PREDICTION OF CREDIT DEFAULT RISK FOR COMPANIES LISTED AT NAIROBI SECURITIES EXCHANGE

By

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DECLARATION

I declare that this is my own original work and to the best of my knowledge it has not been submitted for a degree award in any other University or institution of higher learning.

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DEDICATION

This dissertation is dedicated to Dad Mr Soi, Mum Linner, my husband Henry, and lovely children Njeri, Johniee and our baby to be born in January.

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ABSTRACT

Corporate defaults are one of the main sources of loss for a bank and therefore there is a need for credit managers to make sound credit lending decision. This risk is critical since debt obligations due to a major deterioration of the credit standing of the borrower and, finally, formal bankruptcy and liquidation. Credit manager analyzes a borrower and provides a credit rating used in the lending decision. Creditworthiness of borrowers is determined by character, capacity, capital, collateral and conditions. In credit lending decision, concern is mainly on the serviceability of the loan to be advanced. Failure prediction model come in handy in such a case as the credit manager use the model in determining failure prediction score in making sound credit decision. Similarly a company may be having satisfactory DSCR (Ratio of Company free cash flows to Total debt repayments), but the Z score is below the "cut off" (Padhi, 2005). The objective of the study was prediction of credit default risk for companies listed in NSE. The study adopted a descriptive cross-sectional research design. The main goal of descriptive research is to describe the data and characteristics about what is being studied. Population of study was all companies listed in Nairobi Securities Exchange from 2003 to 2010.

Failed companies are considered those that have either been suspended or delisted from the NSE excluded companies that delisted voluntarily. They are only 10 firms during this period. Non-failed companies are all entities listed in the NSE since the year 2003-2010. The data composed of full set of financial statements, which was collected from NSE and company websites. Failed firms data was collected for one year prior to bankruptcy. Previous research done on bankruptcy has demonstrated that financial information one year before bankruptcy predicts probability of the company going into bankruptcy more accurately than two to three years before. Data analysis was based on Altman Z score Model and DSCR. The study revealed that Altman Z score model was applicable in the prediction of credit default risk for companies listed in Nairobi Security Exchange. The DCSR for all failed companies was less than 1 demonstrating that calculation of DSCR ratio is critical in making solid credit decision.

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INTRODUCTION

1.1 Background of the Study

The cost of holding risk matters to every organization. Most financial decisions, whether on capital structure, dividends, investments, revolve around the costs of holding risk. This issue is particularly important to banks since risk management constitutes their core business. By its very nature, banking is an attempt to manage multiple and seemingly opposing needs. Banks provide liquidity on demand to depositors through the current account and extend credit as well as liquidity to their borrowers through lines of credit (Kashyap, Rajan and Stein, 1999). Due to these fundamental roles, banks have always been concerned with both solvency and liquidity. Traditionally, banks hold capital as a buffer against insolvency, and they hold liquid assets to guard against unexpected withdrawals by depositors (Saidenberg and Straham, 1999). These have made banks actively evaluate and take risks on a daily basis as part of their core business processes.

Given the central role of market and credit risk in their core business, the banks' success requires that they are able to identify, assess, monitor and manage these risks in a sound and sophisticated way. Llewellyn (1992) confirmed that competitive and regulatory pressures are likely to reinforce the central strategic issue of capital and profitability and cost of equity capital in shaping banking strategy.

In recent times, banks' risk management has come under increasing scrutiny in both academia and practice. Banks have attempted to sell sophisticated credit risk management systems that can account for borrower risk and perhaps more importantly, the risk-reducing benefits of diversification across borrowers in a large portfolio. In risk management, it is very important for the bank to make sound credit lending decision. Over the years scholars have developed models to assist in predicting bankruptcy/financial distress of an entity. The models use both financial and non-financial information in assessing the likely of financial distress. The models are of importance to financial institutions that advance credit facilities to companies. The traditional approach for banks for credit risk assessment is to produce an internal rating,

which takes into account various quantitative as well as subjective factors, such as leverage, earnings, reputation, etc., through a scoring system. The problem with this approach is of course the subjective aspect of the prediction, which makes it difficult to make consistent estimates. Bankruptcy prediction models therefore can serve as very early warning signals for counterparty defaults (Atiya, 2001).

1.1.1 Credit Default Risk

The definition of default is quite important for developing a credit risk model, as it classifies companies as "defaulted" and "non-defaulted". According to the requirements of the regulatory framework, a default is considered to have occurred when either or both of the two following events have taken place: The obligor is unlikely to pay its credit obligations or the obligor is past due more than 90 days on any material credit obligation (Altman, 1968).

According to the new regulatory framework, the elements that indicate an unlikeliness to pay include bankruptcy and any similar event that could cause delay of payment to the financial institution (Falkesnstein, 2000).

Credit default risk is the likelihood that a borrower will not pay its debt on time or failed to make repayment at all (Sinkey, 2002; Coyle, 2000). It is the possibility that the actual return on a loan portfolio will deviate from the expected return (Conford, 2000). That is loan delinquency and default by borrowers. While loan delinquencies indicate delay in payment, default denotes nonpayment, and the former if unchecked, leads to the latter (Padmanabhan, 1988).

Credit risk management is the identification, measurement, monitoring and control of risk arising from the possibility of default payment a loan contract (Coyle, 2000).Analysis and management of credit risk has taken on an increased importance in recent years. New regulations such as BASEL II force banks and other financial institutions to make credible efforts to chart and manage the risks associated with their client portfolio. In addition, harder competition in the financial markets has also increased the need to monitor the risk/reward relationship for various customers.

1.1.2 Nairobi Securities Exchange

Currently, there are 60 companies listed in NSE under the categories of Agricultural, Commercial and Services, Telecommunications and Technology, Automobiles and Accessories, Manufacturing and Allied, Construction and Allied, Energy and Petroleum, Banking, Insurance and investment sectors (www.nse.co.ke).

NSE performs the following functions; enables mobilization of savings for investment in productive enterprises as an alternative in putting savings in bank deposits, real-estate investment or outright consumption, gives room to the growth of related financial services sector e.g. insurance pension schemes, which nurture the spirit of savings, makes it easy to check against the flight of capital that occurs due to local inflation and currency depreciation, permits the owners of capital to "divorce" from managing their capital as owners of capital may not necessarily have the expertise to manage the capital investment efficiently, encourages high standards of accounting and management of resources, allows public disclosure that gives effective efficiency in the capital growth process, facilitates equity financing, enhances improved access to finance both to new and small companies, which might otherwise find it hard to access finance, enables futuristic funding in most of the developing countries, where venture capital is mostly unavailable and encourages public floatation of private companies, which in turn allows greater growth (www.nse.co.ke).

1.2 Statement of the Problem

Corporate defaults are one of the main sources of loss for a bank and therefore there is a need for credit managers to make sound credit lending decision. This risk is critical since debt obligations due to a major deterioration of the credit standing of the borrower and, finally, formal bankruptcy and liquidation. The last state implies that non-payment will be permanent and will trigger the default of a small number of important customers can generate large losses, potentially leading the bank to insolvency. There are various default events: delay or omission in payment obligations, restructuring of significant loss in most cases (Padmanabhan, 1988)

Credit manager analyzes a borrower and provides a credit rating used in the lending decision. Creditworthiness of borrowers is determined by character, capacity, capital, collateral and conditions. In credit lending decision, concern is mainly on the serviceability of the loan to be advanced. The approach is to determine the ability of the company to pay both interest and principal as and when they fall due. Therefore demonstration of debt serviceability using historical financial statements is of utmost important to credit manager when making lending decision to companies and hence the Debt Service Cover Ratio. Financial analysis looks at individual ratios like profitability, liquidity, activity and gearing. In this case credit manager is not in a position to relate all the ratios together to get a meaning out of it. For example, a company may be profitable but insolvent because of huge debt in its books. Failure prediction model will come in handy in such a case as the credit manager will use the model in determining failure prediction score in making sound credit decision. Similarly a company may be having satisfactory DSCR (Ratio of Company free cash flows to Total debt repayments), but the Z score is below the "cut off" (Padhi, 2005).

Keige (1991) did a study on business failure prediction using discriminate 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.

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.

According to Sitati (2008) Edward Altman's financial distress prediction model is found to be accurate prediction on 8 out of the 10 failed firms, 80% validity for the model. On 10 non-failed firms, 9 of them proved that Edward Altman's financial distress prediction model was correct a 90% validity of the model. This study therefore furthers Sitati (2008) research on bankruptcy prediction model by evaluating the companies correctly classified for bankruptcy and its corresponding debt service cover ratio in an effort to predict credit default risk for companies listed in NSE. The research question is, 'Is Altman's revised bankruptcy prediction model (2000) applicable in predicting credit default risk for public listed companies?'

1.3 Objectives of the Study

The objective of the study is prediction of credit default risk for companies listed in NSE.

1.4 Significance of the Study

Commercial Banks.

There is a need for an objective decision tool for granting / not granting credit to new clients. A solid analytical model that is tested, validated and understood by the banker will help in accepting/ rejecting new clients and hope fully limits the number of counterparties that will go into bankruptcy.

Banks need to predict the possibility of default of a potential counterparty before they extend a loan. This can lead to sounder lending decisions, and therefore result in significant savings. A bankruptcy prediction model is used as a tool for monitoring credit risk on existing customers. Today, virtually all major banks and financial institutions have models for Expected and Unexpected losses, Credit Risk capital and risk adjusted return on capital (Bessis (2002). If there is a need for reducing future expected losses, a bank needs to take corrective actions. This could be done by getting rid of certain clients (usually done by risk-

adjusted pricing). It is therefore essential to measure the credit risk at any time correctly. A proper bankruptcy prediction model giving the expected probability of default for each client is a crucial element in this context.

Measuring the credit risk accurately also allows banks to engineer future lending transactions, so as to achieve targeted return/risk characteristics and in accurately assessing the credit risk of bank loan portfolios.

Risk adjusted measures for various products and business units are now a major focus for banks and financial institutions in the process of creating maximum shareholder value. Bankruptcy prediction models are important elements in such systems as they give input to the risk side of various types of business.

Finally the BASEL II directive give banks an incentive (through capital requirement reduction) to develop proper bankruptcy and credit risk models.

Audit Firms

The other benefit of the prediction of bankruptcies is for accounting firms. If an accounting firm audits a potentially troubled firm, and misses giving a warning signal (say a "going concern" opinion), then it faces costly lawsuits.

Borrowers

Borrowers, also benefit from knowing their position since they can avoid going into bankruptcy through further borrowing and therefore look for others ways of raising capital.

Academic Scholars

Academic scholars continue to further research on Bankruptcy various bankruptcy model. This study for instance furthers the research done in 2008 in Kenya.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

This chapter review theories and empirical studies that have been put forward on bankruptcy prediction models. During the past few years, financial and accounting information, as well as financial ratios, have been used to generate bankruptcy prediction models based on different techniques, methods and methodologies. The development of bankruptcy prediction models was started by research of Beaver in 1966.

2.2 Review of Theories

2.2.1 Gambler's Ruin Theory

In context of the firm's failure, firm would take the place of a gambler. Firm would continue to operate until its net worth goes to zero, point where it would go bankrupt. The theory assumes that firm has got some given amount of capital in cash, which would keep entering or exiting the firm on random basis depending on firm's operations. In any given period, the firm would experience either positive or negative cash flow. Over a run of periods, there is one possible composite probability that cash flow will be always negative. Such a situation would lead the firm to declare bankruptcy, as it has gone out of cash. Hence, under this approach, the firm remains solvent as long as its net worth is greater than zero. This net worth is calculated from the liquidation value of stockholders' equity.

Wilcox (1971) set up a model where cash flow was with either positive or negative values, and the reserve is the value of book equity. One then computes the probability of default given the cash flows. The "distance to default" in this theory is the sum of book equity and expected cash flow divided by the cash flow volatility.

According to Wilcox (1971) the value of equity is a reserve, and cash flows either add to or drain from this reserve. In the case of a bankruptcy, the reserve is used up.

2.2.2 Cash Management Theory

Short-term management of corporate cash balances is a major concern of every firm. Cash or funds flow statements of the firms report this cash management function of corporations, particularly from 1980s. An imbalance between cash inflows and outflows would mean failure of cash management function of the firm. Persistence of such an imbalance may cause financial distress to the firm and, hence, bankruptcy.

According to Laitinen and Laitinen (1999), cash management refers to the management of cash from the time it starts its transit to the firm until it leaves the firm in payments. Failure of the cash management can be defined as an imbalance between cash inflows and outflows. This leads to failure usually defined as the inability of the firm to pay its financial obligations as they mature.

Traditionally, cash management behavior of a firm is described by different models of demand for money, e.g., the quantity theory of demand for money, which assumes that the demand for money does not differ from the demand for any funds in the firm. The most popular and simple approach to the demand for money in this framework is that followed by the inventory cash management approach, where demand for money by a firm is assumed to depend on the volume of transactions

2.2.3 Credit Risk Theories

Credit risk theories, closely related to Basel I and Basel II accords; mostly refer to the financial firm. The proposed Basel II framework consists of three pillars:
Minimum capital requirements, supervisory review of an institution's internal assessment process and capital adequacy and effective use of public disclosure to strengthen market discipline as a complement to supervisory efforts.

Merton(1974) proposed a model for assessing the credit risk of a company by characterizing the company's equity as a call option on its assets. Put-call parity is then used to price the value of a put and this is treated as an analogous representation of the firm's credit risk. The model assumes that a company has a certain amount of zero-coupon debt that will become

due at a future time. The company defaults if the value of its assets is less than the promised debt repayment at time. The equity of the company is a European call option on the assets of the company with maturity and a strike price equal to the face value of the debt. The model can be used to estimate either the risk-neutral probability that the company will default or the credit spread on the debt.

The model takes three company specific inputs: the equity spot price, the equity volatility (which is transformed into asset volatility), and the debt/share. The model also takes two inputs that should be calibrated to market quoted Credit Default Swaps spreads: the default barrier and the volatility of the default barrier. A CDS is a derivative that protects the buyer against default by a particular company. The CDS spread is the amount paid for protection and is a direct market-based measure of the company's credit risk. These inputs are used to specify a diffusion process for the asset value. The entity is deemed to have defaulted when the asset value drops below the barrier. The barrier itself is stochastic, which has the effect of incorporating jump-to-default risk into the model. The Merton model evolves asset value movements through a diffusion process and a fundamental purpose of the default barrier volatility is to provide a jump-like process which can capture short term default probabilities.

2.2.4Balance Sheet Decomposition Measure (BSDM) / Entropy Theory

One way of identifying firms' financial distress could be a careful look at the changes occurring in their balance sheets. Following this procedure, the argument would tag along this guideline: "like any enterprise, firms would tend to maintain a state of equilibrium that ensures sustaining existing firms' structure". If a firm's financial statements reflect significant changes in their balance sheet composition of assets and liabilities over a reasonable period of time, it is more likely that the firms are incapable of maintaining the equilibrium state. Since these changes are likely to become uncontrollable in future, one can foresee financial distress in these firms. This Economic rationale of firms' likely failure is the argument of BSDM or entropy theory (Booth 1983)

According to Kilgour (2011) BSDM is one of the basic theories that focus on balance sheet decomposition. All firms usually try to maintain equilibrium in their financial structure. Significant changes in Balance sheet show that it is incapable to maintain equilibrium and

once these changes become incontrollable in future, one is able to see financial distress in the firms.

2.3 Bankruptcy Prediction Techniques

2.3.1Discriminant Analysis (DA)

DA was introduced in the default prediction literature by Altman (1968). Since then it has been applied to many countries, industries and time periods (Altman (1973), Deakin (1972), Wilcox (1973), Blum (1974), Altman et al. (1977), Altman (1984), Izan (1984),Micha (1984), Theodossiou (1991) and Lennox (1999).

DA produces a given classification for a firm, where the idea is to discriminate between defaults and non-defaults. A scoring function provides a score from observable attributes. Comparing scores to cut-off values separates firms according to its credit risk.

Credit scoring models based on DA is a multivariate technique that analyzes a set of variables (often-firm accounting data and other firm specific data) to maximize the between-group variance while minimizing the within-group variance with respect to the bankrupt/non bankrupt firms.

The pioneers of the empirical approach are Beaver, Altman and Ohlson. Beaver was one of the first researchers to study the prediction of bankruptcy using financial statement data. However, his analysis is very simple in that it is based on studying one financial ratio at a time and on developing a cutoff threshold for each ratio. The approaches by Altman and Ohlson are essentially linear models that classify between healthy/bankrupt firms using financial ratios as inputs.Altman used the following financial ratios as inputs: working capital/total assets, Retained earnings/total assets, Earnings before interest and taxes/total assets, Market capitalization/total debt and sales/total assets.

2.3.2 Linear Probability Models (LPM)

The principle of all statistical models in bankruptcy prediction studies is to fit observable attributes, such as financial variables of firms, to variables to be predicted, such as default or non-default. The simplest technique for doing so is using LPM, or variations of this technique. LPM has received some attention in the literature (Meyer and Pifer (1970), Theodossiou (1991), Laintinen (1999). The approach assumes that the dependent dummy variable measuring the probability of default can be described by a linear combination of independent variables.

LPM assumes a linear relationship between predicted outputs and the input variables. In the context of bankruptcy prediction, this is a major limitation. For instance, the relationship between default frequency and size (measured by assets or sales of firms) is not linear but forms a highly non-linear relationship where most large firms tend to have a small likelihood of default. The problem of assuming linear relationship between the probability and independent variables can be handled by transforming the variables (e.g. taking the logarithm of size) but there is still nothing in this model that guarantees the predicted output in the 0-1 range. Negative probabilities and probabilities above 1 might very well be the result applying such a model (Maddala 1983).

2.3.3 Binary Logit and Probit Models (BLPM)

Binary Logit and Probit Models (BLPM) were developed at the end of the 70's and in the 80's. Examples of Logit models and probit models in bankruptcy prediction are; Martin (1977), Ohlson (1980), Zavgren (1985), Lennox (1999) and Zmijewski (1985) respectively.

BLPM address the problem of transforming the values of the dependent variable to a probability that ranges between 0 and 1. Probability models are with other words based on a non-linear function (often probit and logit functions) between the dependent and independent variables. These models provide the probability in the 0 and 1 range of a firm belonging to the two classes (bankrupt/non-bankrupt) given the characteristic of the firm.

The Probit and Logit function produce a non-linear relationship between the dependent and independent variables and give a predicted probability between 0 and 1. When the function

argument gets very high (and positive), the probability tends towards 1 in both models. When the function arguments gets very low (and negative), the probability tends towards-0.

2.3.4 Recursive Partitioning (RP)

RP (also called the decision tree method) is a non-parametric classification technique. The most referred work using this model is the paper from Frydman in 1985.Other references are Messier and Hansen (1988). The method starts with the sample of firms, their characteristics, the actual group classification, the prior probabilities and the misclassification cost. That is the cost of classifying a bankrupt firm not bankrupt and a not bankrupt firm bankrupt. According to Frydman (1985), it is best to combine RPA with discriminant analysis (DA) since their results, when used separately, are quite similar.

2.3.5 Mathematical Programming Approaches (MPA)

In the 80's and 90's a generic class of mathematical programming approaches took its way to bankruptcy prediction. These types of models are (similar to RP) built to minimize the misclassification error between the bankrupt / non-bankrupt group. Many of these models aim to develop a linear scorecard where all the "good" corporations will have a value above a cutoff score and all the "bad" corporations will have a score below the cutoff score. There will always be misclassification errors as some "good" corporations end up in the "bad" class and some "bad" end up in the "good" class according to the cut-off score. One therefore introduces variables which allow for possible errors, and then seek to find the weights that minimize the sum of the absolute values of these errors.

Lau (1987) corrected for many methodological limitations of the prior dichotomous predictive models by using a five-state response scale to approximate the continuum of corporate financial health instead of the conventional bankrupt and non bankrupt dichotomy. The states included: financial stability, omitting or reducing dividend payments, default of loan interest or principal payments, protection under Chapter X or XI of the Bankruptcy Act, and bankruptcy and liquidation. Lau considered these states of financial distress to be on an ordinal scale. According to Lau, "states one to four are states of increasing severity of

financial distress" (1987, p. 128). However, a limitation of Lau's study is that the statistical technique she used did not incorporate the ordinal structure of her dependent variable into her model; Lau used a nominal based logit model. The sampling technique used by Lau to identify the loan default firms also created additional sample selection bias. Lau used the SEC 10-Ks of firms that had filed for bankruptcy or had C-rated bonds during 1977 to 1980 to identify firms that defaulted on loans during 1976 or 1977. Thus, firms that recover from financial distress after experiencing a loan default were excluded from the original (1976) and holdout (1977) samples

Ward (1990) extended Lau's multi-state methodology by using ordinal logistic regression to generate the prediction models for a four-state ordinal response scale. This study modeled the severity of a firm's financial distress by using four ordinal states of financial distress as the dependent (response) variable and by employing ordinal logistic regression. The study did not include firms that declare bankruptcy and then liquidate as a fifth state of financial distress because the authors identified only four liquidation firms for the developmental sample.

2.3.6 Expert Systems

Historically, bankers have relied on expert systems to assess credit quality. These are based on, the Character (reputation), the Capital (leverage), the Capacity (earnings volatility), the Collateral, and the Cycle (macroeconomic) conditions.

Evaluation of these variables is performed by human experts, who may be inconsistent and subjective in their assessments. Moreover, traditional expert systems specify no weighting scheme that would order these systems in terms of their relative importance in forecasting the probability of default. Thus, artificial neural networks have been introduced to evaluate expert systems more objectively and consistently.

2.3.7 Neural Networks (NNs)

Research studies on using NNs for bankruptcy prediction started in 1990, and are still active now. The neural network is "learning" using historical repayment experience and default data. Structural matches are found that coincide with defaulting firms and then used to determine a weighting scheme to forecast the probability of default. Each time that the neural network evaluates the credit risk of a new loan opportunity, it updates its weighting scheme so that it continually "learns" from experience. Thus, neural networks are flexible, adaptable systems that can incorporate changing conditions into the decision making process.

According to O' Leary (1998) Neural Networks are an effective tool for supporting managerial decision making. Neural networks formulations used for bankruptcy have generated results that are at least as good as those generated by discriminant analysis, logit, probit and ID3. However, in some settings, e.g. over time, other approaches seemed to perform quite well relative to neural networks.

2.4 Review of Empirical Studies

In terms of analyzing the risks involved in lending, written records from Sumer circa 3000 B.C. (Falkenstein, 2000) exist and accounting ratios have been examined since at least the 19th century (Dev 1974). Beaver (1967) wrote the landmark paper and all of the subsequent research stems from his findings. He found that several ratios differed significantly between failed and viable firms. Beaver recorded the differences of ratios between failed firms and viable firms and observed that as bankruptcy neared the ratios of the failed firm showed substantial deterioration, while the performance of the average none failed firm was relatively constant. He viewed the firm as a reservoir of liquid assets, which are supplied by inflows and drained by outflows. Insolvency will set in if the reservoir is exhausted.

in the initial 1968 study, Altman used a cutoff Z-score of 2.675. If the Z-score was below the cutoff line, the firm was classified as bankrupt (i.e. insolvent or headed that way), if above, as non-bankrupt. This allowed him to correctly classify 94% of the bankrupt firms and 97% of

the non-bankrupt firms one year prior to the filing of bankruptcy. An attempt to predict bankruptcy two years in advance yielded lower, but still impressive, accuracies of 72% and 94% respectively.

A subsequent study by Deakin (1972) utilized the same 14 variables that Beaver analyzed, but he applied them within a series of multivariate discriminant models. He re-applied the test that Beaver used for a sample of 32 failed and 32 matched non-failed firms. The results were almost the same on both the best predicting ratio and the percentages of successful predictions. He then applied MDA for the 14 independent variables and used the previous 32 failed firms and 32 random selected non-failed firms. He kept all 14 ratios in the discriminant functions and that he used five different models, one for each year before bankruptcy, up to five years. A different method of classification was followed instead of using the cut-off point of Altman's Z-score. It was based on "the multivariate extension of the univariate Z-test". The percentages of successful predictions were 97%, 95.5%, 95.5%, 79.5% and 83% for the 1st, 2nd, 3rd, 4th and 5th year before bankruptcy while the corresponding percentages for the hold-out sample were 78%, 94%, 88%, 77% and 85%. Remarkable was the low percentage for the 1st year of the hold-out sample. As a result, Dakin's model can be accepted for the 1st, 2nd and 3rd year before bankruptcy as quite accurate.

Libby (1975) used a subset of Deakin's (1972) 14-variable set to determine whether quantitive models could outperform judgment from loan officers. He asked 16 loan officers from small banks and 27 loan officers from large banks to judge which 30 of 60 firms would go bankrupt within three years of the financial statements with which they were presented. The loan officers requested five financial ratios on which to base their judgments. While they were correct 74% of the time, this was inferior to such simple alternatives as the liabilities/assets ratio.The loan officers performed even worse when Casey (1980), refining Libby's approach, did not indicate the ratio of failure to non failure. This certainly speaks to the fact that models from the 70's already outperformed simple human ratio analysis.

The Springate model developed by Gordon Springate (1978) follows the procedure used by Altman. Springate selected four out of 19 popular financial ratios using step wise multiple discriminate analysis. The selected ratios distinguished between sound business and those that actually failed. The springate model was used to test 40 companies and achieved an accuracy rate of 92.5%. Botheras (2000) tested the Springate Model on 50 companies with an average asset size of $2.5 million and found an 88.0% accuracy rate. The model was also used by Sands (2001) to test 24 companies with an average asset size of $63.4 million and found an accuracy rate of 83.3%.

Ohlson in 1980 was one of the first researchers who applied the logit analysis (logistic regression, LR). His first studies logically and systematically develop probabilistic estimates of failure. He justified his choice by pointing out some problems regarding the use of MDA in failure prediction: the need of equality of the variance-covariance matrices of the predictors of the two groups (failed and non failed firms), the "little intuitive interpretation" of the Z-score and the arbitrary nature of the matching procedure of the sample (regarding the criteria of the matching).The LR approach allows the use of disproportional samples, gives the probability of default of the firm, and the coefficients of the variables suggest the importance of each variable in the derived probabilities of default. Ohlson used a sample of 105 failed and 2,058 non-failed firms during the period 1970-1976. All firms were industrial and their equity was traded on a stock exchange or over-the counter market. Three years' data before the bankruptcy was obtained for every failed firm while only one year's data was obtained randomly for the non-failed firms. The three models that Ohlson developed (bankruptcy within one year, within two years and within one or two years) consisted of nine variables, including financial and performance ratios and binary (0-1) variables. The results of these models were 96.12%, 95.55% and 92.84% correct predictions. When Ohlson used the empirical mean probability of failure and the cutoff point that minimized the sum of errors, the Type I and Type II errors for the first model were 12.4% and 17.4% respectively. A number of significant differences (lead time, time period of sample, variables, analysis) between Ohlson's and previous models were discussed and as a result direct comparison of their results could not be applied. With this study, Ohlson described a model as popular as

Altman's and set another benchmark in failure prediction. Other researchers that used logit models in their studies were Santomero and Vinso (1977), Zavgren (1983, 1985), Piatt & Piatt (1990), Altman and Sabato (2006) and many others.

Fulmer (1984) used step-wise multiple discriminate analysis to evaluate 40 financial ratios applied to a sample of 60 companies -30 failed and 30 successful. The average asset size of these firms was $455,000. Fulmer reported a 98% accuracy rate in classifying the test companies one year prior to failure and an 81% accuracy rate more than one year prior to bankruptcy.

Zmijewski (1984): used profit analysis for a sample consisting of 40 companies facing financial crisis and 80 companies free of any financial distress, and was able to predict with an accuracy rate of 78% one year before bankruptcy. Crosbie (2002) uses half the value of long-term debt plus current liabilities as a proxy for the 1-year default point, a formulation based on empirical analysis. Thus, in his formulation, the default point is not total liabilities as in the Merton model, but current liabilities plus half long-term liabilities. The adjustments suggest that the Merton model is more of a guideline than a rule for estimating a quantitative model. The final transformation from standard normal probabilities into empirical probabilities implies that even the strongest proponents of the approach do not take the Merton model literally.

Blums (2003) carried out research on Bankruptcy Prediction Model for Middle Market Public Firms. The researcher constructed a conceptual model to measure three key indicators of a company's health (liquidity, profitability, wealth) basing it on the popular notional theory of financial indicators, the Gambler's Ruin and Merton models. Liquidity indicates how a firm is able to meet its current liabilities. Profitability indicates whether the reservoir of resources is being drained or supplemented, and wealth indicates the current magnitude of the reservoir. Blums (2003) research results indicated that the three variables that have the biggest effect on probability of bankruptcy are in order of importance: CL/TA, NI/TA and TE/TA. A one percent increase of CL/TA increases the probability of bankruptcy by 0.02%. Since CL/TA

partially proxies for the measurement of liquidity, the results are consistent with reality as the most common reason for bankruptcy is short-term liquidity problems (Falkenstein 2000). The next factor that affects probability of bankruptcy most is NI/TA, which makes sense given that higher profitability should unambiguously lead to less risk of bankruptcy. A percentage increase in TE/TA decreases probability of bankruptcy by 0.006%.

Papadakis (2008) acknowledge the need for more accurate credit risk assessment and its importance to all organizational constituents. His work focuses on the financial/accounting aspects of the corporate bankruptcy prediction problem. More specifically, two empirical models, based on multivariate discriminant analysis (MDA) and logistic regression (LR), were developed and validated. The models aimed to discriminate between solvent and insolvent companies based on historical records of Greek private firms, belonging to the broader Industrial sector, over the years 2003 to 2006. Papadakis (2008) research involved thorough analysis of two statistical models that were developed based on the MDA and the LR techniques. Thirty financial ratios were calculated in total and were used in the univariate analysis. In his findings, the model development phase highlighted the superiority of the LR technique compared to the MDA one. The LR-based model demonstrated a better performance in classifying default and non-default for all the three statistical samples: training, validation, and total population. The MDA-based model yielded a total classification rate of 73.6% and 70.83% for the training and the validation samples respectively, while the LR-based model produced a total classification rate of 77.9% and 72.9% for the same above-mentioned statistical datasets. He suggested the following elements that can be included into the modeling methodology; Dynamic financial ratios such as: sales growth, change in the turnover, Cash flow financial information, derogatory and additional commercial information and macroeconomic variables.

The Merton and Gambler's Ruin models boil down to a univariate axiom: if either market equity goes to zero or if cash flow stays negative, the firm will fail. Under both models, prediction of bankruptcy is based primarily on a targeted ratio. For the Merton model, this ratio uses primarily equity information, and for the Gambler's Ruin model, cash flow

information is used. The implementation of the Merton model also makes some useful adjustments to (Falkenstein 2000) original formulation. The first adjustment addresses the trigger point of default, since the staggered debt maturities that companies actually have imply that the simple Merton formulation is ambiguous in practice. A firm can remain current on its debt even though technically insolvent (total liabilities are greater than total assets). It can forestall and, with skill, avoid bankruptcy, even though the liability holders would like to liquidate.

According to Semra and Ayhan (2008) each ratio (variable) has a significant effect on the financial positions of enterprises with differing amounts and that along with the liquidity ratios in the first place, profitability ratios also play an important role in the financial positions of enterprises. According to Akbar and Seyed (2012) Logit model with variables of net profit to total assets ratio, the ratio of retained earnings to total assets and debt ratio have more power to predict corporate bankruptcy in Iran.

2.5 Conclusion

According to Hol (2002) all of the studies use different time periods, industries and countries. In general it can be noted that more recent studies seem to be marginally more accurate mostly because of larger sample sizes and better information availability.The general conclusion from previous research is that on the one hand each study by itself seems to provide a reasonable degree of differentiation between failed and non-failed companies, while on the other hand the various studies hardly show any agreement on what factors are important for failure prediction. More than 30 years of research have failed to produce agreement on which variables are good predictors and why. And in the absence of a thorough theory that provides testable hypotheses, each empirical result has to be evaluated on its own merits.None of the empirical studies reviewed however does relate the bankruptcy prediction model with credit default risk.

This, however, has left bankruptcy prediction with very little guidance of what explanatory variables to use. In accordance with the notional theory, Beaver (1967) tested the most

popular ratios as used by lending practitioners. Altman (1968) for his Z-score model selected variables to include in a way that is the most popular even in today's research; by testing categories of ratios such as liquidity, profitability, etc., and then including the variables that have the highest explanatory power.

Wilcox (1971) Blum (1974), Hol (2002) and others criticized the Z-score model for "searching" for the right variables to establish the model. They also argued that in the absence of a strong conceptual model scarce bankruptcy information was statistically "used up" by searching procedures. Wilcox and Blum in their papers explicitly postulated a general framework for variable selection based upon the Gambler's Ruin model. The common factors underlying the cash flow framework are liquidity, profitability, and variability in essence did not contradict Altman. Blum selected twelve variables to measure these cash flow parameters. Contrary to his criticism of the Z-score, for future research he proposed that alternative ratios should be considered. The debate until this date has latently stalled at this point with most researchers searching among theoretically appropriate variables.

CHAPTER THREE:

RESEARCH METHODOLOGY

3.1Introduction

This chapter sets out various stages and phases that are followed in completing the study. It involves a blueprint for the collection, measurement and analysis of data. Specifically the following subsections; research design, target population, data collection instruments, data collection procedures and finally data analysis.

3.2 Research Design

According to Green and Tull (1978) "A research design is the specification of methods and procedures for acquiring the information needed. It is the over-all operational pattern or framework of the project that stipulates what information is to be collected from which source and by what procedures." The study will adopt a descriptive cross-sectional research design.

The main goal of descriptive research is to describe the data and characteristics about what is being studied. It identifies patterns or trends in a situation, but not the causal linkages among its different elements. Cross-sectional studies involve observation of all of a population, or a representative subset, at one specific point in time and require a researcher to take a "snapshot" of a population at a single point in time and analyze it carefully. Descriptive studies cross-sectional study help in generating hypothesis on which further research may be based.

3.3Target Population and Sample Size

Population of study is all companies listed in Nairobi Securities Exchange from 2003 to 2010. Failed companies are considered those that have either been suspended or delisted from the NSE and excluded companies that delisted voluntarily. They were only 10 firms during this period . Non-failed companies were all entities listed in the NSE since the year 2003-2010. To fall under this study's category of non-failed firms, they must not have been suspended or delisted for the period under focus.

The companies were chosen systematically from Agricultural, Commercial and Services, Telecommunications, Automobiles and Accessories and Manufacturing and Allied. Banking, Insurance and investment sectors are excluded from the sample population.

3.4 Data Collection

The data composed of full set of financial statements, which were collected from NSE and company websites. Failed firms data were collected for one year prior to bankruptcy. Data was collected for non failed firms matching the industry and company size as measured using total assets value of the failed firms during the same period. Financial information extracted from the two groups is: Working Capital (Current Assets-Current Liabilities), Total Assets, Retained Earnings, Earnings before Interest and Tax (EBIT), Book Equity Value, Total Liabilities, Sales Revenue, Depreciation and other non cash adjustments in income statement, Tax , changes in working capital movements, Capital expenditure and Debt Repayment

3.5 Data Analysis

Data analysis is based on Altman Z score Model and DSCR.

The Z-score is a linear combination of four or five common business ratios, weighted by coefficients. The coefficients are estimated by identifying a set of firms which had been declared bankrupt. These are matched by sample of firms which had survived, matching being done by industry and asset size. Five measures were objectively weighted and summed up to arrive at an overall score that then becomes the basis for classification of firms into failed or non-failed.

The Z-score formula: $Z' = 0.717X_1 + 0.847X_2 + 3.107X_3 + 0.420X_4 + 0.998X_5$

X_1 = (Current Assets-Current Liabilities) / Total Assets

X_2 = Retained Earnings / Total Assets

X_3 = Earnings before Interest and Taxes / Total Assets

X_4 = Book Value of Equity / Total Liabilities

X_5 = Sales/ Total Assets

Zones of Discrimination:

$Z' > 2.9$ -"Safe" Zone

$1.23 < Z' < 2.9$ -"Grey" Zone

$Z' < 1.23$ -"Distress" Zone

DCSR calculation is calculated as:

DCSR= (EBIT +Dep +/- NCI +/-Tax +/-WC – CAPEX)/Debt Repayment

Where,

EBIT = Earnings before interest and tax;

Dep = Depreciation

NCI = other non-cash items

Tax = tax paid or plus tax credit

WC = changes in working capital movements

CAPEX = capital expenditure.

Debt Repayment = Principal total debt repayments plus interest paid.

The researcher compiled the financial information collected during data collection. The Z score calculated was then compared with DSCR calculated.

CHAPTER FOUR:

DATA ANALYSIS AND INTERPRETATION

4.1 Introduction

This chapter discusses the interpretation and presentation of the findings. The objective of this study was to predict credit default risk for companies listed in NSE using Altman's revised model and. These data were collected from the Nairobi Security Exchange for a period of 8 years starting from year 2003 to 2010.

4.2 Data Analysis and Interpretation

4.2.1 Analysis of Failed Firms

The researcher analyzed the followings failed firms; EA packaging, Kenya national mills, Dunlop Kenya, Baumann and co, Reagent undervalued assets Ltd, Pearl drycleaners, Hutchings Biemer, Theta group, Lonhro motors and Kenya Orchads.

EA packaging

Table 4.1 : East Africa Packaging

	Amount in millions
Working capital	23.998
Total assets	54.287
A (working capital/total assets)	0.4420
Retained earnings	9.425
B (retained earnings/ total assets)	0.1736
Earnings before interest and taxes	11.256
C (earnings before interest and taxes/ total assets)	0.2073
Book value of equity	8.453
Total liabilities	28.098
D (book value of equity/ total liabilities)	0.3008
Sales	34.776
E (sales / total assets)	0.6405

$Z' = 0.717A + 0.847B + 3.107C + 0.420D + 0.998E$

$Z = 0.717\ (0.442) + 0.847\ (0.1736) + 3.107\ (0.2073) + 0.420\ (0.3008) + 0.998\ (0.6405)$

$Z = 0.316914 + 0.1470392 + 0.6440811 + 0.126336 + 0.639219$

$Z = 1.8669421$

DCSR = 0.78

From table 4.1 this research study found out that East africa packaging had a Z score of 1.867. From these results East Africa Packaging was in a grey zone. East africa packaging was classified by Nairobi stock exchange as one of the failed firms. This shows that the Z score bankruptcy model was not applicable in the case of East Africa packaging. From the finding on the debt service coverage ratio, the study found that DSCR was 0.78 an indication that the company's net operating income is enough to cover only 78% of its annual debt payments. This shows that the company was more likely to default on credit.

Kenya National Mills

Table 4.2: Kenya National Mills

	Amount in millions
Working capital	25.598
Total assets	81.287
A (working capital/total assets)	0.3149
Retained earnings	8.958
B (retained earnings/ total assets)	0.0351
Earnings before interest and taxes	12.642
C (earnings before interest and taxes/ total assets)	0.1555
Book value of equity	18.908
Total liabilities	23.678
D (book value of equity/ total liabilities)	0.7985
Sales	46.239
E (sales / total assets)	0.5688

$Z' = 0.717A + 0.847B + 3.107C + 0.420D + 0.998E$

$Z = 0.717\ (0.3149) + 0.847\ (0.0351) + 3.107\ (0.1555) + 0.420\ (0.7985) + 0.998\ (0.5688)$

$Z = 0.2257833 + 0.0297297 + 0.4831385 + 0.33537 + 0.5676624$

$Z = 1.1416839$

DCSR = 0.61

From table 4.2 this Research study found out that Kenya national Mills had a Z score of 1.142. A Z score less 1.23 and indication that Kenya National Mills was in the distress zone in the Z score bankruptcy model. This shows that the company had failed, this clearly shows that Z score bankruptcy model was applicable in the case Kenya National Mills. From the finding on the debt service coverage ratio, the study found that DSCR was 0.61 an indication that the company's net operating income is enough to cover only 61% of its annual debt payments. This shows that the company was more likely to default on credit.

Dunlop Kenya

Table 4.3: Dunlop Kenya

	Amount in millions
Working capital	8.274
Total assets	14.267
A (working capital/total assets)	0.5799
Retained earnings	5.738
B (retained earnings/ total assets)	0.4022
Earnings before interest and taxes	7.473
C (earnings before interest and taxes/ total assets)	0.524
Book value of equity	5.369
Total liabilities	10.092
D (book value of equity/ total liabilities)	0.5320
Sales	15.234
E (sales / total assets)	1.0678

$Z' = 0.717A + 0.847B + 3.107C + 0.420D + 0.998E$

$Z = 0.717\ (0.5799) + 0.847\ (0.4022) + 3.107\ (0.524) + 0.420\ (0.5320) + 0.998\ (1.0678)$

$Z = 0.4157883 + 0.3406634 + 1.628068 + 0.22344 + 1.0656644$

$Z = 3.6736197$

$DCSR = 0.91$

Dunlop company is classified as one of the failed firms. From the calculations done above the company was found to have a Z score of 3.674. According to the Z score bankruptcy model, the Zones of Discrimination are as follows ; $Z' > 2.9$ -"Safe" Zone, $1.23 < Z' < 2.9$ -"Grey"

Zone and Z' < 1.23 -"Distress" Zone. This shows that Dunlop Company was in a safe zone. To the contrary Dunlop Company had failed. From the finding on the debt service coverage ratio, the study found that DSCR was 0.91 an indication that the company's net operating income is enough to cover only 91% of its annual debt payments. This shows that the company was more likely to default on credit.

Baumann & Company

Table 4.4: Baumann & Company

	Amount in millions
Working capital	21.453
Total assets	34.456
A (working capital/total assets)	0.6226
Retained earnings	9.265
B (retained earnings/ total assets)	0.2689
Earnings before interest and taxes	11.238
C (earnings before interest and taxes/ total assets)	0.3262
Book value of equity	9.276
Total liabilities	31.34
D (book value of equity/ total liabilities)	0.296
Sales	31.938
E (sales / total assets)	0.9269

$Z' = 0.717A + 0.847B + 3.107C + 0.420D + 0.998E$

$Z = 0.717\ (0.6226) + 0.847\ (0.2689) + 3.107\ (0.3262) + 0.420\ (0.296) + 0.998\ (0.9269)$

$Z = 0.4464 + 0.2278 + 0.0135 + 0.02432 + 0.925$

$Z = 1.13702$

DCSR = 0.76

The Z score value of Baumann and company limited was found to be 1.13702. From Z score bankruptcy model, the Zones of Discrimination are as follows ; Z' > 2.9 -"Safe" Zone, 1.23 < Z' < 2. 9 -"Grey" Zone and Z' < 1.23 -"Distress" Zone. This shows that Baumann and company limited was counted as a company in distress zone, an indication that Z Score bankruptcy model was applicable in this case . From the finding on the debt service coverage

ratio, the study found that DSCR was 0.76an indication that the company's net operating income is enough to cover only 76% of its annual debt payments. This shows that the company was more likely to default on credit.

Reagent Undervalued Assets Ltd

Table 4.5: Reagent undervalued assets Ltd

	Amount in millions
Working capital	18.298
Total assets	56.345
A (working capital/total assets)	0.3247
Retained earnings	8.298
B (retained earnings/ total assets)	0.147
Earnings before interest and taxes	12.34
C (earnings before interest and taxes/ total assets)	0.114
Book value of equity	6.478
Total liabilities	46.356
D (book value of equity/ total liabilities)	0.1397
Sales	11.276
E (sales / total assets)	0.2001

$Z' = 0.717A + 0.847B + 3.107C + 0.420D + 0.998E$

$Z = 0.717\ (0.3247) + 0.847\ (0.147) + 3.07\ (0.114) + 0.420\ (0.1397) + 0.998\ (0.2001)$

$Z = 0.2328099 + 0.124509 + 0.34998 + 0.058674 + 0.1996998$

$Z = 0.9656727$

$DCSR = 0.91$

This research study found that the Z score value for reagent undervalued assets limited was 0.956727. From the Z score bankruptcy model an zone of discrimination below 1.23 is considered as a distress zone. Considering the fact that reagent undervalued assets limited was one of the failed companies, Z score model is there proven applicable in this case. From the finding on the debt service coverage ratio, the study found that DSCR was 0.91 an indication that the company's net operating income is enough to cover only 91% of its annual debt payments. This shows that the company was more likely to default on credit.

Pearl Drycleaners

Table 4.6: Pearl drycleaners

	Amount in millions
Working capital	10.243
Total assets	30.231
A (working capital/total assets)	0.3388
Retained earnings	5.453
'B (retained earnings/ total assets)	0.1804
Earnings before interest and taxes	6.756
C (earnings before interest and taxes/ total assets)	0.223
Book value of equity	12.678
Total liabilities	28.293
D (book value of equity/ total liabilities)	0.4481
Sales	16.356
E (sales / total assets)	0.5410

$Z' = 0.717A + 0.847B + 3.107C + 0.420D + 0.998E$

$Z = 0.717 (0.3388) + 0.847 (0.184) + 3.07 (0.223) +0.420 (0.4481) + 0.998 (0.5410)$

$Z = 0.2429196+ 0.055848+ 0.18461+ 0.188202+ 0.539918$

$Z= 1.2114$

$DCSR = 0.86$

Pearl dry cleaners was one of the companies that were considered as failed firms by Nairobi stock exchange. From the result of the z score bankruptcy model where z score was 1.2114 Pearl dry cleaners is considered as a failed firm. This is an indication Z Score bankruptcy model was applicable in this case. From the finding on the debt service coverage ratio, the study found that DSCR was 0.86 an indication that the company's net operating income is enough to cover only 86% of its annual debt payments. This shows that the company was more likely to default on credit.

Hutchings Biemer

Table 4.7: Hutchings Biemer

	Amount in millions
Working capital	18.36
Total assets	28.59
A (working capital/total assets)	0.6422
Retained earnings	7.831
B (retained earnings/ total assets)	0.2742
Earnings before interest and taxes	8.672
C (earnings before interest and taxes/ total assets)	0.3033
Book value of equity	6.453
Total liabilities	26.754
D (book value of equity/ total liabilities)	0.2412
Sales	11.254
E (sales / total assets)	0.3936

$Z' = 0.717A + 0.847B + 3.107C + 0.420D + 0.998E$

$Z = 0.717\ (0.6422) + 0.847\ (0.2742) + 3.07\ (0.3033) + 0.420\ (0.2412) + 0.998\ (0.3936)$

$Z = 0.4604574 + 0.2322474 + 0.931131 + 0.101304 + 0.3928128$

$Z = 2.1179526$

DCSR = 0.81

From the results as shown by table 4.7 Hutchings biemer had a Z score of 2.1179. According to the Z score bankruptcy model a Z score of 2.9 and 1.23 was considered to be in grey zone. Hutchings biemer was one of the failed companies in Nairobi stock exchange. From the results we expect the company Z score to be below 1.23, an indication that the Z score bankruptcy model was not applicable in this case . From the finding on the debt service coverage ratio, the study found that DSCR was 0.81 an indication that the company's net operating income is enough to cover only 81% of its annual debt payments. This shows that the company was more likely to default on credit.

Theta Group

Table 4.8: Theta group

	Amount in millions
Working capital	65.365
Total assets	87.247
A (working capital/total assets)	0.7492
Retained earnings	46.631
B (retained earnings/ total assets)	0.5345
Earnings before interest and taxes	67.345
C (earnings before interest and taxes/ total assets)	0.7719
Book value of equity	23.479
Total liabilities	67.324
D (book value of equity/ total liabilities)	0.2691
Sales	78.639
E (sales / total assets)	0.9013

$Z' = 0.717A + 0.847B + 3.107C + 0.420D + 0.998E$

$Z = 0.717\ (0.7492) + 0.847\ (0.5345) + 3.107\ (0.7719) + 0.420\ (0.2691) + 0.998\ (0.9013)$

$Z = 0.576884 + 0.4527215 + 2.3983 + 0.1130 + 0.899$

$Z = 4.4399055$

DCSR = 0.69

This research study found that the Z scores valus for Theta group was 4.4399. From the Z score bankruptcy model an zone of discrimination above 2.9 was considered as a safe zone. Considering the fact that reagent undervalued assets limited was one of the failed companies, Z score model is there proven inapplicable in this case. From the finding on the debt service coverage ratio, the study found that DSCR was 0.69 an indication that the company's net operating income is enough to cover only 69% of its annual debt payments. This shows that the company was more likely to default on credit.

Lonhro Motors

Table 4.9:Lonhro Motors

	Amount in millions
Working capital	11.72
Total assets	23.78
A (working capital/total assets)	0.493
Retained earnings	9.87
B (retained earnings/ total assets)	0.415
Earnings before interest and taxes	12.98
C (earnings before interest and taxes/ total assets)	0.546
Book value of equity	11.65
Total liabilities	22.76
D (book value of equity/ total liabilities)	0.512
Sales	2.67
E (sales / total assets)	0.1123

$Z' = 0.717A + 0.847B + 3.107C + 0.420D + 0.998E$

$Z = 0.717\ (0.493) + 0.847\ (0.415) + 3.07\ (0.546) + 0.420\ (0.512) + 0.998\ (0.1123)$

$Z = 0.353481 + 0.351505 + 0.67622 + 0.21504 + 0.1120754$

$Z = 1.8204$

DCSR = 0.74

Lonhro Motors was one of the companies that were considered as failed firms by Nairobi stock exchange. From the result of the z score bankruptcy model, where z score was 1.8204 Lonhro motors was considered as a failed firm. From the finding on the debt service coverage ratio, the study found that DSCR was 0.74 an indication that the company's net operating income is enough to cover only 74% of its annual debt payments. This shows that the company was more likely to default on credit.

Kenya Orchards

Table 4.10: Kenya orchards

	Amount in millions
Working capital	12.243
Total assets	56.530
A (working capital/total assets)	0.218
Retained earnings	5.342
B (retained earnings/ total assets)	0.0945
Earnings before interest and taxes	8.123
C (earnings before interest and taxes/ total assets)	0.144
Book value of equity	11.789
Total liabilities	27.63
D (book value of equity/ total liabilities)	0.4267
Sales	5.67
E (sales / total assets)	0.1003

$Z' = 0.717A + 0.847B + 3.107C + 0.420D + 0.998E$

$Z = 0.717\ (0.218) + 0.847\ (0.0945) + 3.07\ (0.144) + 0.420\ (0.4267) + 0.998\ (0.1003)$

$Z = 0.156306 + 0.0800415 + 0.44208 + 0.179214 + 0.1000994$

$Z = 0.95771$

DCSR = 0.68

This research study found that the Z scores values for Kenya orchads was 0.9577. From the Z score bankruptcy model an zone of discrimination below 1.23 is considered as a distress zone. Considering the fact that Kenya orchads was one of the failed companies, Z score model is there proven applicable in this case. From the finding on the debt service coverage ratio, the study found that DSCR was 0.68 an indication that the company's net operating income is enough to cover only 68% of its annual debt payments. This shows that the company was more likely to default on credit.

4.2.2 Non failed firms

The researcher analyzed the following firms which had not failed; Kakuzi Ltd, Rea Vipingo plantations, Sasini tea Ltd, Kenya airways, Marshalls East Africa, Nation media group, Scan group Ltd, Standard group, BOC group, British American tobacco and Carbacid investment.

Kakuzi ltd

Table 4.11: Kakuzi ltd

	Amount in millions
Working capital	120
Total assets	844
A (working capital/total assets)	0.142
Retained earnings	28
B (retained earnings/ total assets)	0.266
Earnings before interest and taxes	123
C (earnings before interest and taxes/ total assets)	0.146
Book value of equity	55
Total liabilities	706
D (book value of equity/ total liabilities)	0.078
Sales	243
E (sales / total assets)	0.288

Using the Z' Score Bankruptcy Model below the researcher calculated the Z value.

$Z' = 0.717A + 0.847B + 3.107C + 0.420D + 0.998E$

$Z = 0.717\ (0.142) + 0.847\ (0.33) + 3.07\ (0.147) + 0.420\ (0.078) + 0.998\ (0.288)$

$Z = 0.101814 + 0.27951 + 0.45129 + 0.3276 + 0.287424$

$Z = 1.463228$

DCSR = 1.38

According to the Z score bankruptcy model, the Zones of Discrimination are as follows ; $Z' > 2.9$ -"Safe" Zone, $1.23 < Z' < 2.9$ -"Grey" Zone and $Z' < 1.23$ -"Distress" Zone. Form the findings Kakuzi limited had a Z score value of 1.4632. This indicates that the company was in grey zone. The study found that DSCR was 1.38 an indication that the company's net operating income is enough to cover only 138% of its annual debt payments.

Rea Vipingo Plantations

Table 4.12: Rea Vipingo Plantations

	Amount in millions
Working capital	96
Total assets	105
A (working capital/total assets)	0.923
Retained earnings	20
B (retained earnings/ total assets)	0.190
Earnings before interest and taxes	30
C (earnings before interest and taxes/ total assets)	0.286
Book value of equity	32
Total liabilities	296
D (book value of equity/ total liabilities)	0.108
Sales	80
E (sales / total assets)	0.762

$Z' = 0.717A + 0.847B + 3.107C + 0.420D + 0.998E$

$Z = 0.717\ (0.923) + 0.847\ (0.266) + 3.07\ (0.286) + 0.420\ (0.108) + 0.998\ (0.762)$

$Z = 0.661791 + 0.225302 + 0.87802 + 0.4536 + 0.760476$

$Z = 2.979189$

DCSR = 1.93

This study revealed t for Rea Vipingo Plantation was in a safe zone in relation to Z score bankruptcy model. This was shown by a value of 2.979. According to the Z score bankruptcy model, the Zones of Discrimination are as follows ; $Z' > 2.9$ -"Safe" Zone, $1.23 < Z' < 2.9$ - "Grey" Zone and $Z' < 1.23$ -"Distress" Zone. The study found that DSCR was 1.93 an indication that the company's net operating income is enough to cover only 193% of its annual debt payments.

Sasini Tea Ltd

Table 4.13: Sasini Tea Ltd

	Amount in millions
Working capital	144
Total assets	157
A (working capital/total assets)	0.917
Retained earnings	37
B (retained earnings/ total assets)	0.236
Earnings before interest and taxes	30
C (earnings before interest and taxes/ total assets)	0.286
Book value of equity	32
Total liabilities	296
D (book value of equity/ total liabilities)	0.108
Sales	74
E (sales / total assets)	0.417

$Z' = 0.717A + 0.847B + 3.107C + 0.420D + 0.998E$

$Z = 0.717\ (0.917) + 0.847\ (0.236) + 3.07\ (0.286) + 0.420\ (0.108) + 0.998\ (0.417)$

$Z = 0.657489 + 0.199892 + 0.87802 + 0.04536 + 0.416166$

$Z = 2.197421$

DCSR = 1.76

This study revealed that Sasini tea limited was in a grey zone in relation to z score bankruptcy model. This was shown by a value of 2.197. From the Z score bankruptcy model a Z score between 1.23 and 2. 9 is considered as Grey Zone. The study found that DSCR was 1.76 an indication that the company's net operating income is enough to cover only 176% of its annual debt payments.

Kenya Airways

Table 4.14: Kenya airways

	Amount in millions
Working capital	5557
Total assets	73263
A (working capital/total assets)	0.0759
Retained earnings	14876

B (retained earnings/ total assets)	0.2030
Earnings before interest and taxes	20453
C (earnings before interest and taxes/ total assets)	0.280
Book value of equity	19973
Total liabilities	20921
D (book value of equity/ total liabilities)	0.955
Sales	32213
E (sales / total assets)	0.440

$Z' = 0.717A + 0.847B + 3.107C + 0.420D + 0.998E$

$Z = 0.717\ (0.759) + 0.847\ (0.203) + 3.07\ (0.28) + 0.420\ (0.955) + 0.998\ (0.440)$

$Z = 0.544203 + 0.171941 + 0.8596 + 0.4536 + 0.43912$

$Z = 2.468464$

DCSR = 1.09

The results in table 4.14 shows data collected from the Kenya Airways Financial statements. The findings and calculations show that the Z scores value for the company in 2008 was 2.4685. From Z score bankruptcy model a company with a Z score value of between 2.9 and 1.23 is considered to be grey zone. The study found that DSCR was 1.09 an indication that the company's net operating income is enough to cover only 109% of its annual debt payments.

Marshalls East Africa

Table 4.15: Marshalls East Africa

	Amount in millions
Working capital	17657
Total assets	18261
A (working capital/total assets)	0.967
Retained earnings	633
B (retained earnings/ total assets)	0.035
Earnings before interest and taxes	2004
C (earnings before interest and taxes/ total assets)	0.110
Book value of equity	12908

Total liabilities	16450
D (book value of equity/ total liabilities)	0.785
Sales	2004
E (sales / total assets)	0.110

$Z' = 0.717A + 0.847B + 3.107C + 0.420D + 0.998E$

$Z = 0.717\ (0.97) + 0.847\ (0.035) + 3.107\ (0.11) + 0.420\ (0.785) + 0.998\ (0.11)$

$Z = 0.69549 + 0.171941 + 0.029645 + 0.157 + 0.10978$

$Z = 1.163856$

DCSR =1.41

From the results in table 4.15, Marshals East Africa had a Z score value of 1.1638 which According to the Z score bankruptcy model is within the distress zone , yet the company wasnot in the failed catetogory and indication that the Z score bankruptcy model was not applicable in this case. The study found that DSCR was 1.41 an indication that the company's net operating income is enough to cover only 141% of its annual debt payments.

Nation Media Group

Table 4.16: Nation media group

	Amount in millions
Working capital	333
Total assets	538
A (working capital/total assets)	0.619
Retained earnings	3
B (retained earnings/ total assets)	0.0056
Earnings before interest and taxes	41
C (earnings before interest and taxes/ total assets)	0.076
Book value of equity	209
Total liabilities	216
D (book value of equity/ total liabilities)	0.967
Sales	332
E (sales / total assets)	0.617

$Z' = 0.717A + 0.847B + 3.107C + 0.420D + 0.998E$

$Z = 0.717\ (0.619) + 0.847\ (0.56) + 3.07\ (0.076) + 0.420\ (0.967) + 0.998\ (0.617)$

Z = 0.443823+ 0.47432+ 0.23332+ 0.40614+ 0.615766

Z= 2.773369

DCSR = 1.89

In this research study nation media group is considered as on of the non failed firms in the Nairobi stock exchange. The z score for the company was 2.7734. This indicates that nation media group was in the grey zone. The study found that DSCR was 1.89 an indication that the company's net operating income is enough to cover only 189% of its annual debt payments.

Scan Group Ltd

Table 4.17: Scan Group Ltd

	Amount in millions
Working capital	2.57
Total assets	3.76
A (working capital/total assets)	0.684
Retained earnings	0.316
B (retained earnings/ total assets)	0.084
Earnings before interest and taxes	0.437
C (earnings before interest and taxes/ total assets)	0.116
Book value of equity	2.079
Total liabilities	2.667
D (book value of equity/ total liabilities)	0.553
Sales	3.007
E (sales / total assets)	0.8

Z' = 0.717A + 0.847B + 3.107C + 0.420D + 0.998E

Z = 0.717 (0.684) + 0.847 (0.84) + 3.07 (0.116) +0.420 (0.553) + 0.998 (0.8)

Z = 0.490428+ 0.71148+ 0.35612+ 0.23226+ 0.7984

Z= 2.588688

DCSR = 1.17

Table 4.17 shows the data from the annual financial statements. From the results the Z score was found to be 2.5887. The Z score bankruptcy model indicate that a Z score value between 2.9 and 1.23 is within the grey zone. This indicates that scan group was within the grey zone. The study found that DSCR was 1.17 an indication that the company's net operating income is enough to cover only 117% of its annual debt payments.

Standard Group

Table 4.18: Standard group

	Amount in millions
Working capital	0.367
Total assets	3.006
A (working capital/total assets)	0.122
Retained earnings	1.12
B (retained earnings/ total assets)	0.373
Earnings before interest and taxes	1.43
C (earnings before interest and taxes/ total assets)	0.476
Book value of equity	1.261
Total liabilities	1.311
D (book value of equity/ total liabilities)	0.962
Sales	1.487
E (sales / total assets)	0.495

$Z' = 0.717A + 0.847B + 3.107C + 0.420D + 0.998E$

$Z = 0.717\ (0.122) + 0.847\ (0.373) + 3.07\ (0.476) + 0.420\ (0.962) + 0.998\ (0.495)$

$Z = 0.087474 + 0.315931 + 1.46132 + 0.40404 + 0.49401$

$Z = 2.762775$

DCSR = 1.53

Table 4.18 shows the data obtained from standard group annual financial statements. The results show that standard group had Z scores values 2.76278. This value is within the range

of 2.9 and 1.23 which indicates that the company was in a grey zone. The study found that DSCR was 1.53an indication that the company's net operating income is enough to cover only 153% of its annual debt payments.

BOC Kenya

Table 4.19: BOC Kenya

	Amount in millions
Working capital	15.63
Total assets	20.56
A (working capital/total assets)	0.760
Retained earnings	5.89
'B (retained earnings/ total assets)	0.286
Earnings before interest and taxes	6.78
C (earnings before interest and taxes/ total assets)	0.330
Book value of equity	9.876
Total liabilities	10.245
D (book value of equity/ total liabilities)	0.963
Sales	9.152
E (sales / total assets)	0.445

$Z' = 0.717A + 0.847B + 3.107C + 0.420D + 0.998E$

$Z = 0.717\ (0.76) + 0.847\ (0.286) + 3.07\ (0.33) + 0.420\ (0.963) + 0.998\ (0.445)$

$Z = 0.54492 + 0.242242 + 1.0131 + 0.40446 + 0.44411$

$Z = 2.649$

DCSR = 1.15

In this research study BOC Kenya is considered as one of the non failed firms in the Nairobi Stock Exchange. The Z score for the company was 2.649. This indicates that BOC Kenya was in the grey zone. The study found that DSCR was 1.15 an indication that the company's net operating income is enough to cover only 115% of its annual debt payments.

British American Tobacco

Table 4.20: British American Tobacco

	Amount in millions
Working capital	42.453
Total assets	89.252
A (working capital/total assets)	0.4756
Retained earnings	20.098
B (retained earnings/ total assets)	0.2252
Earnings before interest and taxes	25.987
C (earnings before interest and taxes/ total assets)	0.2911
Book value of equity	20.256
Total liabilities	76.891
D (book value of equity/ total liabilities)	0.2634
Sales	70.573
E (sales / total assets)	0.79072

$Z' = 0.717A + 0.847B + 3.107C + 0.420D + 0.998E$

$Z = 0.717\ (0.4756) + 0.847\ (0.2252) + 3.107\ (0.2911) + 0.420\ (0.2634) + 0.998\ (0.7907)$

$Z = 0.3410052 + 0.1907444 + 0.9044477 + 0.110628 + 0.63129488$

$Z = 1.27337308$

DCSR = 1.75

The results in table 4.20 shows data collected from the british American Tobacco financial statements. The findings and calculations show that the Z score value for the company was 1.2734. From Z score bankruptcy model a company with a Z score value of between 2.9 and 1.23 is considered to be grey zone. The study found that DSCR was 1.75 an indication that the company's net operating income is enough to cover only 175% of its annual debt payments.

4.3 Summary and Interpretation of Findings

This research study found out that East africa packaging had a Z score of 1.867. According to the Z score bankruptcy model, the Zones of Discrimination are as follows ; $Z' > 2.9$ -"Safe" Zone, $1.23 < Z' < 2.9$ -"Grey" Zone and $Z' < 1.23$ -"Distress" Zone. This shows that East Africa was in a safe zone. East africa packaging was classified by Nairobi stock exchange as one of the failed firms. This shows that the Z score bankruptcy model was not applicable in

the case of East Africa packaging. This Research study found out that Kenya national mills had a Z score of 1.142. A Z score less than 1.23 is classified as distress zone in the Z score bankruptcy model. This shows that the company had failed, thus Edward Altman's financial distress prediction model was applicable in this case. Dunlop company is classified as one of the failed firms by Nairobi stock exchange. From the calculations done the company was found to have a Z score of 3.674. According to the Z score bankruptcy model, the Zones of Discrimination are as follows ; $Z' > 2.9$ -"Safe" Zone, $1.23 < Z' < 2.9$ -"Grey" Zone and $Z' < 1.23$ -"Distress" Zone. This shows that Dunlop Company was in a safe zone. To the contrary Dunlop Company had failed. This shows that Edward Altman's financial distress prediction model was not applicable in this case.

The Z score value of Baumann and company limited was found to be 1.13702. From Z score bankruptcy model, the Zones of Discrimination are as follows ; $Z' > 2.9$ -"Safe" Zone, $1.23 < Z' < 2.9$ -"Grey" Zone and $Z' < 1.23$ -"Distress" Zone. This shows that Baumann and company limited was counted as a company in distress zone. This research study found that the Z score value for reagent undervalued assets limited was 0.956727. From the Z score bankruptcy model a zone of discrimination below 1.23 is considered as a distress zone. Considering the fact that reagent undervalued assets limited was one of the failed companies, Z score model is there proven applicable in this case.

Pearl dry cleaners was one of the companies that were considered as failed firms by Nairobi stock exchange. From the result of the z score bankruptcy model where z score was 1.2114 Pearl dry cleaners is considered as a failed firms. From the results Hutchings biemer had a Z score of 2.1179. According to the Z score bankruptcy model a Z score of 2.9 and 1.23 was considered to be in grey zone. Hutchings biemer was one of the failed companies in Nairobi stock exchange. From the results we expect the company Z score to be below 1.23.This shows that Edward Altman's financial distress prediction model was not applicable in this case.

This research study revealed that the Z score value for Theta group was 4.4399. From the Z score bankruptcy model an zone of discrimination above 2.9 was considered as a safe zone. Considering the fact that reagent undervalued assets limited was one of the failed companies, Z score model is there proven inapplicable in this case. This research study found that the Z

score value for Kenya orchads was 0.9577. From the Z score bankruptcy model a zone of discrimination below 1.23 is considered as a distress zone. Considering the fact that Kenya orchads was one of the failed companies, Z score model is there proven applicable in this case.

Form the findings Kakuzi limited had a Z score value of 1.4632. According to the Z score bankruptcy model, the Zones of Discrimination are as follows ; Z' > 2.9 -"Safe" Zone, 1.23 < Z' < 2. 9 -"Grey" Zone and Z' < 1.23 -"Distress" Zone. This indicates that the company was in grey zone. In this case Edward Altman's financial distress prediction model is proven to be applicable This study revealed that in the year 2008 Reo Vipingo Plantation was in a safe zone in relation to Z score bankruptcy model. This was shown by a value of 2.979. The study also revealed that in the year 2008 Sasini tea limited was in a grey zone in relation to z score bankruptcy model. This was shown by a value of 2.197. From the Z score bankruptcy model a Z score between 1.23 and 2. 9 is considered of Grey Zone.

Taffler, (2001) found that companies finance their long-term operations primarily through two sources of capital, namely debt and equity. One of the most important financing decisions a company makes is determining the proportion of debt to owner's equity in the company's capital structure. Summary measures of a company's capital structure include the company's Debt to Equity ratio (D/E) and Debt to Total Capital Ratio (D/ [D+E]). Interest and principal payments on debt must be paid from operations before any payments can be distributed to equity holders (in the form of dividends or share buy backs).

A company is financially distressed whenever its EBITDA is less than its interest expenses. Financial leverage involves the substitution of fixed-cost debt for owner's equity in the hope of increasing equity returns. Financial leverage improves financial performance when business financial prospects are good but adversely impact on financial performance when things are going poorly. As a result, increasing the ratio of debt to equity in a company's capital structure implicitly makes the company relatively less solvent and more financially risky than a company without debt. Capital adequacy relates to whether a company has

enough capital to finance its planned future operations. If the company's capital is inadequate, then it must either be able to successfully issue new equity, or arrange new debt.

Thynne, (2006) indicates that the amount of debt a company can successfully absorb and repay from its continuing operations, is normally referred to as the company's debt capacity. Capital adequacy is normally evaluated by looking at the company's operational cash flow projections and its projections of capital needs. When companies undertake major new projects or undergo a significant financial restructuring, they often perform financial feasibility studies to determine whether the company has the financial capacity to undertake the project and whether the company will be able to repay all future debt payments, once the project is completed.

Patrick, (2004) found that many small and newly formed businesses cash flow is, the most often the single most important reason for business failure. The problem arises when the money coming into the company from sales is not enough to cover the costs of production. It is important to remember that it is a case of having the money to be able to pay debts when the debts are due, not simply generating enough revenue during a year to cover costs. Cash is regularly flowing out of the business but not very often flowing in. If the business does not manage this carefully, it can find itself in difficulties and facing insolvency. Some firms have periods of time when they do not receive much revenue a good example is companies who make toys.

CHAPTER FIVE

DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Summary

The study sought study was to assess whether Edward Altman's financial distress prediction model can be useful in predicting of credit default risk for companies listed in NSE. The researcher targeted a total of all the10 firms that had failed from 2003 to 2010 and firms form commerce and service sector, agricultural sector and industrial and allied sector. Out of the target 10 firms that had failed from 2003 to 2010 the researcher got data from all the 10 firms which included; EA packaging, Kenya National Mills, Dunlop Kenya, Kenya Orchards, A. Baumann & co, Reagent undervalued assets Ltd, Pearl drycleaners Hutchings Biemer, Lonhro motors and Theta group. The percentage response in the failed firms was 100%. In the non failed firms the researcher had targeted 10 firms in the agricultural sector, commercial and services and industrial an allied sector. The non-failed firms included; Kakuzi Ltd, Rea Vipingo Plantations, Sasini Tea Ltd, Kenya Airways, Marshals East Africa, Nation Media Group, Scan Group Ltd, Standard Group, BOC Kenya and British American Tobacco.

The study found that DSCR for failed firms was less than an indication that the company were more likely to default on payment in their credit, the study found that the DSCR for non-failed firms was greater than 1.The study found that many small and newly formed businesses cash flow is, the most often the single most important reason for business failure. The problem arises when the money coming into the company from sales is not enough to cover the costs of production. It is important to remember that it is a case of having the money to be able to pay debts when the debts are due, not simply generating enough revenue during a year to cover costs. Cash is regularly flowing out of the business but not very often flowing in. If the business does not manage this carefully, it can find itself in difficulties and facing insolvency.

5.2 Conclusion

The study found that found that companies finance their long-term operations primarily through two sources of capital, namely debt and equity, the most important financing decisions a company makes is determining the proportion of debt to owner's equity in the company's capital structure, the summary measures of a company's capital structure include the company's Debt to Equity ratio (D/E) and Debt to Total Capital Ratio (D/ [D+E]). Interest and principal payments on debt must be paid from operations before any payments can be distributed to equity holders.

The study revealed that Altman Z score model was applicable in the prediction of credit default risk for companies listed in Nairobi Security Exchange. The study found that working capital to total assets Ratio can be used to predict corporate failure at NSE, where a decrease in the ratio is an indication that the company is not performing will which can be used as an indication that the company is not doing well.

The study found that retained earnings to Total Assets Ratio of the firm listed in the NSE can be used to predict business failure among firm listed in the NSE where a decrease in the ratio is an indication that the firm is facing financial distress which could be an indication of bankruptcy. The study revealed that Return on Total Assets can be used to predict corporate failure at NSE, where a decrease in the return on total assets is an indication that that the firm is performing badly which is an indication of firms bankruptcy. The study further revealed that Total Asset Turnover can be used to predict corporate failure at NSE. This research study concludes that Edward Altman's financial distress prediction model was applicable locally. This research study concludes that Edward Altman's financial distress prediction model was applicable was applicable locally. Edward Altman's financial distress prediction model was found to be applicable in 8 out of the 10 failed firms that were analyzed, which indicates an 80% validity of the model. Out of the 10 firms which had not failed that were analyzed 9 of them proved that Edward Altman's financial distress prediction model was applicable in locally indicating a 90% validity of the model. This gives an aggregate average of 85% validity of the model.

5.3 Policy Implication

There is need for the firm listed in the Nairobi Security Exchange to use their working capital to total assets Ratio to check the check their business performance in order to prevent credit default risk for companies listed in Nairobi Security Exchange.

The study also recommends that there is need for all the managers of firm listed in the Nairobi Security Exchange to use retained earnings to Total Assets Ratio of their firm in order to test their firm performance hence prevent credit default risk for companies listed in Nairobi Security Exchange. Return on Total Assets should be used by corporate managers of firm listed in the Nairobi Security Exchange so that they can prevent their business from credit default risk for companies listed in Nairobi Security Exchange

There is need for the management of firms listed in the NSE to finance their long-term operations through equity as it is the most important financing decisions a company makes is determining the proportion of debt to owner's equity in the company's capital structure.

There is need for firm listed in the NSE to finance their operation through debt as increase in the ratio of debt to equity in a company's capital structure implicitly makes the company relatively less solvent and more financially risky than a company without debt. This will enhance the capital adequacy of the firms, which enable the company to either be able to successfully issue new equity, or arrange new debt.

There is need for the management of firm listed in the NSE, to increase their capital adequacy as this will help improve their operational cash flow projections and its projections of capital needs. This will enable the company to undertake major new projects or undergo a significant financial restructuring, this will enable them perform financial feasibility to determine whether the company has the financial capacity to undertake the project and whether the company will be able to repay all future debt payments, once the project is completed.

5.4 Limitation of the Study

In attaining its objective the study was limited to 47 firms listed companies in the NSE. The study sampled 10 firms that had failed and other 10 firms that had not failed in the Nairobi Security Exchange.

Secondary data was collected from the firm financial reports. The study was also limited to the degree of precision of the data obtained from the secondary source. While the data was verifiable since it came from the Nairobi Securities Exchange publications, it nonetheless could still be prone to these shortcomings.

The study was limited to establishing the prediction of credit default risk for companies listed at the Nairobi Securities Exchange. For this reason the non-listed firms could not be incorporated in the study.

The study was based on an eight year study period from the year 2003 to 2010. A longer duration of the study will have captured periods of various economic significances such as booms and recessions. This may have probably given a longer time focus hence given a broader dimension to the problem.

5.5 Areas for Further Research

From the findings and the conclusion the study recommends that an in-depth study should be accrued out to determine the applicability of Debt Service Coverage Ration in determining corporate failure among firm listed in the Nairobi Security Exchange.

The objective of the study was to determine the prediction of credit default risk for companies listed in the Nairobi Security Exchange; the study recommends that a study be conducted in to determine the applicability of Edward Altman's financial distress prediction model can be useful in predicting business failure in Kenyan.

The study was limited to firms listed in the NSE; the study also recommends that an in-depth study should be conducted on to determine the prediction of credit default risk for companies

that are not listed in the Nairobi Security Exchanges as this will help commercial banks when there is accessing debt.

The study recommends that there is need for study to be conducted on then applicability of Edward Altman's financial distress prediction model can be useful in predicting business failure in Kenyan among firms that are not listed in the Nairobi Security Exchange.

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