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# Determinants of Corporate Financial Distress: Case of Non-Financial Firms Listed in the Nairobi Securities Exchange

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**ABSTRACT**

Financial statements fail to acknowledge the significance of a market mechanism in predicting bankruptcy because accounting variables are produced by a limited number of experts and accountants, but not by the market as a whole. However, in his study, he concluded that Z-score model (an accounting ratio model) produces more consistent results for the data collected and analyzed in terms of the "Max-rescaled R-square" and the "Classification Table" and seems to be reliable model (Bum, 2003). One of the classic works in the area of ratio analysis and bankruptcy classification was performed by Beaver in 1967. In a real sense, his univariate analysis of a number of bankruptcy predictors set the stage for the multivariate attempts which followed. Beaver found that a number of indicators could discriminate between matched samples of failed and non-failed firms for as long as five years prior to failure. He questioned the use of multivariate analysis. A subsequent study by Deakin in 1972 utilized the same 14 variables that Beaver analyzed, but he applied them within a series of multivariate discriminant models. The above mentioned studies imply a definite potential of ratios as predictors of bankruptcy. In general, ratios measuring profitability, liquidity, and solvency prevailed as the most significant indicators (Altman, Haldeman, & Narayanan, 1977).

Although these works established certain important generalizations regarding the performance and trends of particular measurements, the adaptation of the results for assessing bankruptcy potential of firms, both theoretically and practically, is questionable. In almost every case, the methodology is essentially univariate in nature and emphasis is placed on individual signals of impending problems (Altman, 1968). Ratio analysis presented in this fashion is vulnerable to faulty interpretation and is potentially confusing. For instance, a firm with a poor profitability and/or solvency record may be regarded as a potential bankrupt. However, because of its above average liquidity, the situation may not be considered serious. The potential ambiguity as to the relative performance of several firms is clearly evident. The root of the shortcomings inherent in any univariate analysis lies therein. An appropriate extension of the previously cited studies, therefore, is to build upon their findings and to combine several measures into a meaningful predictive model. In so doing, the highlights of ratio analysis as an analytical technique are emphasized rather than downgraded (Altman, Haldeman, & Narayanan, 1977).

According to Altman (1968), an emphasis on ratio analysis in a firm's financial health, Multiple Discriminant Analysis (MDA) is deemed as an appropriate statistical technique. Although not as popular as regression analysis, MDA has been utilized in a variety of disciplines since its first application in the 1930's. In recent years, this technique has become increasingly popular in the practical business world as well as in academia.MDA is a statistical technique used to classify an observation into one of several *priori* groupings dependent upon the observations of individual characteristics. It is used primarily to classify and/or make predictions in problems where the dependent variable appears in qualitative form, for example, male or female, bankrupt or non-bankrupt. Therefore, the first step is to establish explicit group classifications. The number of original groups can be two or more (Altman, Haldeman, & Narayanan, 1977).After the groups are established, data are collected for the objects in the groups; MDA in its most simple form attempts to derive a linear combination of these characteristics which best discriminates between the groups. If a particular object, for instance, a corporation, has characteristics (financial ratios) which can be quantified for all of the companies in the analysis, the MDA determines a set of discriminant coefficients. When these coefficients are applied to the actual ratios, a basis for classification into one of the mutually exclusive groupings exists (Szilagy, Hilsche, & Campbell, 2010). The MDA technique has the advantage of considering an entire profile of characteristics common to the relevant firms, as well as the interaction of these properties. A univariate study, on the other hand, can only consider the measurements used for group assignments one at a time. Another advantage of MDA is the reduction of the analyst's space dimensionally. The analysis is transformed into its simplest form: one dimension. The discriminant function, of the form $Z = V_1X_1 + V_2X_2 + \ldots + V_nX_n$ transforms the individual variable values to a single discriminant score, or Z value, which is then used to classify the object where $V_1, V_2 \ldots V_n$ are discriminant coefficients, and $X_1, X_2 \ldots X_n$ are independent variables (Altman, 2000).

When utilizing a comprehensive list of financial ratios in assessing a firm's bankruptcy potential, there is reason to believe that some of the measurements will have a high degree of correlation with each other. While this aspect is not serious in discriminant analysis, it usually motivates careful selection of the predictive variables

 

(ratios). It also has the advantage of potentially yielding a model with a relatively small number of selected measurements which convey a great deal of information. This information might very well indicate differences among groups, but whether or not these differences are significant and meaningful is a more important aspect of the analysis (Altman, 2000).The model proposed by Altman (1968) combines various accounting ratios. He derived the Altman Z-score model, an MDA model, to discriminate between characteristics of a financially distressed firm and a non-financially distressed one combining traditional ratio analysis with statistical techniques. The Altman Z-score model analyses the entire variable profile of the object simultaneously rather than sequentially examining individual characteristics. Combinations of ratios are analyzed together in order to remove possible ambiguities and misclassifications. Altman suggested that this model can predict ultimate of distress as much as three reporting periods prior to the event.

**1.1 Statement of the Problem**

Over the years, the emphasis on corporate financial distress determination has been critical. Its credence has ignited huge debate in the field of corporate finance on which financial distress measurement tools are more appropriate. Since the Altman Z-score model was created in 1968, it has been evolved to suit the peculiar nature of firms under study. The model has evolved from one that predicts financial distress for large firms in the developed countries to one that best suits all firms in the developing world (Szilagy, Hilsche, & Campbell, 2010). While the Altman Z-score model is a multivariate discriminant analysis tool combining various accounting based variables to produce a single distress score, other schools of thought exist that advocate for univariate analysis in place of multivariate analysis. The need to assess the determinants of financial distress based on this model is the concern of this study. The study sought to examine individual factors that determine corporate financial distress and the extent to which they affect financial distress of public firms listed in the NSE. The factors, which are drawn from the Altman Z-score model, include companies' profitability, liquidity, growth capacity and leverage. The study also utilised the Altman Z-score model in the measurement of corporate financial and assess the extent of its effectiveness. The need to add to the existing knowledge is yet a gap to be filled by this study.

**2.0 LITERATURE REVIEW**

**2.1 Theoretical Orientation**

This subsection provides an insight into theories revolving around financial distress; it presents theories that seek to predict financial distress, theories that explain the effects of financial distress, and theories that determine procedures that minimize and spread the cost of financial distress in order to reduce its impact. This study was based on Distress determinant theories, Wreckers theory of financial distress and normative theory of Bankruptcy as explored in this section.

**2.2.1 Predictive Models**

Determinant theories provide an assortment of empirically developed distress predictive models by means of matching accounting ratios and distressed firms. 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. Despite the variety of models available, both the business community and researchers often rely on the models developed by Altman (1968) and Ohlson (1980); (Wang and Campbell, 2010). One of the classic works in the area of ratio analysis and prediction classification was performed by Beaver in the year 1966. His was a univariate analysis that used t-tests to predict bankruptcy by studying one accounting ratio at a time. The analysis revealed cash flow to debt ratio to be the most effective variable of predicting bankruptcy for as long as five years prior to failure by giving statistically significant signals well before actual business failure. Despite his questioning of the use of multivariate analysis, his univariate analysis of a number of bankruptcy predictors set the stage for the multivariate attempts which followed in a real sense. Subsequent models were developed by Altman in 1968 and Ohlson in 1980 (Altman, 1968). Altman extended Beaver's model by developing a discriminant function which combines ratios in a multivariate analysis. Altman found that his five ratios outperformed Beaver's cash flow/total debt ratio. The Altman model combines seven accounting variables (current assets, current liabilities, noncurrent assets, retained earnings, earnings before interest and taxes, long-term liabilities, book value of equity, and net sales) to produce a single Z score that groups analyzed firms into distressed, grey and safe zones. According to Altman (2000), the model's accuracy in predicting bankruptcy one year after reporting is 80% - 90% prior.

Ohlson's 1980 analysis raised questions about the MDA model, particularly regarding the restrictive statistical requirements imposed by the model (Wang and Campbell, 2010). To overcome the limitations, Ohlson employed logistic regression to predict company failure. He used the logit model and US firms to develop an estimate of the probability of failure for each firm. He argued that this method overcomes some of the criticisms of MDA, which requires an assumption of a normal distribution of predictors, and suffers from the arbitrary nature of identifying non-failed matching firms. Ohlson selected nine independent variables that he thought should be helpful in predicting bankruptcy, but provided no theoretical justification for the selection. Variables used were total assets, gross national product, total liabilities, current liabilities, current assets, cash flow from operations,

 

net income two financial periods prior to analysis, and net income for the period of analysis (Wang and Campbell, 2010).

**2.2.2 Wreckers theory of financial distress**

After developing a reduced form default risk indicator, Campbell, Hilscher and Szilagi (2005) present hypothesis that stocks of distressed firms perform in a manner which is vastly inferior to stocks of financially healthy firms. The wreckers' theory of financial distress seeks to explain the benefits that may step out of financial distress to stakeholders. It is not necessary to attribute the negative excess returns of distressed firms to inefficient or irrational markets. Such negative excess returns can be shown to be the equilibrium outcome under efficiency in an environment where a subset of participants is able to draw returns (in kind) from distressed companies. For firms close to bankruptcy, non-cash returns to ownership may be the dominant form of payout. If markets are efficient, those returns must show up in stock valuation. This may be labeled the 'wreckers theory' of financial distress. It explains the entire pattern of results very well. They proceed to show how to test this hypothesis directly against the alternative of inefficient markets using the theory of convenience yields. It is hard to believe that financial market participants as a group can be that irrational or inefficient. Therefore, Campbell, Hilscher and Szilagi (2005), take one step back and try to tell the story of "profiting from a ship wreckage" from a completely different perspective. They paint an illusion of a firm being hit by a series of negative shocks, making losses and approaching a state of financial distress. With higher leverage, volatility of share prices increases with respect to private information; the ultimate fate of the firm depends on issues unknown to the general public.

With information asymmetry becoming more important, uninformed investors – widows and orphans – will leave, as, from their perspective; it is a market for lemons. Very soon, equity will be owned by insiders – market participants who have a specific advantage in obtaining and interpreting information related to the company in question. Two groups come to mind: managers themselves, and competing firms. A third possibility might be private equity or funds, working on a restructuring (Campbel, Hilscher, & Szilagyi, 2005).

It is this group of well-informed insiders that can draw returns on their investment in other ways than receiving a cash dividend payout. With managers, this is obvious: there is a large body of literature on corporate governance which shows how difficult it is to prevent managers from taking undue advantage of the firm. If the firm is distressed, it would not be wise for managers to realize hidden reserves generating a cash flow, as this cash presumably would go to the creditors (Campbel, Hilscher, & Szilagyi, 2005). Instead, the utility maximizing managers will try to make use of the firms' resources in a more direct way. Competitors, on the other hand, are those market participants that have the same use of the firms material and non-material resources, among other things specialized labor, market information, technical and engineering information and product knowledge. Much of these resources can be transferred by anybody who happens to have executive power. Of course, controlling the market behavior of the competing firm can also have a direct positive impact on the competitor's own profits. This type of benefit will not necessarily deplete the resources of the company (Campbel, Hilscher, & Szilagyi, 2005). This leads to a crucial point: Equity is not only a right to receive dividends, it also confers control rights. These control rights have an economic value on their own, as they enable owners to draw a return in kind. If control rights had no economic value, who would care to have them? The value of control rights makes equity comparable to a commodity. The return of a storable commodity consists of two parts: the capital gain and the "convenience yield", that is, the flow of services which accrues to the owner of a physical inventory but not to the owner of a contract on future delivery (Brennan, 1991). The convenience yield of corporate control comprises all non-cash economic benefits of ownership, by no means necessarily illegal ones. Although it does not show up in the books, the convenience yield of corporate control is economically equivalent to a dividend, and it will be valued as such – not only by the ultimate beneficiary, but also by all other market participants who try to form rational price expectations. The shares of distressed firms do generate returns which are consistent with their risk class, but only a subset of market participants can make use of the flows (Brennan, 1991).

**2.2.3 Early Bankruptcy theory**

Formal bankruptcy theory began with the recognition that a bankruptcy system is sometimes necessary to solve a collective action problem among the creditors of an insolvent firm. Insolvency may be a function of economic distress, financial distress, or both. Economic distress occurs when the firm cannot earn revenues sufficient to cover its costs, exclusive of financing costs. Such a firm has negative economic value. A firm is only in financial distress if it would have positive earnings were it not required to service its debt. Because a firm's debt is sunk when insolvency occurs, the existence of debt is irrelevant to the question of whether the firm should continue or not. Social welfare is maximized when economically distressed firms are liquidated but financially distressed firms are continued. Creditors are less interested in saving firms than in whether assets exist to satisfy their claims. If assets exist, creditors will attempt to seize them, which commonly will yield a piecemeal liquidation. When a firm is experiencing only financial distress, however, the creditors' total insolvency-state payoff would be maximized were the firm continued. Saving a firm, though, will often require creditors to coordinate their collection efforts, and co-ordination costs may be high. As a consequence, reasonable equilibrium exists in

 

which, without regulation, financially as well as economically distressed firms are liquidated piecemeal. A bankruptcy system can avoid this inefficient equilibrium by staying creditor collection efforts so that a state official has time to decide whether the firm is worth saving (Alder, 2002).

Early modern theory favored letting the market make the liquidation/continuation decision. More concretely, a state official should conduct auctions of insolvent firms, free off current claims, distributing the proceeds to creditors. If economic value would be maximized by a piecemeal liquidation, the highest bids will be for individual assets; if continuing the firm as an economic entity would maximize value, then the highest bids would be for the firm as a unit (Longhover, 2004). Early theorists believed that a bankruptcy system should strictly follow the absolute priority rule, which requires creditors to be paid in the order that the firm's contracts created. An implication of this rule is that equity-holders—the owners—should receive nothing because the residual claim on an insolvent firm is worth nothing. Only distributional goals could justify violating absolute priority, but using a bankruptcy system to pursue such goals is questionable on two grounds. First, these goals are difficult to implement because parties can contract around the distributional rules through the price term or through other terms. For example, if a bankruptcy system is amended to subordinate senior creditor claims in order to shift wealth to junior creditors, senior creditors can respond with increased interest rates or more rigorous lending terms. Consequently, bankruptcy systems cannot achieve distributional objectives in the long run. Distributional objectives are sometimes cast in social terms (for example, the law should attempt to save jobs). However, early theorists believed that a bankruptcy system was a poor vehicle for achieving social goals (Douglas, 2002).

**2.2.4 Normative theory of Bankruptcy**

Normative theory, also called modern theory of bankruptcy, relates the results of a bankruptcy procedure to earlier stages in the life of the borrowing firm. An ex post efficient bankruptcy system would maximize the payoffs that creditors receive from insolvent firms. For example, a system that rescues only financially distressed firms generates higher payoffs for creditors than a system that attempts to rescue economically distressed firms as well. At the borrowing stage, a competitive credit market reduces the amounts that lenders require solvent firms to repay when the lenders' expected insolvency payoffs increase. This theory posits that: interest rates (cost of debt) fall as the efficiency of the applicable bankruptcy system increases (a more efficient system increases creditor payoffs); a society that wants to maximize social welfare would prefer firms to pursue every project for which credit can be raised; debt-financed firms pursue fewer projects than society prefers because firms must surrender bad state returns to creditors, but must share good state returns with them. Society thus should want an efficient bankruptcy system because lower interest rates increase the share of good state returns that firms can keep, thereby reducing the wedge between the socially efficient project set and the project set that debt-financed firms will pursue; and an efficient bankruptcy system also improves the borrower's investment incentives because firms invest in projects to maximize net expected profits, which rise as the interest rate falls (Alder, 2002).

In addition, a bankruptcy system that reduces the cost of debt capital will reduce the cost of capital generally. The equity-holders own a call option on a leveraged firm because shareholders can buy the firm by repaying the debt. The strike price for exercising this call option thus is determined by the firm's cost of credit. Reducing this cost—that is, reducing the strike price—makes the stock of a leveraged firm more valuable to own. Hence, it becomes easier for firms to raise equity capital as their country's bankruptcy system becomes more efficient (Douglas, 2002).

In the United States, the economic results of normative theory have concrete policy implications, of which four are briefly summarized. Firstly, the United States Bankruptcy Code gives trustees or debtors in possession "avoiding powers."These powers permit the insolvent party or its representative to recover for the bankrupt estate eve-of-bankruptcy payments to creditors and to challenge liens that may not have been taken in full compliance with state law. The avoiding powers have been a central feature of bankruptcy law for a century, but their existence requires a better theoretical grounding. These powers (other than the traditional prohibition of fraudulent conveyances) generally decrease the value of the bankrupt firm rather than increase it (Douglas, 2002). Secondly, parties should be permitted to write contracts, now prohibited, that permit customers and suppliers to cease dealing with an insolvent firm. When solvent parties have exit rights, debtors could still pursue efficient projects but would have difficulty continuing inefficient projects. Consequently, free contracting regarding exit will cause interest rates to fall below the level that the current bankruptcy regime induces (Alder, 2002).Thirdly, the debtor-in-possession should decide which creditor expenses are reimbursed. The Code currently authorizes bankruptcy courts to reimburse junior creditor expenses that increase the amount available for distribution to the juniors, but the Code reimburses little senior creditor spending. This compensation scheme encourages rent seeking by the juniors, who sometimes litigate to defeat absolute priority rather than to increase the value of the in-solvent firm. A better scheme would delegate the reimbursement decision to the debtor-in-possession. The debtor has no incentive to subsidize rent seeking and would sometimes enlist the seniors in the task of value maximization (Alder, 2002). Fourthly, the law should permit parties to contract in the lending

 

agreement to influence the insolvent firm's choice of a bankruptcy procedure. Bankruptcy contracts can reduce the firm's incentives inefficiently to delay entry into the bankruptcy system and to choose the system that maximizes the firm's private benefits, rather than the monetary return available for distribution to creditors (Longhover, 2004).

This summary shows that while assigning the goal of capital cost reduction to a bankruptcy system is unlikely to be controversial, a serious pursuit of the goal would have important implications. A bankruptcy law with no avoiding powers, that suppliers and customers could contract out of, that reverses the scheme for compensating creditor expenses, and that is only a default procedure from which parties are free to deviate would greatly differ from current law (Longhover, 2004).

**2.3 Empirical Literature Review**

This section presents a review of empirical studies conducted in the past on MDA, Altman Z-score model and corporate financial distress.

**2.3.1 Altman Z score model**

Altman (1968) conducted a study attempting an assessment of the quality of ratio analysis as an analytical technique. This was amid arguments by scholars (Bum, 2003) that that traditional ratio analysis is no longer an important analytical technique in the academic environment due to the relatively unsophisticated manner in which it has been presented. The prediction of corporate bankruptcy was used as an illustrative case. Specifically, a set of financial and economic ratios were investigated in a bankruptcy prediction context wherein a multiple discriminant statistical methodology was employed. The data used in the study were limited to manufacturing corporations. In order to assess its potential rigorously, a set of financial ratios was combined in a discriminant analysis approach to the problem of corporate bankruptcy prediction. The theory is that ratios, if analyzed within a multivariate framework, will take on greater statistical significance than the common technique of sequential ratio comparisons (Altman, 1968).

The discriminant-ratio model proved to be extremely accurate in predicting bankruptcy correctly in 94 per cent of the initial sample with 95 per cent of all firms in the bankrupt and non-bankrupt groups assigned to their actual group classification. Furthermore, the discriminant function was accurate in several secondary samples introduced to test the reliability of the model. Investigation of the individual ratio movements prior to bankruptcy corroborated the model's findings that bankruptcy can be accurately predicted up to two years prior to actual failure with the accuracy diminishing rapidly after the second year. A limitation of the study was that the firms examined were all publicly held manufacturing corporations for which comprehensive financial data were obtainable, including market price quotations. An area for future research was suggested to extend the analysis to relatively smaller asset sized firms and unincorporated entities where the incidence of business failure is greater than with larger corporations (Altman, 1968).

**2.3.2 Studies on discriminant models**

Considering the fundamental role played by small and medium sized enterprises (SMEs) in the economy of many countries and the considerable attention placed on SMEs in the new Basel Capital Accord, Sabato and Altman (2005) developed a distress prediction model specifically for the SME sector and to analyze its effectiveness compared to a generic corporate model. The behavior of financial measures for SMEs is analyzed and the most significant variables in predicting the entities' credit worthiness were selected in order to construct a default prediction model. Using a logit regression technique on panel data of over 2,000 US firms (with sales less than $65 million) over the period 1994-2002, they developed a one-year default prediction model. This model had an out-of-sample prediction power which is almost 30 percent higher than a generic corporate model. An associated objective was to observe our model's ability to lower bank capital requirements considering the new Basel Capital Accord's rules for SMEs (Sabato & Altman, 2005).

Wang and Campbell (2010) re-examine the well-known Ohlson (1980) model on firm failure prediction. The data came from china publicly listed companies and cover a range of 11 years (1998-2008). The Ohlson (1980) model was re-estimated and then revised to better fit the specific situation of China publicly listed companies. The result showed that OENEG (if total liabilities exceeds total assets, 0 otherwise) and INTWO (1 if net income was negative for the last two years, 0 otherwise) were the two most influential variables in failure prediction and were significant at $p<.01$. This study contributed to the literature by expanding the application of Ohlson (1980) model to China publicly listed companies. It provided applicable measures for predicting firm delisting events in China stock markets.

Keating & Hillegeist, 2003, assess whether two popular accounting-based measures, Altman's (1968) Z-score and Ohlson's (1980) O-score, effectively summarized publicly-available information about the probability of bankruptcy. They compared the relative information content of these scores to a market-based measure of the probability of bankruptcy that they developed based on the Black-Scholes-Merton option-pricing theory (BSM-Prob). Their tests showed that BSM-Prob provides significantly more information than either of the two accounting-based measures. This finding was robust to various modifications of Z-score and O-score, including

 

updating the coefficients, making industry adjustments, and decomposing the score variables into their lagged levels and changes. They recommend that researchers use BSM-Prob instead of O-score and Z score in their studies.

The study conducted by Halim, Ahmad, & Rus (2008) compared three methodologies for identifying financially distressed companies: multiple discriminant analysis (MDA), logistic regression and hazard model. In a sample of 52 distressed and non-distressed companies with a holdout sample of 20 companies, the predictions of the hazard model were accurate in 94.9 % of the cases examined. This was a higher accuracy rate than generated by the other two methodologies. However, when the holdout sample is included in the sample analyzed, MDA had the highest accuracy rate at 85%. Among the ten determinants of corporate performance examined, the ratio of debt to total assets was a significant predictor of corporate distress regardless of the methodology used. In addition, net income growth was another significant predictor in MDA, whereas the return on assets was an important predictor when the logistic regression and hazard model methodologies were used.

Zouari and Abid (2000) carried out an exploratory research examining and modeling the financial distress prediction using neural network approach. The study was based on financial ratios. Nine different neural network models were constructed to test the predictive capability of the models by considering: the impact of time varying information structure prior the distressed situation using first, independent annual financial ratios (four models) and second, different panel data sets (three models), and the influence of time varying probability estimates of financial distress in panel data sets (two models). Results support that it is not necessary to have complex architecture in neural models to predict firm's financial distress. Besides the more the predictability horizon is shorter and the input information structure is most recent, the more the predictive capability of the neural model is better.

**2.3.3 Studies on financial distress**

Financial distress is more likely to happen in bad times. The present value of distress costs therefore depends on risk premia. Almeida & Philippon (2006) estimate this value using risk-adjusted default probabilities derived from corporate bond spreads. For a BBB-rated firm, their benchmark calculations show that the NPV of distress is 4.5% of pre-distress value. In contrast, a valuation that ignores risk premia generates an NPV of 1.4%. They show that marginal distress costs can be as large as the marginal tax benefits of debt. Thus, distress risk premia can help explain why firms appear to use debt conservatively. According to Dichev (1998), several studies suggest that a firm distress risk factor could be behind the size and the book-to-market effects. A natural proxy for firm distress is bankruptcy risk. He hypothesized that if bankruptcy is systematic, one would expect a positive association between bankruptcy risks and subsequent realized returns. However, his study demonstrated that bankruptcy risk is not rewarded by higher returns. Thus a distress factor is unlikely to account for the size and book-to-market effects. Surprisingly, firms with high bankruptcy risk earn lower than average returns since 1980. A risk based explanation cannot fully explain anomalous evidence.

Szilagy, Hilsche, and Campbell (2010) considered the measurement and pricing of distress risk. They present a model of corporate failure in which accounting and market-based measures forecast the likelihood of future financial distress. They then used their measure of financial distress to examine the performance of distressed stocks from 1981 to 2008. They found that distressed stocks have highly variable returns and high market betas and that they tend to underperform safe stocks by more at times of high market volatility and risk aversion. However, investors in distressed stocks have not been rewarded for bearing these risks. Instead, distressed stocks have had very low returns, both relative to the market and after adjusting for their high risk. The underperformance of distressed stocks is present in all size and value quintiles. It is lower for stocks with low analyst coverage and institutional holdings, which suggests that information or arbitrage-related frictions may be partly responsible for the underperformance of distressed stocks.

Hoshi, kashyap, & Scharfstein (1990) explored the idea that financial distress is costly because free-rider problems and information asymmetries make it difficult for firms to renegotiate with their creditors. They present evidence that Japanese firms with financial structures in which these problems are likely to be small perform better than other firms after the onset of distress. In particular, their study shows that firms in industrial groups - those with close financial relationships to their banks, suppliers, and customers - invest more and sell more after the onset of distress than non-group firms. They found similar results for non-group firms that nevertheless have strong ties to a main bank.

Salehi & Abedini (2009) in their study, the ability of financial ratios for prediction of financial distress of the listed companies in Tehran Stock Exchange (TES) was investigated. For this reason, the multiple regression models were used and a model was presented for prediction of financial distress in listed companies in TES. The assessment of the model was done by utilizing the data of two groups. The first group contained 30 companies which don't have any financial distress, and the second group, similarly, contained 30 companies which have financial distress. The presented model was according to five ratios namely; ratios indicate liquidity, profitability, managing of debt and managing of property. The statistical results of the model indicate the validity of that model and the selected ratios. The results of the test of the ability of model prediction indicate the reality

 

that the model designed four years before financial distress in companies present a correct prediction about the financial distress.

Titman and Opler (1994) found that highly leveraged firms lose substantial market share to their more conservatively financed competitors in industry downturns. Specifically, firms in the top leverage decile in industries that experience output contractions see their sales decline by 26 percent more than do firms in the bottom leverage decile. A similar decline takes place in the market value of equity. These findings are consistent with the view that the indirect costs of financial distress are significant and positive. Consistent with the theory that firms with specialized products are especially vulnerable to financial distress, we find that highly leveraged firms that engage in research and development suffer the most in economically distressed periods. They also found that the adverse consequences of leverage are more pronounced in concentrated industries.

Paranowo (2010) empirically examined the dynamics of corporate financial distress of public companies (non financial companies) in Indonesia for the period of 2004 - 2008. Using panel data regression, he analyzed internal and external factors affecting corporate financial distress. To distinguish the status of financial condition, the process of integral corporate financial distress was classified into four steps: good, early impairment, deterioration and cash flow problem companies. The results showed that current ratio, efficiency, equity and dummy variable of the status good financial condition have positive and significant influences to Debt Service Coverage as a proxy of financial distress. On the other hand, leverage has a negative and significant relation with DSC. Other variables such as profit, retain earning, good corporate governance and macroeconomic factor have no significant impact on the status of corporate financial distress. Furthermore, the analysis indicated that profitable companies should not be a guarantee that the companies can survive to fulfill its liabilities. Liquidity of companies which can be a prominent point can be recognized by evaluating cash flow performance.

Sitati and Odipo (2009) assessed whether Edward Altman's financial distress prediction model can be useful in predicting business failure in Kenya. The target population was composed of all the companies listed in the Nairobi Stock exchange 1989 to 2008. Twenty firms were selected for the study: 10 firms that continue to be listed and 10 firms that were delisted in Nairobi stock exchange during period 1989 to 2008. The source of Secondary data was obtained from financial reports of these listed and delisted companies at the Nairobi Stock Exchange and the Capital Markets Authority. The research study revealed that Edward Altman's financial distress prediction model was applicable in 8 out of the 10 failed firms that were analyzed, which indicates an 80% successful prediction of the model. On the 10 non-failed firms analyzed, 9 of them proved that Edward Altman's financial distress prediction model was successful indicating a 90% validity of the model. They concluded that Edward Altman model of predicting financial failure of companies is a useful tool for investors in the Kenyan market. Baimwera (2006) examined the relationship between book-to-market ratio of equity, distress risk and stock returns. The distress risk was proxied by Ohlson's score, a measure devised to find the probability of a stock being delisted in stock exchange. The book-to-market ratio of equity and distress risk as proxied by O-score was also compared with other variables thought to be related to distress including leverage, return on assets and size. Stocks were ranked every year on the basis of the probability of distress and book-to-market ratio of equity with the spearman's rank correlation co-efficient being calculated between the ranks. The results showed that book-to-market ratio of equity and distress risk were both negatively related to variables thought to be associated with distress i.e. return on assets, market leverage and size as measured by market capitalization of equity. Moreover, the sorts revealed that both distress risk and the book-to-market ratio of equity were positively related to returns though not very strongly.

Kiragu (1993) carried out a study on the prediction of corporate failure using price adjusted accounting data. He used a sample consisting of 10 failed firms and 10 non failed firms. Financial ratios were calculated from price level adjusted financial statistics. Discriminant model developed showed that 9 ratios had high corporate failure predictive ability. These ratios were times interest coverage, fixed charge coverage, quick ratio, current ratio, equity to total assets, working capital to total debt, return on investments to total assets, change in monetary liabilities, total debt to total assets. The most critical ratios were found to be liquidity and debt service ratios. The results were consistent with the finance theory relating to the firm's risk. The firm has to maintain sufficient liquidity in order to avoid insolvency problems. It also needs to generate sufficient earnings to meet its fixed finance charges. The results however differed from earlier studies done by Altman (1968) and Kimura (1980) who had concluded that liquidity ratios were not of any significance in bankruptcy prediction. Both had indicated that efficiency and profitability ratios were the most important.

Keige (1991) did a study on business failure prediction using discriminant analysis. He concluded that ratios can be used to predict company failure. However, the types of ratios that will best discriminate between failing companies and successful ones tend to differ from place to place. In Kenya current ratio, fixed charge coverage, return on earning to total assets, and return on net worth can be used successfully in predicting for a period up to

 

2 years before it occurs. Keige concludes that stakeholders should pay attention to liquidity, leverage and activity ratios.

Liquidity measures the ability of the firm to meet its current obligations. A firm should ensure that it does not suffer from low of liquidity. The failure of a company to meet its obligations due to lack of sufficient liquidity will result to poor creditworthiness, loss of creditors' confidence or even legal tangles leading to the closure of the company. On the other hand growth is measured by organic growth when the company ploughs back its earnings, and accumulates its funds, through retained earnings in order to finance further investment thereby increasing output and enhancing sales. Organic growth represents the true growth for the core of the company. It is a good indicator of how well management has used its internal sources to expand profits. Concerning profitability a company should earn profits to survive and grow over a long period of time. Sufficient profits must be earned to sustain the operations of the business to be able to obtain funds from investors for expansion and growth and to contribute towards the welfare of the society. Both stock holders and creditors are interested in the profitability of the firm. Creditors want to get interest and repayment of principal regularly. Owners want to get a required rate of return on their investments. On leverage, long term creditors like debenture holders and financial institutions are concerned with the firm's long term financial position. They are concerned with the financial leverage and the capital structure of the firm. The manner in which assets are financed has implications. Debt is perceived to be more risky than equity from the firm's point of view. The firm has a legal obligation to pay interest to debt holders irrespective of the profits made or the loss incurred by the firm. In case of failure by the firm to pay debt holders in time, they can take legal action against it to get payment and, in extreme cases, can force the firm into liquidation. Despite earnings magnification through leverage, the cost of debt may be higher than the firm's overall rate of return, the earnings of shareholders will be reduced. In addition, there is threat of insolvency. Finally, financial distress is a tight cash situation in which a business cannot pay the owed amounts on the due date. If prolonged, this situation can force the owing entity into bankruptcy or forced liquidation. When a firm is under financial distress, the situation frequently sharply reduces its market value, suppliers of goods and services usually insist on COD terms, and large customer may cancel their orders in anticipation of not getting deliveries on time.

### 2.5 Research Gap

Numerous studies have been conducted on financial distress using the Altman Z-score model and other discriminant analysis tools. With a limitation of scope to Kenya's only equity market, the NSE, four studies have been covered under the literature review. Sitati and Ondipo (2006), Kiragu (1993) and Keige (1991) each used the Altman Z score model in assessing corporate financial distress for companies quoted in the NSE. These studies were replicas to the original and the revised Altman Z score model by stratifying sampled firms into failed and non failed firms. This study, however, sought to match the same ratios used by the researchers with Debt Service Coverage as a proxy to financial distress as opposed to bankruptcy itself and interpret the results thereafter. This fact coupled with the contextual gaps in the literature review justified this study.

## 3.0 RESEARCH METHODOLOGY

### 3.1 Research design

This study adopted a descriptive research design. This design was suitable because it provided the basis of collecting data in order to determine and describe the financial distress levels for firms listed in the NSE and relating the Z-score values to stock returns and financial risk premium. The study was quantitative as it involved collection and analysis of quantitative data derived from the financial statements of companies. The target population of the study consisted of 38 non-financial public firms listed in the NSE as shown in appendix I. A census study was done where all the firms in the target population were selected and considered for analysis. This procedure was preferred to sampling as the small size of the population made it possible to study all the firms in the population and at the same time a census solves the accuracy problems associated with sampling. The study made use of secondary data obtained from the financial statements (balance sheets and income statements) of selected firms for a three year period 2007 to 2010 in order to fit the Altman (1968) Z score analysis model. Data analysis was done using both inferential and descriptive statistical techniques. Correlation analysis for a three year period was done to relate the dependent variables to the independent variable using the Pearson product-moment correlation coefficient. DSCR was used as a proxy to financial distress. The significance of the correlation coefficient was tested using Student t-test. Data analysis was also done with the help of Microsoft Excel computer packages. The Altman Z-score model was used to determine the financial distress levels of companies listed in the NSE and Percentages laid down proportions of firms in the various distress zones: distress zone, gray zone, and safe zone. The determinant ratios (liquidity, profitability, growth, leverage and Altman Z scores) were computed and then paired with succeeding years' DSCR during the analysis.The standard Altman Z-core MDA model for non-manufacturer firms & emerging market firms used in this study is as follows: $Z=6.56X_1+3.26X_2+6.72X_3+1.05X_4$ with $X_1$ being liquidity ratio, $X_2$ = growth ratio, $X_3$ = profitability ratio and $X_4$ = leverage ratio.

 

## 4.0 Findings

### 4.1 Univariate Analysis

Data analysis was carried out with the description of a single determinant, its attributes, and its effect on financial distress. The individual determinants were liquidity, profitability, growth and leverage. Simple linear regression and correlation analysis was done using Least Squares regression and Karl Pearson Product Correlation respectively. The study sought to evaluate the extent to which corporate financial distress determinants effectively predict corporate financial distress. The determinants were matched with succeeding year's DSCRs and placed on a nominal scale for analysis. For example, a liquidity ratio of year 2007 was matched with 2008's DSCR with the liquidity ratio being the independent variable and DSCR the dependent variable. The window period was one year.

During analysis of data, some firms generated extremely high DSCRs as they had incurred very low financial costs and paid extremely low borrowing during the year of interest while some firms could not yield a DSCR since they had not incurred any financial costs nor paid any borrowings for the year. Of the 120 units of analysis, 13 (4 units in 2007, 4 units in 2008, three in 2009 and two in 2010) failed to derive a DSCR since they had not paid off any financial borrowings nor incurred financial costs. 2007's DSCRs were excluded from analysis since they had no matching preceding year's determinants ratios as no financial data from year 2005 was collected. At the same time the determinant ratios of year 2010 could not be used as there were no matching DSCRs for the succeeding year. Some individual units of analysis were excluded from analysis because of unavailability of preceding or succeeding years' data. For example financial statements of Kapchorua Limited were unavailable in 2009; there was thus no 2009 DSCR to match with 2008's financials. Nine units of analysis had extremely high DSCRs (DSCR greater than 20 times) and thus they were discarded as outliers with the possibility of biasing study results and thus leading to erroneous conclusions. A. Baumann limited's DSCRs were also excluded owing to their extreme low levels. This led to 54 units being analyzed out of 65 possible units.

#### 4.1.1 Liquidity

Liquidity measures a company's ability to pay off its short-term liabilities and debt obligations from short term assets. It is measured by dividing working capital by total assets of the company. Working capital equals current assets less current liabilities. The higher the value of the ratio a company has, the larger the margin of safety it possesses to cover short term debts.

**Table 4.4 Regression of liquidity on Debt Service Coverage**

| *Regression Statistics* | |
|---|---|
| Coefficient | 2.96 |
| Intercept | 1.35 |
| R | 0.22 |
| R Squared | 0.05 |
| Adjusted R Squared | 0.03 |

*Other Statistics*

| | *df* | *Observed F* | *Critical F* | *Observed t* | *Critical t* | *Standard Error* |
|---|---|---|---|---|---|---|
| R Squared | 52 | 2.55 | 4.03 | | | |
| R | 52 | | | 1.60 | 2.01 | |
| Coefficient | 52 | | | 1.60 | 2.01 | 1.85 |

(Researcher, 2012)

There was a weak positive correlation between liquidity and DSC which was insignificant since at 95% confidence level the critical value t is 2.01 which is higher than observed t = 1.6. The regression model assumes the equation $DSCR = 2.96X_1 + 1.35$ with the liquidity coefficient being tested to be insignificant at 0.05% level of significance because the observed t = 1.60 is lower than the critical t with 52 degrees of freedom. The observed F = 2.55 was lower than the critical F at 95% confidence level, 52 degrees of freedom; the regression model is therefore insignificant and not useful in predicting DSC.

#### 4.1.2 Growth

This refers to the internal growth; the level of growth a firm can achieve without having to resort to additional borrowed funds or additional outside capital infusion. Internal growth rate, in the context of this study, is measured according to the Altman Z score model variable $X_2$ by dividing Retained earnings by Total Assets. A high ratio indicates investment financed out of a high level of retained earnings as compared to external equity and debt. Retained earnings and Total Assets data is obtained from the balance sheet of the firms. Internal growth succeeds the plowing back of earnings and the subsequent reinvestment of these earnings into profitable investments. Upon gathering data, the following results were obtained.

 

**Table 4.5 Regression of Growth on Debt Service Coverage**

| *Regression Statistics* | |
|---|---|
| Coefficient | 6.39 |
| Intercept | 0.84 |
| R | 0.48 |
| R Squared | 0.23 |
| Adjusted R Squared | 0.47 |

*Other Statistics*

| | *df* | *Observed F* | *Critical F* | *Observed t* | *Critical t* | *Standard Error* |
|---|---|---|---|---|---|---|
| R Squared | 52 | 15.72 | 4.03 | | | |
| R | 52 | | | 3.96 | 2.01 | |
| Coefficient | 52 | | | 3.96 | 2.01 | 1.61 |

(Researcher, 2012)

The regression model took the form $DSCR = 6.39X_2 + 0.84$ with DSCR being the dependent variable. The coefficient of determination (R Squared) was 0.23 and the correlation coefficient (R) between liquidity and DSC was 0.48. At 95% confidence level, the regression coefficient, regression model and correlation coefficient were tested to be significant. This is as a result of the critical test statistics, *F* and *t,* being lower than the observed statistics. It is therefore concluded that the liquidity regression model only determined 23% of variation in DSC, 77% of variation in DSC remained unexplained by the liquidity regression model. The level of association between liquidity and DSC was a positive moderate association as indicated by the 0.48 correlation coefficient.

**4.1.3 Profitability**

Profitability ratio in this study was determined by dividing operating profit by the total assets of the firm with data being obtained from the income statement and the balance sheet. This measured the rational use of a firm's assets to generate profits from operations with a higher ratio indicating a more rational use. The following results were obtained upon analysis.

**Table 4.6 Regression of Profitability on Debt Service Coverage**

| *Regression Statistics* | |
|---|---|
| Coefficient | 13.63 |
| Intercept | 0.16 |
| R | 0.47 |
| R Squared | 0.22 |
| Adjusted R Squared | 0.46 |

*Other Statistics*

| | *df* | *Observed F* | *Critical F* | *Observed t* | *Critical t* | *Standard Error* |
|---|---|---|---|---|---|---|
| R Squared | 52 | 14.70 | 4.03 | | | |
| R | 52 | | | 3.83 | 2.01 | |
| Coefficient | 52 | | | 3.83 | 2.01 | 3.56 |

(Researcher, 2012)

The regression model assumed the form $DSCR = 13.63X_3 + 0.16$ with $X_3$ being the profitability ratio. A profitability ratio of 0.5 would therefore approximately yield a DSCR of 6.975. Profitability has a moderate positive correlation with DSC. At 95% confidence level and 52 degrees of freedom a critical t of 2.01 was derived which is lower than the observed t 3.83 which led to the conclusion that the correlation coefficient was significant. The coefficient of determination (R Squared) was also tested for significance at 0.05 level of significance with $v1 = 54 - 52 - 1 = 1$ and v2 = 52 deriving a critical F test equal to 4.03 therefore making the coefficient of determination significant. The $X_3$ coefficient also tested significant at 95% confidence level with the observed t being greater than the critical t. It was therefore concluded that the profitability regression model only determined 22% of variation in DSC, 78% of variation in DSC remained unexplained by the profitability regression model.

**4.1.4 Leverage**

It is important to assess the extent to which shareholders or outsiders are financing the business and the cushion of security for the creditors. Leverage, in this study's context, refers to the ratio of debt finance to equity finance. A higher leverage ratio therefore means a higher proportion of debt compared to equity in long-term financing. While higher leverage would boost return on investment in favorable business conditions, higher leverage would, on the other hand, adversely affect return on investment during unfavorable business conditions. Leverage ratio in this study was determined by dividing book value of equity by total liabilities of a firm. With equity being the numerator and liabilities being the denominator, a higher ratio thus indicates low leverage while a lower ratio, high leverage.

 

**Table 4.7 Regression of Leverage on Debt Service Coverage**

| *Regression Statistics* | |
|---|---|
| Coefficient | 0.88 |
| Intercept | 0.77 |
| R | 0.27 |
| R Squared | 0.07 |
| Adjusted R Squared | 0.26 |

*Other Statistics*

| | *df* | *Observed F* | *Critical F* | *Observed t* | *Critical t* | *Standard Error* |
|---|---|---|---|---|---|---|
| R Squared | 52 | 3.94 | 4.03 | | | |
| R | 52 | | | 1.98 | 2.01 | |
| Coefficient | 52 | | | 1.98 | 2.01 | 0.44 |

(Researcher, 2012)

The above statistics were obtained when data was put forth for analysis. There was a weak positive correlation (R) between leverage and DSC which was insignificant since at 95% confidence level the critical value t is 2.01 which is higher than observed t = 1.98. The leverage regression model assumes the equation $DSCR = 0.88X_3 + 0.77$ with the $X_3$ coefficient being tested to be insignificant at 0.05% level of significance because the observed t = 1.98 is lower than the critical t with 52 degrees of freedom. The observed F = 3.94 was lower than the critical F at 95% confidence level 52 degrees of freedom which rendered the coefficient of determination (R Squared) not significant; the regression model, therefore, was insignificant and not useful in predicting DSC.

**4.2 Multivariate analysis**

**4.2.1 Altman Z score model**

This involved a simultaneous analysis of multiple financial distress determinants' ability to predict corporate financial distress by grouping them together thereby yielding a single distress score. This study employed the Altman Z score model, an MDA model, developed to predict corporate bankruptcy. The Altman Z score model takes the form $Z=6.56X_1+3.26X_2+6.72X_3+1.05X_4$ with $X_1$ being liquidity ratio, $X_2$ = growth ratio, $X_3$ = profitability ratio and $X_4$ = leverage ratio. The model is suitable for general firms in emerging markets where the NSE lies. As with univariate analysis, Z scores were matched with succeeding years' DSCR and bivariate regression and correlation analysis was done. Units of analysis were fifty four. Results were obtained as below:

**Table 4.8 Regression of Altman Z scores with Debt Service Coverage**

| *Regression Statistics* | |
|---|---|
| Coefficient | 0.55 |
| Intercept | 0.01 |
| R | 0.48 |
| R Squared | 0.23 |
| Adjusted R Squared | 0.47 |

*Other Statistics*

| | *df* | *Observed F* | *Critical F* | *Observed t* | *Critical t* | *Standard Error* |
|---|---|---|---|---|---|---|
| R Squared | 52 | 15.37 | 4.03 | | | |
| R | 52 | | | 3.92 | 2.01 | |
| Coefficient | 52 | | | 3.92 | 2.01 | 0.14 |

(Researcher, 2012)

The regression model assumed the form $DSCR = 0.55Z + 0.01$. An upper limit of the safe zone, Z = 2.6, would approximately yield a DSCR equal to 1.44 while the lower limit, Z = 1.1, would approximately yield DSCR = 0.615. Altman Z scores had a moderate positive correlation with DSC. At 95% confidence level and 52 degrees of freedom a critical t of 2.01 was derived which was lower than the observed t 3.92 which led to the conclusion that the correlation coefficient was significant. The coefficient of determination (R Squared) was also tested for significance at 0.05 level of significance with $v1 = 54 – 52 -1 = 1$ and $v2 = 52$ deriving a critical F test equal to 4.03 therefore making the coefficient of determination significant. The Z coefficient also tested significant at 95% confidence level with the observed t being greater than the critical t. It was concluded that the Altman Z score model effectively predicts 23% of variation in financial distress as measured DSCR, 77% of variation in DSC remained unexplained by the Altman Z score model.

**4.2.2 Multiple Regression**

In this section, an actual regression model was developed with four independent variables. The independent variables are liquidity ($X_1$), growth ($X_2$), profitability ($X_3$), and leverage ($X_4$). The regression model took the form: $DSCR=.05X_1+8.72X_2+4.39X_3+1.88X_4-0.15$ as in the table below.

 

**Table 4.9 Multiple Regression with Debt Service Coverage**

| *Regression Statistics* | | |
|---|---|---|
| Coefficient | X1 | 0.05 |
| | X2 | 8.72 |
| | X3 | 4.39 |
| | X4 | 1.88 |
| Intercept | | -0.15 |
| R Squared | | 0.33 |
| Adjusted R Squared | | 0.28 |

*Other Statistics*

| | | *df* | *Observed F* | *Critical F* | *Observed t* | *Critical t* | *Standard Error* |
|---|---|---|---|---|---|---|---|
| R Squared | | 49 | 6.15 | 2.56 | | | |
| Coefficient | X1 | 49 | | | 0.11 | 2.01 | 0.44 |
| | X2 | 49 | | | 2.29 | 2.01 | 3.81 |
| | X3 | 49 | | | 2.44 | 2.01 | 1.80 |
| | X4 | 49 | | | 1.09 | 2.01 | 1.72 |

(Researcher, 2012)

At 95 percent confidence level and 49 degrees on freedom, liquidity ($X_1$) and leverage ($X_4$) coefficients were found to be insignificant since their observed t statistic was lower than the critical t test. Profitability ($X_3$) and growth ($X_2$) coefficients fell in the critical region and thus concluded significant. The regression model had a 33% coefficient of determination which was found to be significant with the observed F being greater than critical F-test at 0.05 level of significance and V1 equal to 4 (54-49-1=4) and V2 equal to 49. The regression model therefore explained 33% of variation in DSCR.

**4.2.3 Multiple Regression with DSCR Intercept equal to Zero**

Since the Altman Z score model is a multiple regression model with DSCR intercept/constant equal to zero, the researcher also saw it fit to develop an actual multiple regression model with constant equal to zero. The following regression model was obtained from the data gathered.

**Table 4.10 Multiple Regression of with intercept equal to Zero**

| *Regression Statistics* | | |
|---|---|---|
| Coefficient | X1 | -0.01 |
| | X2 | 8.22 |
| | X3 | 4.43 |
| | X4 | 1.86 |
| R Squared | | 0.59 |
| Adjusted R Squared | | 0.57 |

*Other Statistics*

| | | *df* | *Observed F* | *Critical F* | *Observed t* | *Critical t* | *Standard Error* |
|---|---|---|---|---|---|---|---|
| R Squared | | 50 | 17.65 | 2.79 | | | |
| Coefficient | X1 | 50 | | | -0.03 | 2.01 | 0.38 |
| | X2 | 50 | | | 2.51 | 2.01 | 3.28 |
| | X3 | 50 | | | 2.49 | 2.01 | 1.78 |
| | X4 | 50 | | | 1.09 | 2.01 | 1.70 |

(Researcher, 2012)

The regression equation took the form $DSCR = -0.01X_1 + 8.22X_2 + 4.43X_3 + 1.86X_4$. At 95 percent confidence level and 50 degrees on freedom, liquidity ($X_1$) and leverage ($X_4$) coefficients were found to be insignificant since their observed t statistic was lower than the critical t test. Profitability ($X_3$) and growth ($X_2$) coefficients fell in the critical region and thus concluded to be significant. The regression model had a 59% coefficient of determination which was found to be significant with the observed F being greater than critical F-test at 95% confidence level. This presented a more improved model of predicting debt service coverage by explaining 59% of variation in DSCR in comparison to other regression models derived in this study.

**4.3 Discussion of Findings**

This study finds growth, as measured by dividing retained earnings by total assets, to be the most significant determinant of corporate financial distress. Profitability, measured by dividing earnings before interest and taxes, is found to be the second most influential determinant of corporate financial distress. Liquidity and leverage are found to have no significant effect on corporate financial distress. The Altman Z score model is found to be having a significant influence on corporate financial distress though with a moderate correlation with DSCR as a proxy to corporate financial distress.

 

These findings are in congruence with Sitati and Ondipo's (2006) study which found out that the Altman Z score model had 80% accuracy in predicting corporate bankruptcy and 90% accuracy in predicting safety and thus being a useful tool in the Kenyan market. The findings also agree with Zouari and Abid's (2000) which led to the conclusion that it is not necessary to have complex architecture in neural models to predict firm's financial distress and that the more the predictability horizon is shorter and the input information structure is most recent, the more the predictive capability of the prediction model as far as the Altman Z score model is concerned. The findings, however, do not concur with the findings of Keating & Hillegeist (2003) study which left them concluding that Black-Scholes-Merton option-pricing model would be a better bankruptcy predictor than less sophisticated Altman Z score and Ohlson O score model in predicting corporate bankruptcy.

As far as leverage analysis is concerned, the findings of this study differ with those of Halim (2008) who concludes that the ratio of debt to total assets was the most significant predictor of corporate distress among the ten determinants of corporate performance examined. The findings of Titman and Opler (1994) support the opinion that highly leveraged firms lose substantial market share to their more conservatively financed competitors in industry downturns. This study, in contrast, finds leverage to be of no significant ability to predict financial distress.

The findings also differ with Paranowo's (2010) findings. Paranowo (2010) found out that leverage and liquidity had positive and significant influence to Debt Service Coverage as a proxy of financial distress. On the other side, Paranowo's study revealed that profitability and retained earnings had no significant impact on the status of corporate financial distress. This led him to the conclusion that that a high profitability should not be a guarantee that the companies can survive to fulfill its liabilities.

The results agree, in part, with the recommendations of Kiragu (1993) that firms need to generate sufficient earnings in order to meet fixed finance charges. They however differ on the fact that his findings that the critical ratio in determining corporate financial distress was liquidity and that firms had to maintain sufficient liquidity in order to avoid insolvency problems. The findings also agree with those of Keige (1991) that return on net worth can be used successfully in predicting for a period up to 2 years before it occurs. The discrepancies in the findings can be explained by the fact that the types of ratios that will best discriminate between failing companies and successful ones tend to differ from place to place and from time to time (Keige, 1991)

## 5.0 Summary of findings, conclusions and recommendations

### 5.1 Summary of Findings

Liquidity was found to have a weak positive correlation with DSC with correlation coefficient being 0.22. The regression model took the form $DSCR = 2.96X_1 + 1.35$. At 95% confidence level, with a two tailed t-test, the critical t value was 2.01. Observed t was 1.6. The observed F was 2.55; critical F at 95% confidence level, 52 degrees of freedom was 4.03.

The regression equation between growth and DSC, with growth being the independent variable and DSC being the dependent variable, took the form: $DSCR = 6.39X_2 + 0.8$. The coefficient of determination was 0.23. The observed F statistic was 15.72 while the critical F statistic at 95% confidence level and 52 degrees of freedom was 4.03. There was a moderate positive correlation between growth and DSC with a 0.48 correlation coefficient. The observed t-statistic was 3.96. Critical t-test values at 95% confidence level, two tailed test were +2.01 and -2.01.

Profitability was found to have a moderate positive correlation with DSC with a 0.47 correlation coefficient. The regression model with profitability as the independent variable was $DSCR = 13.63X_3 + 0.16$ with a 22% coefficient of determination. A two tailed test at 95% confidence level and 52 degrees of freedom derived critical t-test values equal to +2.01 and -2.01. The observed t value was equal to 3.83. Analysis of variance at 95% confidence level, 52 degrees with of freedom and 54 entries revealed a critical test equal to 4.03; the observed F statistic was equal to 14.70.

With a correlation coefficient equal to 0.27, leverage and DSC had a weak positive correlation. The regression model with leverage as the independent variable took the form $DSCR=0.88X_3+0.7$ with a 7% coefficient of determination. . A two tailed test at 95% confidence level and 52 degrees of freedom derived critical t-test values equal to +2.01 and -2.01. The observed t value was equal to 1.98. Analysis of variance at 95% confidence level, 52 degrees with of freedom and 54 entries revealed a critical test equal to 4.03; the observed F statistic was equal to 3.94.

Altman Z score model was found to have a moderate positive correlation with a coefficient equal to 0.48 between Altman Z scores and DSCR. The regression model with Altman Z scores as the independent variables was $DSCR = 0.55X3 + 0.01$ with a 23% coefficient of determination. A two tailed test at 95% confidence level and 52 degrees of freedom derived critical t-test values equal to +2.01 and -2.01. The observed t value was equal to 3.92. Analysis of variance at 95% confidence level, 52 degrees with of freedom and 54 entries revealed a critical test equal to 4.03 with the observed F statistic being equal to 15.37.

 

Two regression models were determined in the study; one with a DSCR intercept, and the other without. They took the forms: $DSCR = 0.05X1 + 8.72X2 + 4.39X3 + 1.88X4 - 0.15$ and $DSCR = -0.01X1 + 8.22X2 + 4.43X3 + 1.86X4$ with 0.33 and 0.59 coefficients of determination respectively. At 95% confidence level, 49 degrees of freedom, Analysis of Variance was done for the former regression model revealing an F-test equal to 2.56; the observed F was 6.15. The latter model derived an observed F equal to 2.79 with an observed F equal to 17.65.

**5.2 Conclusions**

Liquidity and leverage were found to be having no significant influence on corporate financial distress. They both had a weak positive correlation with DSC which was insignificant as determined by a two tailed t-test with 95% level of confidence. As variables in multiple regression models, their coefficients also had no significant contribution. Liquidity and leverage, as measured in the study, therefore have no significant effect on DSC as a proxy to corporate financial distress. Profitability and Growth were found to have a significant influence on corporate financial distress though they each had moderate positive correlations with DSC. Under univariate analysis, the variables were seen to have a significant influence by having significant coefficients of determination. The ratios also had a significant contribution in multiple regression analysis. Profitability was found to explain 22% of variation in DSC as a proxy to corporate financial distress while growth explained 23%. The Altman Z score model was found to have a significant influence on DSC as a proxy to corporate financial distress. It however had weak ability to predict financial distress one year prior as evidenced by the study. The Altman Z scores have a significant moderate correlation coefficient with DSCR of 0.48. Altman Z score model's regression equation versus financial distress was also found to be significant since the Z scores' coefficient on the equation and coefficient of determination were significant. With a 23% coefficient of determination, it can be concluded that the Altman Z score model could only explain 23% of variation on financial distress while 77% of variation in financial distress could not be explained by the model. There were two multiple regression models that were derived in the study. The first one's equation was $DSCR = 0.05X1 + 8.72X2 + 4.39X3 + 1.88X4 - 0.15$. Its coefficient of determination was 0.33 thereby explaining 33% of changes in financial distress. Liquidity (X1) and leverage (X2) had no significant contribution to the model while profitability (X4) and growth (X3) had a significant influence. The second regression model's linear equation was $DSCR=-0.01X_1+8.22X_2+4.43X_3+1.86X_4$. This was an improved model with a significant coefficient of determination equal to 59%; it could thus explain 59% of variation in DSC. Liquidity and leverage had no significant contribution to the model while profitability and growth had.

**5.3 Recommendations**

The Altman Z score model (a multivariate approach) was found to be a significant distress prediction model. The study recommends companies to maximize profits and retain most of the profits for reinvestment in order to boost their credit rating. Firms should also exert confidence in the Altman Z score model as a distress prediction tool.

**5.4 Suggestions for further research**

This study left a huge gap to be filled by subsequent studies. The problem of financial distress still remains to be of crucial concern to the stakeholders of a firm. Future researchers should take a keen interest in assessing the factors affecting corporate financial distress other than those postulated in the Altman Z score model. The factors could either be qualitative or quantitative; in case of ratio analysis, other ratios could be used. For example, current ratio could be used in place of liquidity. The researcher also recommends a replication of the study either with a different time frame other than the period between year 2007 and 2010 for NSE listed companies or with a different target population.

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