A study on application of Altman's Z score model in predicting the bankruptcy of Reliance Communication

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ABSTRACT

Background: Bankruptcy is a state of insolvency wherein the company or the person is not able to repay the creditors the debt amount. Early prediction of the company going for bankruptcy is of prime importance to the various stakeholders of the company also the society on the whole.

Prediction of Bankruptcy is critical task. Early stage of identification of likelihood of solvency may avoid evils in the near future & may shelter the firm from Bankruptcy situation. Bankruptcy of organizations can be predicted by using Altman's Z-score model. This paper tries to study about the prediction power of Altman Z score model to predict the Bankruptcy of Reliance communication, which has filed for bankruptcy in the month of February 2019.

Methodology: The research has analyzed the financial statement and the market data of Reliance communication and found that the company was making loses since long and was under the gray area as per the Altman Z score model of bankruptcy prediction.

Conclusion: The study has found that model was successful in predicting the upcoming financial distress of Reliance communication which can lead towards Bankruptcy as their Z score was in distress zone 3 years before they filed for bankruptcy.

Key words: Bankruptcy, Altman Z core model, Reliance communication, financial distress.

JEL Classification: G320, G330, K22

Introduction

Most of the organizations exist with an objective of profit maximization. To achieve profit maximization objective, firm needs strong internal and external support. The failure of internal support system such as effective utilization of funds, labour, material etc and external support system such as economic, political and socio cultural conditions results in Bankruptcy of the organization.

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'. The real net worth of the firm is, therefore negative. "Bankruptcy" has been defined under Insolvency and Bankruptcy code, 2016 as the state of being bankrupt. The insolvency and bankruptcy code, 2016 defines bankrupt as

a) A debtor who has been adjudged as bankrupt order under section 126
b) Each of the partners of a firm, where bankruptcy order under section 126 has been made against the fire. Or
c) Any person adjudged as an undischarged insolvent.

The recent economical events caused many firms to file for bankruptcy and the study of risk and bankruptcy became of main interest for various stake holders in these firms. Before facing this problem on a worldwide scale, the shareholders focus was mainly on minimising the risk, but due to the recent developments, and since bankruptcy affects the financial system by creating a vulnerable atmosphere for the economy, they start seeking way of forecasting these malaises.

Altman (1968) Z-score is one model that can help the investors foresee the bankruptcy of a certain company. He analysed 33 publicly held US manufacturing bankrupt companies and their corresponding matches. Furthermore, he based his research on five, 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.

ALTMAN'S Z-SCORE MODEL OF BANKRUPTCY PREDICTION

Edward Altman Finance Professor of the Leonard N. Stern School of Business of New York University has developed the financial model in 1967 to predict the likelihood of bankruptcy of the company which is named as Altman's Z score model. Later, in 2012 he released an updated version called the Altman's Z score plus model that can be used to evaluate both manufacturing & non-manufacturing firms & public & private companies in both U.S & non-U.S. companies. The investors can use this model to determine whether to buy or sell a particular stock if they are concerned about the financial strength of the organization. The Altman Z score plus can be used to evaluate corporate credit risk.

Z score Estimated Formula

Nature of firm	Manufacturing Firms	Private firm	Non-manufacturing	Non manufacturing and emerging markets
X1	Working capital / Total Assets	Working capital / Total Assets	Working capital / Total Assets	Working capital / Total Assets
X2	Retained earnings / Total Assets	Retained earnings / Total Assets	Retained earnings / Total Assets	Retained earnings / Total Assets
X3	EBIT / Total Assets	EBIT / Total Assets	EBIT / Total Assets	EBIT / Total Assets
X4	Market value of equity / book value of total liabilities	Book value of equity / total liabilities	Book value of equity / total liabilities	Book value of equity / total liabilities
X5	Sales / Total Assets	Sales / Total Assets	-	-
Z score	1.21 X1 + 1.4 X2 + 3.3X3 + 0.6X4 + 1.0 X5	0.717X1+ 0.847X2+3.107X3+ 0.420X4+ 0.998X5	6.56X1 + 3.26X2 + 6.72 X3 + 1.05X4	3.25 + 6.56X1 + 3.26X2 + 6.72 X3 + 1.05X4
Zone of Discriminations	Z > 2.99 –"Safe" Zone 1.81 < Z < 2.99 "Gray" Zone Z < 1.81 "Distress" Zone	Z ' > 2.9 –"Safe" Zone 1.23 < Z' < 2.9 "Gray" Zone Z' < 1.23 "Distress" Zone	Z > 2.6 "Safe" Zone 1.1 < Z < 2.6 "Gray" Zone Z < 1.1 "Distress" Zone	Z > 2.6 "Safe" Zone 1.1 < Z < 2.6 "Gray" Zone Z < 1.1 "Distress" Zone

Note: 1. the symbol "\" means division

2. EBIT Means Earnings before interest and Taxes

1. Working capital / Total assets ratio (X1): This ratio basically measures the firm's liquid position in relation to its capitalization i.e. the net current assets or working capital of a company as a percentage of its total assets. Working Capital, which is current assets minus current liabilities, helps stakeholders analyze the amount of assets required to run the day to day operations of a company and the extent of assets tied up in working capital.
2. Retained Earnings / Total Assets (X2): This ratio measures the firm's ability to Accumulate earnings using its assets. A higher Retained Earning to Total Assets ratio is preferred by most analysts and investors because this reflects that the company is able to retain more earnings. The Retained Earnings to Total Assets Ratio of 1:1 or 100% is considered as ideal.

3. Earnings before interest and Taxes / Total Assets (X3): This ratio is much similar To Return on Assets (ROA) ratio in which Net Earnings is used, whereas in this ratio Earnings before Interest and Tax (EBIT) are used. This ratio basically measures operating efficiency (all profits before taking into account interest payments and income taxes). This ratio measures the productivity of a firm's assets and is independent of any tax liability as well as leverage factors. Many investors and analysts look at this ratio as the one reflecting a firm's earning powers from its assets.
4. Market value of equity / Book value of total liabilities (X4): This ratio measures long term solvency of a firm i.e. how much the firm's market value would decline before liabilities exceed assets, if it happens. This ratio is the only forward looking ratio in the Z-score calculation. This is an inverse of well known Debt to Equity Ratio (or Total Debt to Total Market Value of Equity or Total Liabilities to Market Capitalization).
5. Sales/Total Assets (X5): This ratio is also known as assets turnover ratio and measures the amount of sales generated using a firm's assets. This ratio targets on sales generation capacity of its assets and management, therefore, the higher the ratio the better it is.

LITERATURE REVIEW

E.I. Altman (1968) from New York University in the late 1960's. After this pioneering work, the multivariate approach to failure prediction spread worldwide among researchers in finance, banking, and credit risk. The Z-Score model has become a prototype for many of these internal-rate based models. Altman (1983, 1993) has suggested that the management of distressed firms can utilize the Z-Score model as a guide to a financial turnaround.

Altman and McGough (1974) were the first to suggest the usefulness of bankruptcy prediction models for assessing going concern status. In a 1974 paper, they carried out a study the objective of which was to develop criteria to assist auditors identify situations where the status of a company as a going concern is in doubt by analysing the relationship between bankrupt companies and auditors' reports prior to bankruptcy. The study concluded that the judgment of the auditor must be the deciding factor on the appropriate going concern opinion and that the Z-Score model may be an effective aid to the auditor in forming his judgment.

Grice and Ingram (2001) analyses the generalibility of application of Z-score. The study finds negative results in application of Z-score in recent periods and to manufacturing firms, but positive results for predicting distress other than bankruptcy as it was originally developed for bankruptcy.

Anjum (2012) research paper speaks about the Business failure, regular changes that were undertaken in the Altman Z score model over the period from 1968 to 1993 and the comparison between

various models developed in respect of bankruptcy. It states that the model is widely identified as the "predictor of bankruptcy". It states that Altman Z score model can safely be applied to the modern economy to predict bankruptcy two to three years before the bankruptcy case was revealed.

Manoj Kumar and Madhu Anand, (2013): on the basis of their study conducted on Kingfisher Airlines limited (KAL), they concluded that the performance of analyzing financial health (and distress) of KAL using Altman's Z score is satisfactory. They observed that the company's financial health was consistently poor during the period of study i.e. from 2005 to 2012. Also, confirmed prediction of financial distress in a firm does not necessarily mean bankruptcy. It is only probability and situation indication likely future failure, which might get reversal also if proper steps are taken.

Bal and Raja (2013) studies the earnings management and techniques to predict solvency position. Their study uses Z-score to predict financial distress of IOCL and concludes that as per original Z-score the financial position of the company is not that much good. Though there are several studies has been made in this context, still may be very less studies has been made in Indian Context especially in case of FMCG Companies. The present study uses Z-score to predict the possibility of bankruptcy in select Companies.

Vandana Guptal (2014) important research studies having relevance to the present work have been reviewed under broad categories viz. studies on accounting models. The first set of accounting models were developed by Beaver (1966, 1968) and Altman (1968) to assess the distress risk for a corporate. Altman and Narayanan (1997) conducted studies in 22 countries where the major conclusion of the study was that the models based on accounting ratios (MDA, logistic regression, and probit models) can effectively predict default risk.

Bal, (2015) : The objective of the above mentioned research paper was to find out the accuracy of Altman Z score model on the five FMCG companies selected from the period 2011 to 2015. The article has a detailed explanation with respect to the liquidity analysis. And, it concludes that the Z score model is effective in predicting the bankruptcy of the FMCG companies and recommends the use of the same by the financial investors. The study also suggests that the companies should regularly estimate Z-score for making strategies to improve their financial position.

Mohammed, (2016): The article speaks about various techniques used for measuring financial health of a business firm but out of them Altman Z score is proved as a reliable tool. This article contains about a study conducted in a company raysut cement company and for this they had taken the financial data of the past 8 years and the study revealed the company and subsidiary companies are financially

sound as their z score is higher than benchmark (2.99). This article concludes that Altman Z score can be used to stock holders for investing options and for managers to make financial decisions.

C, S (2016): Altman Z score is a likely hood and not a prediction. From a company's financials, it may look likely that bankruptcy looms, but the management may well succeed in improving matters. The Z score is not intended to predict when a firm will actually file for legal bankruptcy; it is instead a measure of how closely a firm resembles other firms that have filed for bankruptcy i.e. it tries to assess the likelihood of economic bankruptcy.

McCarthy, (2017) The main objective of this article was to find out whether the two forensic accounting tools that is the Altman Z score model and the Beneish M score model would predict the corporate failure and financial manipulation of Enron Corporation. The researcher of the said article has accomplished the objective of and has stated that both Altman Z score model and Beneish M score model should be used simultaneously for the purpose of audit

Apoorva & Sneha Prasad, (2019): on the basis of their study, by applying Altman Z score on 7 companies listed on the Bombay stock exchange, they concluded that the model is 85% accurate and effective for three years prior to the occurrence of the event of bankruptcy. They also suggested that the Altman Z score model could be widely used by the stakeholders of the company so that their financial interest remains protected.

OBJECTIVE OF THE STUDY

This study intends to study the application of Altman Z score model in predicting the likelihood of bankruptcy of Reliance communication. Based on the theories and previous researches on financial health assessment and probable failure prediction of the firms using Altman Z score models, it is found that Altman Z''score model is perfectly able to predict the financial distress and likely future bankruptcy in publicly traded non-manufacturing firm in India.

RESEARCH METHODOLOGY

For this case study, Reliance communication – a publicly traded non manufacturing listed company, was taken as a sample. Reason for selecting reliance communication is as it is undergoing bankruptcy procedure under the guidance of NCLT. So study will try to identify that, whether this situation would have been predicted well in advance by using **Altman Z score model** which can be used as a warning signal to take the necessary actions to reach them towards the stage of bankruptcy.

The data is collected solely from the secondary sources (Annual report of the company and money control website). In order to check the accuracy of the model the financial statements of the company have been taken for past 10 years. The data analysis is carried out in MS excel.

HISTORY OF RELIANCE COMMUNICATION

Reliance Communications (known as Rcom) was a significant mobile network provider in India. In February 2019, the company filed for bankruptcy as it was unable to sell assets to repay its debt. It has an estimated debt of Rs 50,000 crore against assets worth Rs 18,000 crore. As of March 2019, the company has reworked its strategy and continues to operate fixed line communications; data centre services, enterprise solutions as well as subsea cable networks under the banner name, "The New Reliance Communications".

Sectoral stresses such as price wars, heavy debt and plunging profitability that crippled India's telecom sector also took their toll on Rcom. In May 2018, the NCLT had admitted three insolvency petitions against Rcom filed by Swedish gear maker Ericsson, which was seeking a payment of over Rs 1,100 crore in dues. The insolvency tribunal named three separate IRPs from RBSA restructuring advisors LLP to run Rcom and its two units, RTL and Reliance infratel, as part of the bankruptcy proceedings.

But the Telco – which was forced to shut its wireless operations under financial pressure late 2017, moved the National Company Law Appellate Tribunal (NCLAT) and averted bankruptcy proceedings by citing its deals with Jio and Brookfield, and agreed to pay Ericsson Rs 550 crore as a settlement.

But Rcom still not paid Ericsson, triggering contempt of court petitions in the Supreme Court against the Telco's chairman Anil Ambani, with the spectrum sale to Jio having been rejected by the Department of Telecommunications (DoT). The government said the deal to trade airwaves does not conform to its guidelines after Jio wrote to DoT refusing to be held liable for any of Rcom's past dues.

ESTIMATION OF RESULT

The original Z score model was design for, typically, manufacturing firms and the same, it is used for non-manufacturing firms, might produces some vague results. This is because of the fifth variable in the original Z score, "Sales / Total assets". Since this variable varies widely among non-manufacturing firms, due to above limitation, Altman modified the earlier (1968) model and new model used different weights and only the first four variables (ratios) from the original multivariate formula is used.

The modified Z score model (Z" – Score) is used for this study as Reliance communication is a non manufacturing firm.

$$z'' = 6.56X_1 + 3.2X_2 + 6.72X_3 + 1.05X_4$$

Where,

X1 = Working Capital/Total Assets Ratio;

X2 = Retained Earnings/Total Assets;

X3 = Earnings before Interest and Taxes/Total Assets;

X4 = Book Value of Equity / Total Liabilities.

The Z" of Reliance communication is computed and compared with the cut-off.

Table no. 2: Working capital / Total assets ratio (X1) (Rs in Crores)

Years	Working capital (WC)	Total assets (TA)	X1= WC/TA
2008 -2009	7925	91959	0.086179711
2009 -2010	5352	84200	0.063562945
2010 - 2011	-9701	90004	-0.107784098
2011 - 2012	-1584	85706	-0.018481787
2012 - 2013	-1768	75936	-0.023282764
2013 - 2014	-4521	76877	-0.058808226
2014 2015	3547	75352	0.047072407
2015 - 2016	-5002	74060	-0.067539833
2016 - 2017	-11351	73889	-0.153622325
2017 - 2018	-1895	55949	-0.033870132

Above calculations show that the working capital to Total assets ratio is decreasing continuously because of the drastic decrease in working capital of reliance communication because from year 2010 – 2011 onwards the company's current liabilities were more than the current assets giving the negative working capital of the company. Negative working capital itself is showing the unhealthy condition of the company. This ultimately leads the company towards the way of bankruptcy.

Table no. 3: Retained Earnings / Total Assets (X2)

Years	Retained earnings (RE)	Total Assets (TA)	X2= RE/TA
2008 -2009	50658	91959	0.550875934
2009 -2010	49467	84200	0.587494062
2010 - 2011	47112	90004	0.523443403
2011 - 2012	43866	85706	0.511819476
2012 - 2013	32110	75936	0.422856089
2013 - 2014	30359	76877	0.394903547
2014 2015	34627	75352	0.459536575
2015 - 2016	26206	74060	0.353848231
2016 - 2017	22840	73889	0.309112317
2017 - 2018	7933	55949	0.141789844

A higher Retained Earning to Total Assets ratio is preferred by most analysts and investors because this reflects that the company is able to retain more earnings. The Retained Earnings to Total Assets Ratio of 1:1 or 100% is considered as ideal. But in reality, this ratio (1:1) is impossible for most businesses to achieve.

Here the ratio kept on decreasing showing that the company is not able to use its assets wisely and hence reducing the ration even below 0.5. A low ratio would assume that growth may not be sustainable if it is from increasing debts and not by reinvesting the profits.

Table no. 4: Earnings before interest and Taxes / Total Assets (X3):

Years	EBIT	TA	X3=EBIT/TA
2008 -2009	3228	91959	0.0351026
2009 -2010	1883	84200	0.02236342
2010 - 2011	-860	90004	-0.009555131
2011 - 2012	155	85706	0.001808508
2012 - 2013	624	75936	0.008217446
2013 - 2014	-758	76877	-0.009859906
2014 2015	-1629	75352	-0.021618537
2015 - 2016	-1627	74060	-0.021968674
2016 - 2017	131	73889	0.00177293
2017 - 2018	64	55949	0.001143899

The earnings before interest and tax negative from 2013 – 2014 onwards showing that the company is not able to make profits out of its operations and hence leading to the reduce in the EBIT/TA ratio.

Table no. 5: Market value of equity / Book value of total liabilities (X4):

years	Market value of Equity (MVE)	Total Liabilities (TL)*	X4=MVE/TL
2008 -2009	360379093423	4,02,69,00,00,000	0.894929334
2009 -2010	352329388587	3,37,01,00,00,000	1.045456778
2010 - 2011	222295695084	4,18,60,00,00,000	0.531045617
2011 - 2012	173481459348	4,08,08,00,00,000	0.425116299
2012 - 2013	113934283831	4,27,94,00,00,000	0.266238921
2013 - 2014	265949863617	4,54,97,00,00,000	0.584543736
2014 2015	147596498879	3,94,81,00,00,000	0.373841845
2015 - 2016	124448987250	7,40,59,99,72,550	0.168038066
2016 - 2017	95327924234	4,98,05,00,00,000	0.191402318
2017 - 2018	60150343838	4,66,33,00,00,000	0.128986649

#: Closing price is the price as on 31st march of the financial year taken from the website of BSE.

*: Total liabilities include the capital and long term liability of the firm, as defined in Altman (1968) paper.

Market value of equity is the only ration in the calculation of Z score which is considering market based evaluation of the firms on the basis of its equity value. As the company started reducing its profit the effect was seen on its share price which leads to the reduction in the value of total market value of equity because of reduce in shareholders fund. Here the market value of equity to Total liabilities in decreasing continuously is representing the severe deterioration of market value of equities of Reliance communication.

Table no. 6: Z" score = 6.56X1 + 3.26X2 + 6.72X3 + 1.05X4

YEAR	X1=NWC/TA	X2 = RE/TA	X3 = EBIT/TA	X4 = MVE/TL	Z"- Score
2008 - 2009	0.086179711	0.550875934	0.0351026	0.894929334	3.536759718
2009 - 2010	0.063562945	0.587494062	0.02236342	1.045456778	3.580215365
2010 - 2011	-0.107784098	0.523443403	-0.009555131	0.531045617	1.492749224
2011 - 2012	-0.018481787	0.511819476	0.001808508	0.425116299	2.00581626
2012 - 2013	-0.023282764	0.422856089	0.008217446	0.266238921	1.560548022
2013 - 2014	-0.058808226	0.394903547	-0.009859906	0.584543736	1.449115955
2014 2015	0.047072407	0.459536575	-0.021618537	0.373841845	2.054141592
2015 - 2016	-0.067539833	0.353848231	-0.021968674	0.168038066	0.739294412
2016 - 2017	-0.153622325	0.309112317	0.00177293	0.191402318	0.21283022
2017 - 2018	-0.033870132	0.141789844	0.001143899	0.128986649	0.38316981

*Calculations is done in Microsoft excel.

Zone of discrimination:

Z > 2.6 : "Safe" Zone

1.1 < Z < 2.6 : "Gray" Zone

Z < 1.1 : "Distress" Zone

The results from table 6 clearly shows that the Z Score of Reliance communication decreased drastically in the year 2015 -2016 from 2.054 in the previous year to 0.739 and which further kept on

reducing showing the chances of financial distress of the company leading it towards the stage of declaring it bankrupt.

In fact the company was under the Gray zone since 2010 – 2011 as per the zone discrimination of Z score model

However the bankruptcy proceeding for Reliance communication had been initiated in February 2019, proving that the Altman Z" score model was effective enough to give the warning signals to the company at least 3 years before the event had occurred.

CONCLUSION AND RECOMMENDATIONS

The purpose of this paper was to investigate the application of Altman's Z score model in predicting the corporate financial distress of Reliance communication. It has been established that the Altman's Z" model which can be used for publically traded non manufacturing firm was able to predict about the upcoming situation of Reliance communication at least 3 years before the company went for bankruptcy procedure.

According to this study, the model was able to predict about severe financial distress in the firm and setting a warning bell for the investors and stakeholders of the company. Also it helped to show that the financial health (and distress) of Reliance communication..

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