Determinants of financial distress evidence from KSE 100 Index

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ARTICLE

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Abstract

Financial distress and its determinants are very important for investors as well as financial institutions; no one can deny its significance. This paper assesses the determinants of financial distress of non financial companies of Karachi Stock exchange from 2003 to 2010. Financial distress in companies was calculated from Z score model. Determinants like current ratio, profitability, efficiency, solvency and leverage were identified. Result shows current ratio, profitability, solvency and leverage are negatively correlated while efficiency is positively correlated.

Key words: Financial distress, Z score, Current ratio, Profitability, Efficiency, Solvability, Leverage

Introduction

Financial distress is becoming a very interesting topic in the area of finance. It shows its impact on companies and moves towards different stakeholders and ends at society. Corporate financial distress became more and more important and relevant when we came across global financial crises. Financial distress is a situation when one party (that may be any individual person or a company) borrows loan and is not in a position to pay back the same along with interest. There are numerous factors that may cause financial distress like cost of capital, leverage, cost of equity, volatility of earning, cost of debt and economic condition. Another reason of financial distress is the increasing number of non performing loans (NPL) of commercial banks. The amount of these non performing loans has reached up to 560 billion rupees in Pakistan. Currently we are looking at whether these forms of companies are successful or not.

Successful companies are growing rapidly and unsuccessful firms are filing for bankruptcy and disappearing from stock exchange. At the time of corporate failure, shareholders are the last one to receive the share of their investment and most of the time companies are in such position that they are unable to fully pay to their creditors as well and as a result shareholders do not receive a thing, so it is the right of a share holder to get correct information i.e. accurate and timely information should be provided (Holder-Webb & Cohen, 2007). According to Andrade and Kaplan (1998) financial distress is a period when borrower does not have the capacity or capability to pay debt. Normally the structure of companies is divided in to two types: financially distressed and non distressed companies. These distressed companies are further categorized as solvent and insolvent. Solvent are those firms that have the capacity to pay back its obligations

while insolvent are those not in the position of paying back. Baldwin and Scott (1983) discussed in their article that a firm reaching the point where it fails to meet its obligations is known to be in state of financial distress. A firm enters into a state of financial distress when its cash flows are less than current long term debts and if its current cash flows exceed its long term debts it will be in safe zone (Whitaker, 1999). One of the reasons for a firm entering into financial distress is economic condition of the country as well as poor management of the companies (Wruck, 1990). The main factor that identifies financial distress is an organization's ability to default.

Objectives of the Study

The objective of this study is to find out different determinants which cause financial distress in companies. This distress adversely affects not just the economy of the country but also results in financial global crises eventually.

Significance of the Study

Health of the firms is very important for investors as well as management. Investors invest in companies that are financially healthy as risk of default is minimized for them. It is important for management as they will be able to identify causes of distress and these causes can be controlled by taking different measures. There are still different dimensions available of financial distress that should be explored and due to limited work being done in developing countries; it has provided an opportunity to conduct research in Pakistani economy. In last few years our economy has been badly affected by financial crises. This paper will help us explore these factors.

Literature Review

Altman and Beaver (1968) were the pioneers to conduct study for the prediction of bankruptcy. Altman (1968) applied multi discriminate analysis and finally selected five ratios out of twenty ratios to develop a model to predict the default of companies. This model was able to predict bankruptcy prior to two years of default very accurately and successfully. In the same year Beaver (1968) used univariant analysis to predict the default of companies. He was of the view that financial ratios can be very useful in prediction of default very accurately at least five years or before default. Beaver then elaborated that among these financial ratios non liquid assets have more convincing results than that of liquid assets. Many other researchers moved on their steps and used multi-variant analyses in their research, these researchers included (Beaver, 1968a; 1968b; Blum, 1974; Altman, 1973; Libby, 1975; Moyer, 1977; Sharmaand and Mahajan, 1980; Taffler and Tisshaw, 1977). This multi variant analysis was very successful to predict default till 1980. It was then replaced by logistic analysis which remained in use till 1990s (Ugurlu and Aksoy, 2006) and again replaced by artificial neutral networks. Altman (2000) developed new model for predicting financial distress of companies by revising the Z-score model (Altman, 1968) and Zeta (Altman, Haldeman and Narayanan, 1977) credit risk model. He used five financial ratios to predict distress and the result showed that this model is very accurate in predicting failure of distressed and non distressed companies. Fitzpatrick (2004) studied financial distress of non financial companies of USA listed in stock exchange. He used parsimonious model to check the financial condition of these companies by creating financial conditional score (FCS). The value of this score card was based on standard deviation, their size and financial leverage. The results

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showed that financially distressed companies' used equity more frequently than that of debt and those companies which covered operational loss from external sources failed against those companies which invested in funds. Outecheva (2007) also conducted research on financially distressed of non financial companies in USA. The study was divided into before 1990 and after 1990. The risk assessment before 1990s was controlled by static single period model and after 1990s was dominated by dynamic models and the results showed companies' equity was enough to borrow additional loan. Almeida dan Philippon (2000) also analyzed public listed companies of US, the results indicated that financial distress cost was too small to overcome tax shield benefit and tax shield benefits were constant at certain level and started decreasing with increased in leverage. Chiang Hu and Ansell (2005) conducted research on financial distress prediction by using credit scoring of five different models on 491 non distressed and 68 distressed firms. The result showed that all the five models were best suited with Sequential Minimal Optimization model showing top performance and Logistic regression model showing lowest performance among these models. Janes (2003) tested relation between financial distress and accruals, and the results implied that creditor did not consider any relation while lending debt at initial stage. Theodossiou et al (1996) also conducted research on different factors like company's profitability, its size, financial leverage, growth and managerial effectiveness and results shows these factors are highly involved in financial distress. Recently Anderson and Chang (2011) studied the impact of disclosure of financial distress in term of profit warning announcement on share prices of public listed companies. The result showed the complexity of prediction of financial distress. Zulkarnan (2009) also conducted the similar study to assess corporate financial distress on Malaysian economy using Altman's Z-score model. The results showed that only 5 companies out of 64 fell in distress area and model was very significant in discriminating distress and non distress companies. Similarly Brahmana (2004) also studied corporate financial distress on Malaysian economy. The data sample was taken as delisted companies of Jakarta stock exchange and results showed only 1% of the companies were financially distressed. Corporate governance characteristics can also lead the firm to financial distress because composition of dependent and independent directors affects company's decisions. Elloumi and Gueyle (2001) on their working paper tested directors' composition and results revealed that the composition of board of directors explains financial distress.

Data And Methodology

Sample

Karachi stock exchange is the national market of Pakistan that is why companies were selected from KSE 100 index. For this purpose, data was taken from 'State Bank of Pakistan's Balance Sheet Analysis' a State Bank of Pakistan's publication. This analysis contains all the useful and necessary information of all the listed companies in Karachi Stock Exchange. The time period for the data was from 2003 to 2010. As Karachi Stock Exchange is a mixture of financial and non financial companies that are listed on it but our study focused on non financial companies. The reason being selecting non financial companies was their nature of their capital structure i.e. the capital structure of non financial companies and financial companies is not same and as a result it cannot be compared with each other. This study is restricted to only 2 sectors which include cement and sugar. I used convenient sampling because there were certain companies whose data for more than six years was not available.

Dependent and Independent variables

After reading and discussing the different researchers in literature, I was able to identify my dependent and independent variables. My dependent variable is financial distress and independent variables are liquidity, profitability, leverage and solvency.

Dependent Variables Measurement

Financial Distress

Financial distress means situation where companies are unable to pay their obligations. Its liabilities exceed its assets and as a result companies default. Altman was considered as the pioneer who started work on financial distress. He developed a model to predict financial distress of companies. This model was known as Z score model and was based on five financial ratios. These ratios were selected after a careful analysis out of many financial ratios and this model is used for measurement of financial distress. Ratios are calculated from total assets, total liabilities, sales and retained earnings, EBIT (earnings before interest and taxes), market value of firm. These ratios are given below

R1 = Working capital/Total assets
R2 = Retained earnings/Total assets
R3 = EBIT/Total assets
R4 = Market value of equity/Total liabilities
R5 = Sales/Total assets

R1 = Working capital/Total assets

Working capital over total assets is used to measure the liquidity of the companies. It has been used very commonly in standard finance. Working capital has always been acting as a blood for the companies. It is used to meet day to day business needs. Working capital or net working capital is the difference of total current assets and total current liabilities. It is also known as net liquid assets. It tells how much ratio of total assets is used for maintaining daily needs or how much part of total assets belongs to working capital.

R2 = Retained earnings/Total assets

It is one of the important ratios in standard finance. Its measurement helps us analyze profitability of the companies. Age of the companies is a very important factor of retained earnings, usually newly formed companies have low retained earning while old and matured giants have high retained earnings. Most of the times, companies having retained earnings use it as a source of financing. In other words companies with high retained earnings have low use of debt while companies with low retained earnings are highly leveraged. This ratio tells us how much of retained earnings are being represented by total assets needed or how much part of total assets belongs to retained earnings which can be used as source of finance.

R3 = EBIT/Total assets

This ratio shows the earning capacity of the company with respect to its assets. The ultimate goal of the company is profit earning or rather profit maximization so their failure and success depends on their earning capacity. This ratio tells how much of EBIT is being represented by total assets or how much part of total assets belongs to EBIT.

R4 = Market value of equity/Total liabilities

Market value of equity over total liabilities is very important ratio for evaluating net worth of the company in the market. It explains value of the company over its total obligations. This ratio can be elaborated from the example that if a company's capital structure consist of Rs 400 as equity and Rs 100 as debt out of Rs 500, then it would have to lose $4/5^{th}$ its assets before it defaults on the other hand if its equity is Rs 100 and debt is Rs 400 out of Rs 500, then the company would default even it loses $1/5^{th}$ of its assets.

R5 = Sales/Total assets

Sales over total assets help us in evaluating the growth of the company as to how well the company is growing. Companies have to utilize their assets smartly to grow their sales and only stable and efficient companies are able to achieve this. Ingredients for this ratio i.e. sales and total assets are taken from the 'State Bank of Pakistan's Balance sheet Analysis'.

Independent Variables Measurement

Liquidity

Liquidity is measured by current ratio as it is one of the commonly used ratios for the calculation of liquidity. By liquidity we mean whether the company is in position to meet its short term obligations or not. This ratio can be calculated by total current assets over total current liabilities. It indicates how much of current assets are excess or deficient over current liabilities.

Profitability

Profitability is measured by profit margin. It is calculated by net profit over total sales. It indicates how much of net income is raised by total sales or it can also be said as to how much portion of a company's sales represents profit. If a company generates sale of Rs 100 and its profit is Rs 20 then ratio indicates that 20% of sales represent its profit.

Efficiency

Efficiency is measured by EBIT (earnings before interest and taxes) over total assets. It helps us in determining how efficient the firm is in utilizing its total assets to generate operating income. Efficiency ratio explains how much of operating income is being generated by the use of total assets or it can also be said as to what percent of total assets represent operating income.

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Solvency

Solvency is measured by total assets over total debt. The purpose of solvency ratio is to identify whether the company is in a position to pay back its long term obligations or not. How much company has in hand to borrow a loan. For example a company has assets of Rs 100 and total debt to be paid is Rs 50. This shows company has Rs 2 available to pay debt of Rs 1.

Leverage

The leverage ratio is calculated by dividing total debt by total assets. It is related to loan management and determines how debt is managed by the company.

Hypothesis

After discussing arguments of different researchers on financial distress, it is clear that when a company is in distress it not only affects the company but also its shareholders, stakeholders and ultimately country's economy; it does not just stop there but gradually may lead to a global financial crisis. To check the impact of distress empirically, we construct following hypothesis:

Ho=There is no correlation between profit margin and financial distress.
H1=There is correlation between profit margin and financial distress.
Ho=There is no correlation between current ratio and financial distress.
H2=There is correlation between current ratio and financial distress.
Ho=There is no correlation between efficiency and financial distress.
H3=There is correlation between efficiency and financial distress.
Ho=There is no correlation between leverage and financial distress.
H4=There is correlation between leverage and financial distress.
Ho=There is no correlation between solvency and financial distress.
H5=There is correlation between solvency and financial distress.

Data

Panel data of 50 manufacturing firms from two sectors is taken namely sugar and cement to test hypothesis. Out of these 50 companies, there were 40 companies that were financially distressed while 10 companies were not. The reason for taking panel data for analysis is that this data has the characteristics of both time series data in a way that it has values of single variable of different periods of time and cross sectional data in a way that it covers different variables at a particular period of time. Time series data deals with the data of single company at different periods of time while cross sectional data deals data of different companies at a particular period of time. Using panel data had increased the size of data. Larger data has its own benefits one of which is larger degree of freedom which results in decrease in co linearity among variables and the result of the estimates are improved.

Methodology

This research study is based on panel data to identify different determinants of financial distress. First of all, correlation matrix is used to check the correlation between financial distress and these variables. Then regression model is used to check the dependency of one variable over others. Slope and intercept are kept constant in regression analyses which makes it constant coefficient model.

Regression Equation

This regression equation is according to according to this study and now given below

$Zit = \alpha + \beta1 \, (Liq) + \beta2 \, (Prof) + \beta3 \, (Lev) + \beta4 \, (Solv) + \varepsilon \dots \dots \dots \dots \dots \dots$ (2)

Z= Financial Distress
Liq=Liquidity
Prof=Profitability
Eff=Efficiency
Lev=Leverage
Solv=Solvency
ε = the error term.

First of all financial distress, profitability, liquidity, leverage and solvency ratios are calculated separately one by one. Distress is calculated by Altman's Z score model. It is based on five financial ratios. These ratios were selected after careful analysis out of many financial ratios and are used for measurement of financial distress. Ratios were calculated from total assets, total liabilities, market value of firm, sales retained earnings and EBIT (earnings before interest and taxes). First ratio is working capital over total assets are use to measure the liquidity of the companies. It is used to meet day to day business needs. Working capital or net working capital is the difference of total current assets and total current liabilities. It is also known as net liquid assets. It tells as to how much ratio of total assets is used for maintaining daily needs or how much part of total assets belongs to working capital. Second ratio is retained earnings over total assets. Its measurement helps us in determining profitability of the companies. Most of the times companies having retained earnings use it as a cheap source of finance but the fact is it is an expensive source of finance. In other words companies with high retained earnings have low use of debt while companies with low retained earnings are highly leveraged. This ratio tells as to how much of retained earnings are being represented by total assets needs or how much part of total assets belongs to retained earnings which can be used as source of finance. Third ratio shows the earning capacity of the company with respect to its assets. The ultimate goal of the company is profit earning or rather profit maximization so their failure and success depends on their earning capacity. This ratio tells as to how much of EBIT are being represented by total assets or how much part of total assets belongs to EBIT. Fourth ratio is market value of equity over total liabilities is very important ratio for evaluation net worth of the company in the market. It explains value of the company over its total obligations. Finally fifth ratio is sales over total assets help us in evaluating the growth of the company that how well company is growing. Companies have to utilize their assets smartly to grow their sales and only stable and efficient companies are able to achieve this. Ingredients for these ratios are taken from the 'State Bank of Pakistan's Balance sheet analyses'.

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Now in the calculation of independent variables we first of all calculate liquidity. It is measured by current ratio. By liquidity we mean whether company is in position to meet its short term obligations or not. This ratio can be calculated by total current assets over total current liabilities. Profitability is measured my profit margin. It is calculated by net profit over total sales. It indicates how much of net income is raised by total sales or it can also be said how much portion of a company's sales represent profit. Efficiency is measured by EBIT (earnings before interest and taxes) over total assets. It helps us determine how efficient firm is in utilizing its total assets to generate operating income. Solvability is measured by total assets over total debt. The purpose of solvability ratio is to identify whether the company is in position to pay back its long term obligations or not. How much company has in hand to borrow a loan. For example company has assets of Rs 100 and total debt to be paid is Rs 50. This shows company has Rs 2 available to pay debt of Rs 1. Leverage is measured by leverage ratio. It is calculated by Total debt over total assets. It is related to loan management. How debt is managed by company and what is itsorrowing problem.

Results And Discussions

Descriptive statistics

Descriptive statistics is a technique used to check the characteristics of data. A descriptive analysis is based on measure of central tendency and measure of dispersion. Central tendency is measured through averages like mean, median and mode.

Mean value of distress, current ratio, profitability, solvency, efficiency is 1.09, 65.349, 0.697, 1.8763, 0.069 and 1.013 respectively.

Dispersion is measured by standard deviation, variance and range.

Deviation of distress, current ratio, profitability, solvency, efficiency is 0.7847, 66.634, 21.975, 2.219, 0.133 and 1.399 respectively.

This deviation shows as to how much of these values deviate from its mean, higher deviation shows inconsistency in values. Skewness shows the shapes of the data. The data is normally skewed if skewness is 0, but in this case all the variables are positively skewed except for profitability which is negatively skewed. Kurtosis shows the peak of the curve. Distress, profitability, solvency, efficiency is leptokurtic while current ratio and leverage is platykurtic. The minimum value shows the minimum value of data and maximum value shows maximum value of data. Range is obtained by taking difference of maximum and minimum values. Therefore range shows the difference between extreme values.

Table - I Descriptive Analyses

Z		CR		Profitability	
Mean	1.09822	Mean	65.349	Mean	0.697351
Standard Error	0.04281	Standard Error	3.6352	Standard Error	1.198813
Median	0.94212	Median	55.9	Median	1.8
Mode	0	Mode	0	Mode	0
Standard Deviation	0.78477	Standard Deviation	66.634	Standard Deviation	21.9746
Sample Variance	0.61587	Sample Variance	40.1	Sample Variance	48.8831
Kurtosis	4.9273	Kurtosis	2.7133	Kurtosis	5.406163
Skewness	1.84119	Skewness	1.4673	Skewness	-2.78369
Range	6.59049	Range	353.1	Range	414.32
Minimum	-0.2536	Minimum	0	Minimum	-238.76
Maximum	6.33684	Maximum	353.1	Maximum	175.56
Sum	369.003	Sum	21957	Sum	234.31
Count	336	Count	336	Count	336

Table - II Descriptive Analyses

Solvency		Efficiency		Leverage	
Mean	1.876339	Mean	0.069992	Mean	1.01366
Standard Error	0.12109	Standard Error	0.007269	Standard Error	0.076353
Median	1.430992	Median	0.056503	Median	0.698577
Mode	0.997274	Mode	-0.05607	Mode	1.002733
Standard Deviation	2.219623	Standard Deviation	0.13325	Standard Deviation	1.399577
Sample Variance	4.926727	Sample Variance	0.017756	Sample Variance	1.958815
Kurtosis	7.687381	Kurtosis	4.642527	Kurtosis	2.145295
Skewness	2.787335	Skewness	1.034062	Skewness	1.416708
Range	27.5702	Range	1.25732	Range	9.130454
Minimum	0	Minimum	-0.4377	Minimum	0
Maximum	27.5702	Maximum	0.819616	Maximum	9.130454

Sum	630.45	Sum	23.51729	Sum	340.5898
Count	336	Count	336	Count	336

Correlation analysis

Correlation shows the association among the variables, higher correlation values shows higher degree of association while lower correlation value shows lower degree of association, and value of correlation lies between -1 to 1. Perfect negative correlation is indicated by -1 and perfect positive correlation is shown by 1 while 0 shows no correlation at all. As we move away from 0 correlations of variable increases whether it is positive or negative depends upon the sign of value. Current ratio and Efficiency is 0.39 and 0.45 which is slightly strong correlation while leverage -0.26 is weak negatively correlated.

Table - III Correlation

	Z	*CR*	*PM*	*Solvency*	*Efficiency*	*Leverage*
Z	1					
CR	0.39106	1				
Profitability	0.29834	0.2011	1			
Solvency	0.17006	0.2196	0.0795	1		
Efficiency	0.45189	0.2163	0.5461	0.097256313	1	
Leverage	-0.2684	-0.2701	-0.041	-0.29217402	-0.07489	1

Regression analysis

Correlation analysis shows degree of association but when we want to know its magnitude as well which correlation lacks. For this purpose, regression analysis is used. Coefficient of current ratio is -0.0005 which shows 1% increase will cause 0.0005% decrease in distress and vice versa. Similarly profitability and solvency coefficient is -0.0023 and leverage coefficient is -0.0825 and only efficiency coefficient is positive and shows if 1% efficiency increases it will cause 2.87% increase in distress. The value of R is 0.377 which shows the fitness of model.

Table - IV Regression Summery Output

SUMMARY OUTPUT	
Regression Statistics	
Multiple R	0.47667
R Square	0.37721

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Adjusted R Square	0.34551
Standard Error	0.29509
Observations	336

Table - V Regression table

	Coefficients	Standard Error	t Stat	P-value	Lower 95%	Upper 95%	Lower 95%	Upper 95%
Intercept	1.01803	0.0774	13.145	4.99534E-32	0.865678	1.170384	0.865678	1.170384
CR	-0.0005	0.0006	-0.754	0.045129535	-0.00167	0.000745	-0.00167	0.000745
Profitability	-0.0023	0.0021	-1.105	0.00269917	-0.00637	0.001789	-0.00637	0.001789
Solvency	-0.0023	0.0181	-0.125	0.009009404	-0.03792	0.033403	-0.03792	0.033403
Efficiency	2.85668	0.3434	8.3179	2.38436E-15	2.18108	3.532279	2.18108	3.532279
Leverage	-0.0825	0.0291	-2.836	0.004850347	-0.13979	-0.02529	-0.13979	-0.02529

Conclusion

Financial distress is a hot topic these days in finance and the health of the firm is very important for investors as well as management. Investors invest in those companies which are financially healthy as risk of default is minimized for them. It is important for management as they will be able to identify causes of distress and these causes can be controlled by taking different measures. Financially distressed companies leave economy towards crisis which is the reason everybody wants to determine causes of distress and prevent it from happening. The objective of this paper was to find determinants of financial distress of non financial companies of Karachi Stock Exchange. Data from 50 companies was collected and a result shows current ratio, profitability, solvency and leverage are negatively correlated while efficiency is positively correlated. There are still different factors which are not identified and yet to be explored. These factors give chance to new researchers to move towards this burning issue. It will also help everyone understand the phenomena behind financial distress.

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