**Business Failure Prediction for Publicly Listed Companies in China**

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**ABSTRACT**

This study uses data from Chinese publicly listed companies for the period 2000-September 2008 to test the accuracy of Altman’s Z-score model in predicting failure of Chinese companies. Prediction accuracy was tested for three Z-score variations: Altman’s original model, a re-estimated model for which the coefficients in Altman’s model were re-calculated and a revised model which used different variables. All three models were found to have significant predictive ability. The re-estimated model has higher prediction accuracy for predicting non-failed firms, but Altman’s model has higher prediction accuracy for predicting failed firms. The revised Z-score model has higher prediction accuracy compared with both the re-estimated model and Altman’s original model.

**INTRODUCTION**

Developing countries are attracting more foreign investment than ever before. Since 2000, foreign direct investment inflows have rocketed from $165.5 billion to an estimated $470.8 billion in 2007. China draws the most, attracting $84 billion of investment in 2007, representing 18% of the total (Global Development Finance 2008, World Bank). Although China is an attractive place for investment, China publicly listed companies suffer credibility issues. All three stock exchange markets - Shanghai, Shenzhen, and Hong Kong - are to varying degrees known for government intervention and a clubby opacity. Investors need guidelines to distinguish low risk investments from higher risk ones. The objective of this study is to determine if the information available in the annual reports of China publicly listed companies is useful to predict which companies are likely to fail.

The following research questions are considered in this paper: Is Altman’s Z-score model effective for predicting company failure in China during the period 2000-2008? Is the model effective for predicting company failure for many different types of firms, not solely for manufacturing companies? Will recalculation of the coefficients of Altman’s variables result in more accurate failure prediction? Can other variables be substituted in the basic Z-score model to create a more accurate model?

**PREVIOUS STUDIES**

The prediction of company failure has been well researched using developed country data (Beaver 1966; Altman 1968; Wilcox 1973; Deakin 1972; Ohlson 1980; Taffler 1983; Boritz, Kennedy and Sun 2007). A variety of models have been developed in the academic literature using techniques such as multiple discriminant analysis (MDA), logit, probit, recursive partitioning, hazard models, and neural networks. Summaries of the literature are provided in Zavgren (1983), Jones (1987), O’leary (1998), Boritz, Kennedy and Sun (2007) and Agarwal and Taffler (2007). Despite the variety of models available, both the business community and researchers often rely on the models developed by Altman (1968) and Ohlson (1980) (Boritz et al. 2007). A survey of the literature shows that the majority of international failure prediction studies employ MDA (Altman 1984; Charitou et al. 2004).

**METHODOLOGY**

As mentioned earlier, the majority of international failure prediction studies employ MDA (Altman 1984; Charitou et al. 2004). This study employs MDA to allow better comparison with other international studies. This research plan avoids one previous criticism of MDA analysis. Ohlson (1980) is concerned about using predictors of failure that are derived from information published after bankruptcy has occurred. In this study all information is from reports published at least 3 months before a company was delisted. Agarwal and Taffler (2007) emphasize the importance of testing the predictive ability of models against an entire population instead of using only a relatively small sample. The authors plan to address this issue in a subsequent study. The current research plan is to test the predictive ability of three Z-score based models using the matched pair technique. Two of the models are actually developed in this study.

**RESULTS**

We evaluated the classification accuracy of Altman’s (1968) Z-score model using the estimation sample and prediction sample respectively. The Z-scores are derived for both samples using two years of financial data.

Additional evidence of the stationarity of the Z-score model is obtained by re-estimating the model’s coefficients using our estimation sample and then testing the prediction accuracy of our model using the prediction sample.

During the process of data collection, we noticed that the delisted firms’ total assets decreased over the two year period, while the non-delisted firms’ total assets increased. Although no previous research has taken this into consideration, we believe it worth further exploration. We thus added another variable into the discriminant function. The variable is defined as follows: (Total assets one year prior to delisting - Total assets two years prior to delisting)/Total assets two years prior to delisting. We then applied a backward elimination procedure. Three variables remained after the procedure with a significance level of p<0.05.

**CONCLUSION**

Our study supports the effectiveness of the Z-score methodology for predicting company failure in China. Overall, the re-estimated model with recalculated coefficients but the same five financial ratios as Altman’s model has higher prediction accuracy for the non-delisted group while Altman’s (1968) model has higher prediction accuracy for the delisted group. Our revised model with three financial ratios has higher overall prediction accuracy than both the re-estimated model and Altman’s model. The revised model includes a financial ratio that is not considered in the other two models. Future research is planned to test the 3 models in this paper against the entire population of Chinese listed companies for a longer period. Future research also is planned to employ Olson’s logit model with a large sample or whole population. It then may be possible to compare the efficacy of MDA versus logit for Chinese listed companies.

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