Corporate Failure Forecast: Evidence from Registered Corporations in Ghana

[1]Edward Domina Attafuah | [2]David Ackah (PhD)
[1]School of Finance & Financial Management | Business University of Costa Rica
[2]School of Business | Central University of Nicaragua
Email: edwardattafuah12@gmail.com | drackah@ipmp.edu.gh

Abstract

This treatise surveys the occurrence of bankruptcy forecast from an evolving economy viewpoint using the Altman Z-score model. Building on empirical data from a sample of 10 non-failed and failed corporations registered on the Ghana Stock Exchange, the researcher test Altman (1968) model through a cross section of different corporations with dataset within 2016 to 2020. Altman's Z-score is relevant in forecasting bankruptcy in Ghana with regards to the size of the corporation in question. This study makes an imperative impact to the global discourse on corporate failure forecast in globalized world.
Keywords: Corporate Forecast, Bankruptcy, Z-Score, Registered Corporations

1.0 INTRODUCTION

Beaver presented his pioneering failure forecast study applying profile analysis of financial ratios when forecasting the future status of a firm. Altman et al, (2013) were the first to involve a Multiple Discriminant Analysis (MDA). There were other theoretical modelling of the failure process like those of Santomero and Wilcox (2020); Other groups of empirical studies searching for the best predictive variables of failure (e.g. Mensah et al, 2016); (Liou and Smith, 2007); Woods et al. 2015)) and studies including Wilcox (2020); non-financial variables (e.g. (Charitou et al., 2007 Altman et al. 2017); (Gepp & Kumar, 2008) One of the most significant threats for many businesses today, despite their size and the nature of their operations, is insolvency. Extant evidence shows that in recent years' business failures have occurred at higher rates than at any time since the early 1930s. It is also interesting to note that during the 1980s certain sectors of the UK economy, such as small industrial businesses in depressed areas, experienced failure rates as high as 50% over a five-year period.

Factors that lead businesses to failure vary. Many economists attribute the phenomenon to high interest rates, recession-squeezed profits and heavy debt burdens. Furthermore, industry specific characteristics, such as government regulation and the nature of operations, can contribute to a firm's financial distress. Studies of patterns of business failure in the UK, US, Canada and Australia found that small, private and newly founded companies with ineffective control procedures and poor cash flow planning are more vulnerable to financial distress than large well-established public firms. Interestingly, corporate failure literature and models are all based on developed countries (Beaver, 1966; Altman, 1968; Altman, 1973; Altman, 1984; Edmister, 1972; Trieschmann & Pinches, 1973; Sinkey, 1975; Deakin, 1977; Pinches & Trieschmann, 1977; Casey & Bartczak, 1985; Aly, Barlow, & Jones, 1992; Baldwin & Glezen, 1992; Dimitras, 1996; Altman & Narayanan, 1997).

Ghana has also had "her share" of corporate failure as evidence in Table 1. The collapse of Tano Agya Rural Bank, Tana Rural Bank Ltd, Meridian BIAO Bank, Bank for Credit and Commerce International were due to the collapse of their parent banks. Most recently, the Gateway Broadcasting Services, Ghana Co-operative Bank, Bank for Housing and Construction, National Savings and Credit Bank and many other corporate failures, in Ghana to some extent, indicate the urgent need for a reliable model which accurately Predicts corporate health in Ghana. The economic cost of business failures is significant; evidence shows that the market value of the distressed firms declines substantially prior to their ultimate collapse (Warner, 1977; Charalambous et al., 2000). Hence, the suppliers of capital, investors and creditors, as well as management and employees, are severely affected by corporate failures. The auditors also face the threat of a potential lawsuit if they fail to provide early warning signals about failing firms through the issuance of qualified audit opinions (Zavgren, 1983; Jones, 1987; Boritz, 1991; Laitinen and Kankaanpaa, 1999). After the tragic collapse of companies like Enron in December 2, 2001 and WorldCom in July 19, 2002

Finance & Management Engineering Journal of Africa | *Published by: Dama Academic Scholarly & Scientific Research Society*

| https://damaacademia.com/fme/ | November 2020 | Pages: 15-19 | Volume 2 | Issue 11 |

researchers developed further interest in predicting the possible collapse of companies and attempts were made to gather the possible indicators of such failed companies.

Ghana has had its fair share of corporate failures with companies like Ghana Airways Limited and Juapong Textiles Ltd collapse in 2005. Before then, Ghana Cooperative Bank Ltd and Bank for Housing & Construction Ltd filling for official liquidation in 2000, with Divine Sea Foods Limited and Bonte Gold Mines liquidating in 2003 and 2004 respectively. Even though there has been research on the applicability of corporate failure prediction models by authors like Mensah (1983) and Appiah (2011), the collapse of seven banks as evidenced in Table 1 in 2018 motivated the object of the researcher to further delve into applying the Multiple Discriminant Analysis (MDA) model used by Altman (1968).

1.2 Objective of the study

The prime objective of this treatise is to advance a model for forecasting the failure status of corporate organizations in developing economies based on both financial and non-financial ratios.

1.3 Hypothesis of the study

The treatise is based on the following hypotheses;

1. There is a difference between corporate failure prediction model based on only financial ratios and model based on both financial and non-financial ratios in terms of their validity and predictive power.

2. There is no difference between corporate failure prediction model based on only non-financial ratios and model based on both financial and non-financial ratios in terms of their validity and predictive power.

The rest of this paper is organized as follows. The next section reviews relevant literature in the area of corporate failure prediction. Section three explains the methods adopted for the study, measurement of both predictor variables and the response variable, description of the modelling approach, sample selection, and data collection methods used in the study. Section four presents the results from the empirical analysis and finally section five concludes the paper. *A Model to Predict Corporate Failure in the Developing Economies 81*

2.0 LITERATURE REVIEW

Corporate failure prediction is an area widely studied by numerous writers. However, majority of these studies are carried out in well developed economies. For instance, researchers contend that the UK provides a financial environment 'ideal' for the successful development of statistical models that could facilitate the assessment of corporate solvency and performance (Taffler, 1984). Again, a considerable volume of the corporate failure literature has mainly employed US data which is evidenced form Beaver's (1966) who employed a univariate approach and then Altman's (1968) using linear multiple discriminant analysis model based on UK data. From this time, there has been extensions to these studies which include the assignment of prior probability membership classes (Deakin, 1972), the use of a more appropriate quadratic classifier (Altman et al., 1977), the use of cash flow-based models (Casey and Bartczak, 1985), the use of quarterly information (Baldwin and Glezen, 1992); and the use of current cost information (Aly et al., 1992). Though the classification accuracy of these studies is considerably high, they all based their studies on the multiple discriminant analysis which is based on some assumptions which are frequently violated. Besides, all these studies were contextualised in a well developed economies and also did not consider non-financial factors.

Altman (1968) for instance used five ratios which includes working capital to total assets - a liquidity indicator; retained earnings to total assets – firm aging indicator; earnings before interest and taxes to total assets - profitability; market value of equity to book value of total debt – solvency indicator; and sales to total assets – volume of activity indicator. The aim was to examine whether the five-variable set can be used to predict the probability of bankruptcy in UK companies using sixty-six firms grouped into failed and non-failed made up of 33 companies in each group. Altman, however, tested the predictive

Finance & Management Engineering Journal of Africa | Published by: Dama Academic Scholarly & Scientific Research Society

https://damaacademia.com/fme/   November 2020   Pages: 15-19   Volume 2 | Issue 11

ability of the variables by means of linear discriminant analysis. To avoid the limitations of this technique and the reliance on only financial ratios, the current study applies the logistic regression analysis and also includes non-financial indices in the Ghanaian setting which is a developing economy.

3.0 Methodology
This section, examines the method of selecting the data for the study, selection of the predictor variables and the modelling approach and specifications for the study.

3.1.1 Population and sample
The population of the study focuses on registered corporation listed on the Ghana Stock Exchange from 2016 to 2020 and selected failed companies in Ghana. In selecting the sample from this population, a matched sample design was applied where major companies that has failed in Ghana during the study period (not necessarily listed) were selected and paired to the non-failed companies on the stock exchange with reference to turnover size and in the same financial year. This sampling method is consistent with the methods applied by Beaver (1966), Altman (1968) and Bunyaminu & Issah (2012) in a similar study. However, this study focus much on industrial groupings.

Non-financial factors in corporate failure prediction which were not considered in these studies. In total, twenty (20) matched-pair (forty (40) companies in total) of failed companies and non-failed listed companies on the Ghana Stock Exchange was used for the study. Each of the 20 failed companies were matched with a corresponding non-failed company on the Ghana Stock Exchange with reference to turnover size and industrial groupings.

3.1.2 Data Collection
Relevant financial and non-financial (specifically on corporate governance issues) data was collected from the published annual reports of the forty companies for the period; in the case of the failed companies, data for one year before failure was used to develop the corporate failure prediction model, in the case of the non-failed companies, the same year data for which it corresponding company was selected.

3.2 Modelling Approach and Specification
The modelling approach adopted for the study is based on the logit model and is considered as most appropriate model for the study as it utilizes the coefficients of the independent variables to predict the probability of occurrence of a dichotomous dependent variable (Dielman, 1996). This method was adopted by Demirguc-Kunt and Detragiache (1998) to estimate of the probability to a threatened economy which is undergoing a banking crisis, hence well applied in the literature and has produced a valid and verified result.

3.2.1 The logit model
In applying the logit model, bivariate data $(x_1,1),(x_2,y_2),…,(x_n,y_n)$ used are assumed to be independent and identically distributed (*iid*) such that $x_1,y_1 \in R$. The predictor variables $(x_i) \in R$ is a combination of financial ratios (quantitative variables) computed from the financial statements of the selected companies and corporate governance indexes (qualitative variable) obtained from the activities of the selected companies whereas the response variable $(y_i) \in R$ follows random law of Benoulli which takes the value of 1 if the entity survives or 0 otherwise. On this basis, the probability of a corporate entity failing using the Logit model is denoted by; $(f)=(Y\_i=0/X\_i =x)$ (1)

Since Y_i follows the Benoulli processes, we formulate linear regression model using the Generalized Linear Model (GLM) introduced by Nelder and Wedderburn (1972). In the context of failure prediction, the Logit model weighs the financial ratios and the corporate governance indexes and creates a score for each company in order to be classified as either failed or non-failed. The score are calculated by z in the first phase of the analysis which is a linear combination of financial ratios and corporate governance indexes where; $z=\beta 0+\beta_\iota TX_i$ (2)

In the second phase, we estimate the failure probability using equation (1) by means of the function G where; *A Model to Predict Corporate Failure in the Developing Economies 83*

$(f)=(Y\_i=0/X\_i=x)=G(z)$ (3) Where G(z) $\in (0,1)$ defined by; $(z)=11+e-z$ (4)

The parameters βi are estimated through the method of maximum likelihood procedure and Lagrangian function as follows;

$L(\beta 0,\beta 1,...,\beta n+1)=\Pi[YiG(z)+(1-Yi)(1-G(z))]$ (5)

Taking the log of equation (5)

$logL(\beta 0,\beta 1,...,\beta n)=\Sigma[YilogG(z)+(1-Yi)log(1-G(z))]$ (6)

Maximising the βi, the first order condition for maximisation is obtained as;

$\partial logL \partial z=(\hat{z})=G(\beta 0+\beta i^TXi$ (7a)

This must also satisfy the second order condition as; $\partial 2logL\partial z2<0$ (7b)

In estimating the parameters, it is necessary to choose the most performing predictor variables to model the prediction of probability of failure. This helps in fitting a parsimonious model that explains variation in the dependent variable with a small set of predictors. We apply the Akaike's (1973) Information Criterion (AIC) where stepwise logistic regression method is applied by introducing all the predictor variables and in each step, those variables that do not contribute to the model is removed until we obtain the model with the minimum AIC thereby selecting the model that best fits the data and at the same time maintaining the number of estimated parameters at minimal, thereby avoiding over fitting. For *n* number of estimated parameters based on a maximum likelihood of the fitted model, L, the AIC is given as; $2n-2logL$ (8)

3.2.2 Selection of variables

In our study, the response variable represents the state of the selected company and it assumes a binary response such that, it takes the value of 1 if the entity survives or 0 if the entity fails. Eleven financial ratios and six non-financial ratios were initially used as the predictor variables each category representing different indicators of operational and liquidity vulnerability measure. The financial ratios are regrouped into four groups; profitability – a measure of the extent to which company's assets generate returns, liquidity – a measure of cash generating ability of the entity, efficiency – a measure of the volume of activity perform by the entities using their assets and gearing – a measure of the effect 84 Richard Oduro and Michael Amoh Aseidu

4.0 CONCLUSION

The objective of this paper is to develop a corporate failure prediction model based on both financial ratios and non-financial variables for companies operating in the developing economies. The result of the study clearly shows that; early warning sign of failure cannot exhaustively be identified without considering non-financial variables with particular reference to corporate governance characteristics.

The study has brought out the fact that, a poor corporate governance practices increases the probability of failure even if for companies with satisfactory financial performance. This confirms the study by Nisansala and Abdul (2015) that, modelling corporate failure prediction should not be based on financial data alone neither on non-financial data but a fair combination of the two.

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