	1.369	1.674	1.660	0.08	1.125	0.241
Sales/ Total assets	1.539	0.946	1.001	1.597	1.004	0.939	1.015	2.323	0.728	1.027

Source: calculated from the figures available in the income statements and balance sheets of the companies concerned

The following table (Table 2) shows the company wise average position of Z's score of the sample listed companies during the period under study.

Table 2. Analysis of Z score

	ABANS	ACL	ACME	CIND	DPL	DIPP	KCAB	LALU	PARQ	CARE	**Average**
Z Score	1.55	0.97	1.00	1.61	1.01	0.95	1.04	2.33	0.73	1.03	**1.22**

Source: Based on Profit and Loss accounts and Balance sheet of the sample listed companies

After assigning the respective average values of X1, X2, X3, X4 and X5, in the aforesaid equations as developed by Altman (1970), Z score was estimated at 1.55, 0.97, 1.00, 1.61, 1.01, 0.95, 1.04, 2.33, 0.73, 1.03 and 1.22 respectively for ABANS, ACL, ACME, CIND, DPL, DIPP, KCAB, LALU, PARQ and CARE. Altman's conclusion is that firms with Z score above 2.99 were solvent while those below of Z score of 1.81 were bankrupt. It is evident from Table2 above that in all sample selected listed companies, the Z values are far below 2.99. This indicates that the financial position of all selected listed manufacturing companies in Sri Lanka appears unsound and they were apparently on the verge of failure during the period under study. In this connection it needs to be mentioned here that Z score as determined by Altman to predict bankrupt and non-bankrupt positions of the firms in the American Context cannot be logically taken as standard in the context of Sri Lanka. Therefore, it can be concluded that the overall financial soundness of the sample listed companies during the period under study had been worst leading to total bankruptcy of the listed companies.

Concluding Remarks

The financial position of listed companies is an issue that every stakeholder is very much concerned about. The managers of the companies try every means to improve the company's financial position, and hope to maintain the good trends in the future. Investors also pay close attention to companies' financial position and the investment decisions they make are based on this. It is obvious from the above discussion that the average financial position of the selected

listed manufacturing companies was not sound during the period under study. Moreover, the test of soundness as revealed by the Z score (Altman Model) showed that the selected companies were on the verge of failure. In order to save the selected companies from bankruptcy, the financial position of the selected listed companies should be improved as early as possible. For improving financial position, therefore, the necessity of qualified trained and experienced management personnel, government realistic measure, following participative management, supply of adequate working capital, setting realistic goals, rectifying the accountability, motivating the achievement of performance and imposing penalty for non-achievement etc. must be ensured in the sample selected listed companies.

References

1. A l t m a n , E. I., *Financial* Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy, *The Journal of Finance,* 1968, Vol.23, pp. 589-609.
2. A l t m a n , E.I., E o m , Y.H., K i m , D.W., Failure prediction: evidence from Korea, *Journal of International Financial Management and Accounting,* 1995, Vol. 6, pp.230–249.
3. A l t m a n , E.I., H a l d e m a n , R.G., N a r a y a n a n , P., ZETA analysis: a new model to identify bankruptcy risk of corporations, *Journal of Banking and Finance*, 1977, pp. 29–54.
4. B e a v e r , W.H., Financial Ratios as Predictors of Failure, *Journal of Accounting Research*, 1966, Vol. 4, pp. 71-111.
5. B u m , J. K..,Bankruptcy Prediction: Book value or Market Value?, APRIA Meeting, 2007, available at http://www.rmi.nccu.edu.tw/apria/docs/Concurrent%20II/Session%206/15907APRIAl_creditrisk .doc *[accessed on December 14ᵗʰ2009]*
6. C h e n ,Y., An Empirical Research on ST companies in China's Stock Market, *Economic Science* (in Chinese), 2000, Vol.6, pp. 57–67.
7. D i m i t r a s , A. I., Z a n a k i s , S.H., Z o p o u n i d i s , C., A Survey of Business Failures with an emphasis on Predictionmethods and industrial applications, *European Journal of Operational Research*, 1996, Vol. 90, pp. 487-513.
8. K i v i l u o t o , K., Predicting Bankruptcies with the Self-Organizing Map, *Neuro computing*, 1998, Vol. 21, pp. 191–201.
9. L e n n o x , C.S., The Accuracy and Incremental Information Content of Audit Reports in Predicting Bankruptcy, *Journal of Business Finance and Accounting,*1999, Vol.26, pp.757–778.
10. M e r t o n , R. C., On the Pricing of Corporate Debt: The Risk Structure of Interest Rates, *Journal of Finance*, 1974, Vol. 29, pp. 449-470.
11. M i n g , J., Policy Implications of the Federal Reserve Study of Credit Risk Models at Major US Banking Institutions, *Journal of Banking and Finance*, 2000,Vol. 24, pp.15-33.
12. O h l s o n , J., Financial Ratios and the Probabilistic Prediction of Bankruptcy, *Journal of Accounting Research,* 1980, Vol.19, pp.109-301.
13. R i c h a r d s o n , F.M., K a n e , G.D., L o b i n g i e r , P., The Impact of Recession on the Prediction of Corporate Failure, *Journal of Business Finance and Accounting*, 1998, Vol. 25, pp. 167–186.
14. O u , J., The Information Content of non Earnings Accounting numbers as Earnings Predictors, *Journal of Accounting Research*, 1990, Vol.28 (1), pp. 2–21.
15. L a m , M., Neural Network Techniques for Financial Performance Prediction: Integrating Fundamental and Technical Analysis*, Decision Support Systems*, 2004, Vol. 37(4), pp. 567–581.
16. W u , S., L u , X., A Study of Models for Predicting Financial Distress in China's Listed Companies, *Economic Research Journal* (in Chinese), 2001, Vol. 6, pp. 46–55.
17. W u , S., Z h a n g , Z., A Study on Financial Distress Costs and It's Determinants in China, *Nankai Business Review,*2005, Vol. 3, pp. 101–106.
18. Z h a n g , C., Z h a n g , Y.P., Z h a n g , Y.C., C h e n , J., W a n , Z., Stock Prediction Based on Support Vector Machin, *Computer Technology and Development* (in Chinese), 2006, Vol. 6, pp. 35-37.

Studiu asupra stabilităţii financiare a companiilor manufacturiere din Sri Lanka: aplicarea modelului Altman

Rezumat

Poziţia financiară a companiilor luate în evidenţă este o problemă care preocupă în mare măsură orice acţionar. Managementul companiilor încearcă orice mijloc de a îndrepta poziţia financiară a companiei, sperând să o menţină pe calea cea bună şi pe viitor. De asemenea, investitorii sunt foarte atenţi la poziţia financiară a companiei şi ţin seama de aceasta în deciziile lor privind investiţiile. Studiul are în vedere investigarea stabilităţii financiare a companiilor manufacturiere pe o perioadă de 5 ani, din anul 2003 până în anul 2007. Testul de stabilitate aşa cum este relevat prin scorul Z (modelul Altman) indică faptul că acele companii erau în pragul falimentului. Pentru a salva companiile de la faliment total, poziţia financiară trebuie îndreptată fără întârziere. În acest scop, în cadrul companiilor selectate trebuie asigurate următoarele condiţii: personal de conducere calificat, perfecţionat şi experimentat, măsuri guvernamentale realiste, management participativ, asigurarea unui fond de rulment adecvat, stabilirea unor scopuri realiste, îndreptarea erorilor contabile, motivarea performanţei şi penalizarea nereuşitelor. Astfel, autorităţile ar trebui să ia măsuri imediate în vederea înlăturării falimentului.