Relationship Between Stock Price and Financial Distress: A Study on Banks of Bangladesh

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Abstract

The purpose of this study is to empirically test relationship between financial distress and stock price. Financial distress is calculated using Altman Z-score. Data for the study consists of financial information of 29 banks listed in Dhaka Stock Exchange (DSE). Variables in this study are Z-score (independent) and Stock price (dependent). This study analyzes and describes the data associated with these variables and linear regression has been done between them to ascertain the level of and direction of their relationship. The trends of z-score for the study period (2015-2019) have been tested. This study finds there is no significant relationship between the variables. In other words, Z-score is unable to explain the variability in the stock price.

Keywords: Stock price, Financial Distress, Altman Z-Score, Banking Industry

1. Introduction

A strong financial market is a precondition for the development of any economy. A financial market is basically split into two sectors - money market and capital market. The money market is mostly represented by the banking sector (in terms of value of assets) of the economy (Saunders & Cornett, 2012, p. 346). A bank is a financial institution that operates to earn profit by collecting money as deposits from a party of customers and then lending them as loans to others along with various other financial activities. The aim of banking business, like any other business, is to maximize the wealth of shareholders while ensuring sustainability (Hamilton & Nickerson, 2003). Bank profitability, among any other type of financial institutions, have played a vital role in the growth of any economy over recent years (Klein & Weill, 2018).

Investigators tend to believe that firms that are performing well in terms of profitability are to be considered as good banks with probable sustainability. Gandhi, Loughran, McDonald (2019) believe that in recent times, most of the practitioners, financial analysts, and banking regulators have been using established finance and accounting literature (Altman [1968], Beaver [1966], Libby [1975], Ohlson [1980]) of either calculated financial ratios from annual reports or CAMELS (capital adequacy, asset quality, management quality, earnings, liquidity, and sensitivity to market risk) ratings as early signals to measure bank distress and bankruptcy. According to Joshi (2019), bankruptcy is the legal situation of an entity that is unable to repay the debt to the lenders, and where the firm's total liabilities exceed total assets.

Chowdhury and Ahmed (2009) found the banking industry of Bangladesh to be bright and prospective but only considering parameters (ratios) that focus on measuring financial performance ignoring the criteria that represent overall financial health of the banking industry. Robin, Salim, and Bloch (2018) found the main drivers of profitability in the banking industry of Bangladesh, these drivers also ignore the factors relevant to financial health, like working capital, retained earnings etc. Islam et al. (2017) found that non-performing loan and diversified banking activities have a positive impact on the ROE of private commercial banks.

Stock price, on the other hand, is another key indicator of performance for any business. Shamsudin et al. (2013) claim that companies with a good performance may have a high demand for their stocks, which in turn boosts the price and vice versa. Many others [Avdalovic & Milenković (2017), Kamar (2017), Antono et al. (2019)] also suggested that investors should look at financial ratios as guidance for stock selection decision. There are a few macroeconomic and external factors like economic growth, the exchange rate, the price of gold, inflation rate, interest rate etc. that have an impact on the volatility of

the stock prices of businesses [Nugraha et al (2020), Msabaha (2020)].

In the context of Bangladesh, Khan (2009) found that in the market of DSE the overall impact of dividend on stock prices is comparatively better than that of retained earnings. Tabassum et al. (2019) found that for the banks in Bangladesh factors that may have an impact on stock prices comprise of dividend, Price Earnings Ratio (P/E), Net Asset Value (NAV), Earnings per Share (EPS), Dividend Payout Ratio and firm-size. Literatures like these show that the factors of financial wellbeing or chances of distress are often ignored by investors while making decision since this is not one of the major factors that influence the stock price.

The profitability of a bank can be influenced by internal determinants like factors that management can control such as liquidity, investment in securities, investment in subsidiaries, loans, non-performing loans, overhead expenditure, and other determinants such as savings, current account deposits, fixed deposits, total capital and capital reserves, and money supply (Rasiah, 2010).

Islam et al. (2017) suggested that if a bank expects increased returns (profitability) and takes up more risks, the chances of covering the equity by assets will be reduced, which may lead to a potential financial distress or worse, bankruptcy. Bankruptcy is the legal status of a person who is unable to repay the debt to the creditors, and where the firm's total liabilities exceed total assets (Joshi, 2019). Altman (1968) Z-score is one model that can help the investors foresee the bankruptcy of a certain company. He analyzed 33 publicly held US manufacturing bankrupt companies and their corresponding matches. Furthermore, he based his research on five variables, and by running a discriminant analysis on the data, he was able to develop a model that enhances bankruptcy prediction for publicly held US manufacturing companies.

This excessive dependency of judging the banks, especially their share market status, based on financial ratios alone, while making investment decisions, arises the question whether the financial wellbeing or chances of financial distress may have any impact on the share price or not. So, the focus of this paper is on the relationship between the chances of financial distress, through Altman Z-score, and share price movement in 5 years.

2. Review of Literature

2.1 Altman Z- Score Model

Beaver (1966) applied univariate technique to separate healthy and unhealthy firms. He measured six accounting ratios separately to measure financial health of firms. These ratios are Cash flow ratio, Net-Income ratio, Debt to total assets ratio, Liquid-asset to total asset ratio, Liquid asset to current debt ratio and Turnover ratio. These ratios had individual cut off score to minimize any misclassification. Later, Altman (1968) pointed out, there are other factors which can provide better estimation about the financial condition of a firm.

In response, Altman (1968) developed Z-score using Multiple Discriminant Analysis (MDA). He combined different ratios into a single score. This score provides an indication about the firms likely to bankrupt in two years. For this reason researchers used Z-score model and found reliable results for various economies and industries. Altman (1968) suggested firms can use Z-score model to avoid possible future financial distress.

Hernandez (2018) applied Z-score in this study where he measured financial health of Mexican firms. He confirmed reliability of Z-score and found 75% firms to be healthy and rest are in distress. Other researchers (Sanesh 2016, Ceilli 2015, Khaddafi 2017) also confirmed reliability of Altman's Z-score model. On the other hand, some researchers suggested improvement of Z-score. Muminovic (2013) recommended change in cut-off ranges of the model after finding inaccurate result for Siberian firms.

Thai et al. (2014) applied Z-score on the Malaysian firms. Instead of three ranges he applied four ranges and still found reliable result for bankruptcy forecast. Mahbobi (2017) derived Forecasted Artificial Neutral Network (FANN) from Z-score and recommended this derivation to be valid.

Chowdhury and Barua (2009) conducted a study on Dhaka Stock Exchange (DSE) to predict financial distress of firms using Z-score. Study suggested 41 companies out of 53 (77%) were in danger zone, 7 in grey area and only 3 were in safe zone. Their study confirmed Z-score model is accurate in predicting distressed companies. Another study by Mostafa et al. (2016) used Altman's model for 25 Bangladeshi banks to analyze financial distress for the period of 2010-2015. Results showed 20% in distress, 56% in grey and 24% in safe zone.

2.2 Z-Score and Stock Price

Accounting and financial ratios provide information related to financial health of a firm to investors. If investors perceive a stock is riskier, they require higher return from that stock. In other words, inventors expect higher return from a firm with higher bankruptcy score.

The company's risk from the standpoint of the investor can be derived from business risks and financial risk (Brigham et al., 2011). Financial risk depends on the capital structure of the firm, means how a firm raises its capital. The optimal capital structure reduces tax and cost of equity, therefore maximizes shareholder value. While use of debt is cheaper for the firm, excessive debt increases default risk. Investors understand this as signal of financial distress. Therefore, demand for that company stock decline and share price fall hence return on stock decreases.

Altman and Brenner (1981) used term 'new' information found by calculating change in Altman Z-score. They found abnormal returns existed for many firms because of 'new' information. Dichev (998) found negative correlation coefficients Z-score and return. Piotroski (2000) found those firms have higher Z-score, their market returns are higher than those of with lower Z-score.

Carton and Hofer (2006) recommended investors use Z-score to identify true share price performance, but Calandro (2007) disagreed and stated Z-score cannot be an ideal performance management tool.

Apergis et al. (2011) designed a new model that relates Altman's Z-score to stock price. They found positive correlation between Z-score and stock price. They also noted, study was done on mature markets during when stock exchanges were much stable, therefore findings may not be true for emerging markets.

Lasmanah et al. (2012) conducted a study on Indonesian stock exchange and found financial distress (calculated based on Z-score) prediction has positive and significant influence on the stock price. In contrast, another study by Prihatni et al. (2011) on the same stock exchange found no influence of Z-score on stock price. They did not see significant difference in stock price during study period when all the sample firms were in distress.

Another interesting study by Bezhanishvili and Henderson (2009) mentioned in their paper there was no significant influence of announcement of equity offerings for healthy and unhealthy firms. And Z-score had no influence on stock return after announcement. They concluded investor's knowledge of company's financial health is not significant.

In the context of Bangladesh, Chowdhury and Barua (2009) used Z-score to predict financial distress for companies listed in Dhaka Stock Exchange. They found Z-score model is accurate to predict financial distress however they did not find any evidence of its effect on stock price. Another study by Afrin (2017) tried to test relationship between Z-score and share return for cement industry in Bangladesh. The study found correlation and regression between Z-score and stock returns are extremely weak, means Altman's Z-score had no relevance to stock price for cement industry in Bangladesh.

3. Hypothesis

Hypothesis of this study

H_1= There is a relationship between stock price and financial distress in Bangladesh banking sector.

4. Methodology

4.1 Sample Size

All the public limited banks were selected for this study. To get true and fair view of the banking industry 1% of the bottom outlier banks were excluded. There are 30 banks listed in Dhaka Stock Exchange (DSE), out of which data of 29 banks were taken into account in this study which represent 97% of listed banks and half of all banks currently operating in Bangladesh.

4.2 Data Collection

Financial data for the period of 2015 to 2019 (inclusive) were collected for this study. Data were collected from published financial statements and these statements are available on the respective bank's websites.

4.3   Data Analysis

Data are analyzed into three parts.

4.3.1   Stock Price

Year-end closing prices were collected from Dhaka Stock Exchange (DSE) website and financial statements for the study period 2015- 2019.

4.3.2 Altman Z-score

Edward Altman developed Z-score to measure firm's health. Since then this model has been used for different industries. Altman (2014) improvised this model for non-manufacturing firms. Below presented the model employed in this study.

$$Z = 6.56*X1 + 3.26*X2 + 6.72*X3 + 1.05*X4$$

Here,

X1= Working Capital/ Total Assets

X2= Retained Earnings/ Total Assets

X3= EBIT/ Total Assets

X4= Market Value of Equity/Total Liabilities

Working capital represents the difference between currents assets and current liabilities. Current assets are cash, inventories, and accounts receivable. Current liabilities include short term debt, accounts payable. Positive working capital means a firm is able to pay it short term operating bills, whereas negative working capital means firm is having difficulty meeting its debt obligations. And working capital/ total assets (X1) measures how much liquid assets a firm has in relation to its size. Altman (2003) recommended this ratio is more effective than current ratio or quick ratio.

Retained earnings /total assets (X2) measure firm's cumulative profitability and its earning power. High retained earnings indicate a firm's good business year or higher longevity. EBIT/ total assets (X3) indicates cash supply available to firms for stakeholders.

Altman (2003) outlines market value of the equity means value of both common stock and preferred stock. If liabilities exceed market value of equity, this indicates firm is in trouble to the investors. Therefore Altman (2003) prefers market value of equity/ total liabilities (X4) ratio to be more appropriate than net worth/ total/debt.

Result of Z-Score model can be interpreted as:

> Z-Score above 2.6: The firm is safe
>
> Z-Score between 1.1 to 2.6: known as "Grey" zone.
>
> Z-Score below 1.1: "distress" zone.

Even though the Z-Score model was developed more than 45 years ago, and many alternative failure prediction models exist, the Z-Score model continues to be used worldwide as a main or supporting tool for bankruptcy or financial distress prediction and analysis both in research and in practice (Altman et al. 2017).

4.3.3 Regression Analysis

Using stock prices and Z-score of the sample banks, a simple linear regression analysis was run to test for any relationship between price of stock and level of financial distress. The formula used was: $Y = \beta1 Z1 + C$ where dependent variable (Y) is price of stock, ($\beta1$) is coefficient, independent variable (Z1) is the calculated Altman Z-Score and (C) is the constant.

5. Empirical Results

In case of Z-score, only one bank (Eastern Bank Ltd.) was found to be out of the distress zone throughout the period studied. The situation of the banking industry for those 5 years is found to be under financial distress with an average between .18 to .37 for the given period (Table 1). The median values of each year show that the average Z-score was almost always (in 4 out of 5 years) below the middle most Z-score (Chart 1). The standard deviation is also not too high to show how far away from the result is from the average.

Values	2015	2016	2017	2018	2019
Average of Z-score	0.33	0.37	0.33	0.20	0.18
Median of Z ~~Table 1: Descriptive Statistics of Z-score~~	0.48	0.44	0.31	0.31	0.29
Standard Deviation of Z-score	0.62	0.61	0.71	0.69	0.69

Chart 1: Descriptive Statistics of Z-score

From the chart it is apparent that the average Z-score has went down for the overall banking industry over the years. This indicates that the banks are becoming more vulnerable to bankruptcy. After 2016, the fluctuations of Z-score have also increased, indicating more volatility.
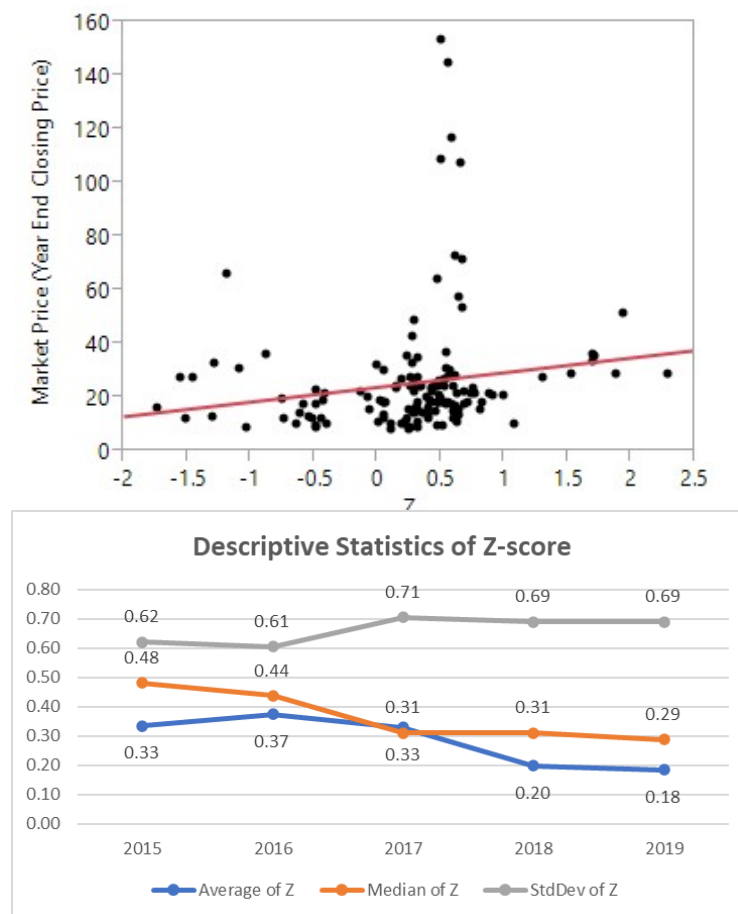

Chart 2: Bivariate Fit of Market Price by Z-Score

Chart 2 shows how the regression line fits the data, and it is apparent from the chart that the line does not fit the data in a statistically significant manner. Although most banks share price ranged between 10 to 40 taka, some of the shares were priced at more than 100 taka, which ranged up to 160 taka, as indicated by the outliers.

Regression expression	Market Price (Year End Closing Price) = 23.820119 + 5.481009*Z
RSquare	0.024938
RSquare Adj	0.01812
Root Mean Square Error	22.64268
Mean of Response	25.37793
Observations (or Sum Wgts)	145

Table 2: Summary of Regression

Table 2 reveals that the model was able to explain about 2.5% of the variation in the market price of the shares. This model had a RMSE of 22.64.

Source	DF	Sum of Squares	Mean Square	F Ratio (F statistic)
Model	1	1875.103	1875.10	3.6574
Error	143	73314.827	512.69	Prob > F
C. Total	144	75189.929		0.0578

Table 3: Analysis of variance

Although the model was able to explain some variability, from the F-statistic of 0.0578 it is evident that the independent variable is not a statistically significant predictor of the market price of share at a confidence level of 95%.

Term	Estimate	Std Error	t statistic	Prob>|t| (p value)	Lower 95%	Upper 95%	VIF
Intercept	23.820119	2.049227	11.62	<.0001*	19.769429	27.87081	23.820119
ZScore	5.481009	2.865998	1.91	0.0578	-0.184187	11.146205	5.481009

Table 4: Parameter estimates

A simple linear regression was conducted on 145 observations (Table 2). From the regression output, it is evident that there exists no statistically significant relationship between the independent variable 'Z-score' and the dependent variable 'Market Price'. In other words, Z-score is unable to explain the variability in the price of the shares, as indicated by the p value of .0578 at 5% confidence level. (Table 4). The corresponding F statistic also indicates the model unable to predict the movements in Market price of shares. (Table 3).

It may be highlighted that although the p value is higher than the level of confidence, the margin is very small. Regardless, by definition, the relationship is still statistically insignificant.

6. Conclusion

This paper investigated related literatures on and found Altman's Z-Score model is widely used to investigate financial distress of firms. A good number of studies found this model to be accurate while other studies highlighted its limitations and proposed for further improvements. Literatures also suggest, investors can use this model to predict share price movements. In this regard, Z-score model employed on 29 banks listed in stock exchange.

Linear regression was conducted to test for any possible relationship between Z-score and stock price. Calculated p value indicates, there is no relationship between them, this was further confirmed by F statistics.

Findings of this study reveal the importance of testing Z-score model for other industries. Future studies can include the causes of financial distress for better understanding. Further studies may also be cross country or cross industry to find out other factors involved in relationship between stock price and Z-score.

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