PREDICTING FINANCIAL DISTRESS USING FINANCIAL RATIOS IN COMPANIES LISTED IN NAIROBI STOCK EXCHANGE (2003 -2011)

BY

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UNITED STATES INTERNATIONAL UNIVERSITY - AFRICA

SPRING 2014
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A Project Report Submitted to the School of Business in Partial Fulfillment of the Requirement for the Degree of Masters in Business Administration

UNITED STATES INTERNATIONAL UNIVERSITY- AFRICA

SPRING 2014
STUDENT’S DECLARATION

I, the undersigned, declare that this is my original work and has not been submitted to any other college, institution or university other than the United States International University in Nairobi for academic credit.

Signed: ________________ Date: ________________
Robert Odero Otom (ID 619499)

This project has been presented for examination with my approval as the appointed supervisor.

Signed: ________________ Date: ________________
Francis Mambo Gatumo

Signed: ________________ Date: ________________
Dean, Chandaria School of Business
The purpose of this study was to confirm whether financial ratios can be used to predict financial distress in the non-financial sector of Kenyan companies listed in the Nairobi Stock Exchange. This study answers the following research questions: What variables reveal conditions conducive to financial distress? How good are financial ratios in predicting financial distress? Which ratios are most accurate in predicting financial distress?

This study is descriptive in nature. Secondary data was used and these were obtained through review of literature including articles, journals and published financial reports and accounts. The study examined some financial ratios in financial reports of groups of financially distressed companies and actively sound companies in Kenya for the period 2003 to 2011 with the aim to determine the most significant and reliable ratios for predicting financial distress. Companies were selected from the non-financial sector.

Like in some previous studies the companies were categorized into financially distressed and non-distressed. Companies were categorized as distressed if (1) the company has suffered losses for two straight years or (2) the audited report shows that the share holder’s equity is lower than the registered capital. This study applied ratios identified in previous studies. The selected ratios were analyzed using the backward stepwise method to determine the ones that are statistically significant. This study then used discriminant analysis method to estimate a model that predicts financial distress. The analysis compared similar financial ratios for the two groups of companies with the aim to explain the association between the explanatory variables and financial distress. Statistical models were then used to test the predictive power of the financial ratios.

The study confirmed that there are variables that reveal conditions which are conducive to financial distress. The study found that the variables that reveal financial distress are those related to profitability, leverage and operational efficiency. The study also confirms that financial ratios can predict financial distress for non-financial sector Kenyan firms listed in the Nairobi Stock Exchange. The study also determined which ratios are the best predictors. Net Income to Total Assets, Total Liabilities to Total Equity, Total Liability to Total Assets and Current Assets to Sales were found to be the best set or combination of ratios for predicting financial distress.
The study concluded that profitability, liquidity, leverage and operational efficiency are crucial in determining financial health of a company. Financial ratios are good predictors of financial distress with some ratios being more significant than others. Even though profitability ratios are the most significant, a combination of ratios does better than a single ratio in predicting financial distress. A combination of the ratios gives a more accurate model.

The research recommends the best ratios or combination of ratios that can be used to predict financial distress. The study also recommends that more ratios, especially those related to profitability, be provided in financial reports to make it easier for users to take informed decisions especially in case of danger signs. This will enable timely corrective actions to be taken when necessary thereby help reduce incidences of company failures. Investors will also be able avoid putting their resources in financially distressed companies unknowingly.
ACKNOWLEDGEMENT

Thanks to the Almighty God for the gift of knowledge and for the opportunity to continuously advance the same. Am very grateful, to all those who supported me in completing this project. I acknowledge and very much appreciate the guidance I got from my supervisor, Prof. Francis Gatumo, Ms Maryanne Muchui for the assistance in data collection, the USIU fraternity for all the facilitation and my beloved family for your continued support and prayers.
DEDICATION

My time as a graduate student in USIU was so enjoyable and educative. I learnt a lot and developed so much as a person. All this would not have been possible without the support of the University lecturer, staff, fellow students, friends and family. I will forever remain grateful for your support and understanding. This project is dedicated to my family and my late dad.
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CHAPTER ONE

1.0 INTRODUCTION

1.1 Background to the study

One of the major objectives of financial analysis is to reduce the degree of risk, to which creditors are exposed as a result of bankruptcies and defaulting on debts (Tamari, 1966). One system often used to examine the financial position of a firm as reflected in its financial statements is ratio analysis - comparison of various data in the balance sheet and profit and loss statement. The ratio of current assets to current liabilities, for example, indicates the firm's capacity to meet such liabilities; the ratio of net worth to total liabilities shows the owners' share in the assets of the business; the ratio of net profit to net worth gives the return on proprietary capital; and the ratio of net profit to the value of production gives some indication of the enterprise's pricing policy. The exact choice of ratios will clearly depend on the object in view and the information available (Tamari, 1966). Ratios are among the most popular and widely used tools of financial analysis. Yet their function is often misunderstood and, consequently, their significance often overrated. A ratio expresses a mathematical relation between two quantities (Bersten & Wild, 1999).

Financial ratios are the most commonly used in analyzing, understanding and interpreting corporate financial statements and in evaluating and monitoring company’s performance over time. The ratios point out changes and identify irregularities, abnormalities and surprises that would require further investigation to ascertain the current and future financial standing of the company (Barry & Jamie Elliot, 2006). The ratios are based on the firm's past behavior and are unaffected by any additional knowledge in the hands of the investigator on the future of the branch, the business or social standing of the owner, Government policy, etc (Tamari, 1966).

Ratios may be used in several ways. Some analysts apply absolute standards, on the grounds that a substandard ratio indicates a potential weakness that merits further analysis. Other analysts compare a company’s ratios with those of the “average” firm in the same industry in order to detect differences that may need further consideration (Sharpe, Alexander, & Bailey, 1999).
Comparison of analytical data for a current period with similar computations for prior years affords some basis of judging whether the condition of the business is improving or worsening. This comparison of data over time is called horizontal or trend analysis. It is distinguished from vertical or static analysis which refers to the review of the financial information for only one accounting period (Meigs & Meigs, 1990).

To be meaningful, a ratio must refer to an economically important relation. Ratios are tools providing us with clues and symptoms of underlying conditions. Analysis of a ratio reveals important relations and bases of comparison in uncovering conditions and trends difficult to detect by inspecting individual components comprising the ratios (Berstein & Wild, 1999).

Financial ratios can broadly be classified into six groups, namely liquidity ratio, capital structure or leverage, profitability ratio, activity ratios, integrated ratios and growth ratios. Liquidity ratios include (i) Current ratio, (ii) Acid test ratio and (iii) Super-quick ratio. Capital structure or leverage ratios include; (i) Debt/Equity ratio, (ii) Debt to total capital ratio, (iii) Debt to total assets ratio, (iv) Proprietary ratio, (v) Capital gearing ratio, (vi) Interest coverage ratio, (vii) Dividend coverage ratio, (viii) Total coverage ratio, (ix) Cash flow coverage ratio and (x) Debt service coverage ratio. The profitability ratios include; (i) Return on total assets, (ii) Return on capital employed, (iii) Return on shareholders’ equity, (iv) Return on equity funds, (v) Earnings per share, (vi) Dividends per share, (vii) Earnings yield and (viii) Price earnings ratio. The activity ratios also known as efficiency or turnover ratio include; (i) Raw material turnover ratio, (ii) Work-in-progress turnover, (iii) Finished goods turnover ratio, (iv) Debtors turnover ratio, (v) Average collection period, (vi) Total assets turnover ratio, (vii) Fixed assets turnover ratio, (viii) Current assets turnover ratio and (ix) Working capital turnover ratio.

In general, ratios measuring profitability, liquidity and solvency prevailed as the most significant indicators but the order of their importance is not clear since almost every study cited a different ratio as being the most effective in indicating impending problems (Altman, 1968).

To add more meaning to the ratios, a benchmark is required when traditional ratio analysis techniques are used in analyzing financial statements. Such benchmarks can be adjusted depending on the economic conditions obtaining at the time or the changes in company objectives. The most commonly used ratio analysis techniques are trend analysis and cross
sectional analysis. Trend analysis compares the company’s performance over time; the benchmark therefore could be the previous years’ financial ratios, the budgeted financial ratios, budgeted financial ratios for the same period or financial ratios for other profit centers or cost centers (Barry & Jamie, 2006). With cross sectional analysis, the benchmark is the financial ratios of another company either in the same industry or in a different industry.

Ratio analysis, however, suffers from various limitations including difficulty in comparison, impact of inflation and conceptual diversity. Difficulty in comparison may be due to use of different accounting practices and policies for example in the basis of inventory valuation, depreciation methods among others. When assets acquired in different periods are, in effect shown at different prices in the balance sheet and are not adjusted for changes in the price level, ratio analysis yield comparable and, therefore, dependable results. Another factor which influences the usefulness of ratios is that there is difference of opinion regarding the various concepts used to compute the ratios. There is always room for diversity of opinion as to what constitutes shareholders’ equity, debt, assets, profit and so on (Khan & Jain, 2004).

Financial economists have not reached a consensus on how financial distress affects corporate performance. Traditionally, the financial economics literature has portrayed financial distress as a costly event whose possibility is important in determining firms' optimal capital structures. Financial distress is seen as costly because it creates a tendency for firms to do things that are harmful to debt-holders and nonfinancial stakeholders (i.e., customers, suppliers, and employees), impairing access to credit and raising costs of stakeholder relationships. In addition, financial distress can be costly if a firm's weakened condition induces an aggressive response by competitors seizing the opportunity to gain market share. (Opler & Titman, 1994)

Financial distress is often a long-term process and has an impact on the capital structure, investment policies, and performance of many firms even after they emerge from debt restructurings (Kahl, 2002).

The firms' increased demand for funds to meet payments on debts is typically met by an increase in the outstanding amount of commercial loans. A crisis explodes when the deterioration of the financial position of several firms and their reduced outlook for future profitability cause creditors to reevaluate the amount of credit to be issued, to refuse to extend additional credit and, in the extreme, to actively seek the liquidation of existing outstanding
loans. The inability of firms to refinance debt forces them to liquidate assets and induces a multiplicative contraction in business profits. When this distress selling is widespread, asset markets crash and bankruptcies ensue (Canova, 1994).

A company in financial distress will usually not be able to settle its obligations. According to section 219 (e) of the Companies Act Cap 486, Laws of Kenya a company may be wound up by the Courts if it is unable to pay its debts.

The Federal Bankruptcy Reform Act of 1978, in the United States is the latest of a series of bankruptcy laws that allow those with excessive debts to discharge the same through a three year repayment plan or through a plan for liquidating assets. Individuals choosing bankruptcy have two alternatives. The first – called chapter 7 – is a liquidation in which the debtor’s assets are seized by the court and sold. Any funds remaining after court costs and legal fees are paid are then prorated among the various creditors. The other bankruptcy alternative, Chapter 13, also known as the wage earner plan, allows the debtor to establish a three year payment plan. Debtors who choose chapter 13 are allowed to retain possession of their property and to repay specified amounts to their creditors over a three year period (Boone, Kurtz, & Hearth, 2006).

The Nairobi Stock Exchange (NSE) was constituted in 1954 as a voluntary association of stockbrokers registered under the Societies Act and until after the attainment of independence in 1963, the business of dealing in shares was confined to the resident European community. Today it has expanded so much and is recognized by International Finance Corporation (IFC) as one of the best performing Stock Exchange in the world (http://en.wikipedia.org/wiki/Nairobi_Securities_Exchange; 2013). By December 2012 NSE had 51 companies listed under it.

The detection of company operating under financial difficulties is a subject which has been particularly susceptible to financial ratio analysis. Prior to the development of quantitative measures of company performance, agencies were established to supply a qualitative type of information assessing the credit-worthiness of particular merchants.' Formal aggregate studies concerned with portents of business failure were evident in the 1930's. A study at that time" and several later ones concluded that failing firms exhibit significantly different ratio measurements than continuing entities" (Altman, 1983).
In the United States business failure is widespread and a fairly large number of businesses fail each year, although the failures in any one year are not a large percentage of the total business population (Brigham & Daves, 2004). It is interesting to note that whereas the failure rate per 10,000 businesses fluctuates with the state of the economy, the average liability per failure has tended to increase over time. This is due primarily to inflation, but it also reflects the fact that some very large firms have failed in recent years. In 1950-1959 the average number of failures per year was 11,119 while average failure rate per 10,000 businesses was 42 with average liability per failure being $41,082. In 1997, the average number of failures per year was 83,384 while average failure rate per 10,000 businesses was 88 with average liability per failure being $448,970 (Brigham & Daves, 2004).

Although bankruptcy is more frequent in small firms, large firms are not immune. However, some firms might be too big or too important to be allowed to fail and mergers or governmental intervention are often used as an alternative to outright failure and liquidation. The decision to give federal aid to Chrysler (now a part of DaimlerChrysler AG) in the 1980s is an excellent example (Brigham & Daves, 2004).

U.S. bankruptcy laws were first enacted in 1898. They were then modified substantially in 1938, then they were changed substantially again in 1978, and some fine-tuning was done in 1986. The primary purpose of the law is to avoid having firms that are worth more as ongoing concerns are put out of business by individual creditors who could force liquidation without regard to the effects on others (Brigham & Daves, 2004).

Financial distress may be caused by several factors. A recent Dun & Bradstreet compilation assigned percentage values to business failure causes, as shown in Table 1.1 below:

<table>
<thead>
<tr>
<th>Cause of Failure</th>
<th>Percentage of Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Economic factors</td>
<td>37.1%</td>
</tr>
<tr>
<td>Financial factors</td>
<td>47.3</td>
</tr>
<tr>
<td>Neglect, Disaster, and fraud</td>
<td>14.0</td>
</tr>
<tr>
<td>Other factors</td>
<td>1.6</td>
</tr>
</tbody>
</table>

100.0%
The importance of the different factors varies over time, depending on such things as the state of the economy and the level of interest rates. Also most business failures occur because a number of factors combine to make the business unsustainable. Further, case studies show that financial difficulties are usually the result of a series of errors, misjudgments, and interrelated weaknesses that can be attributed directly or indirectly to management (Brigham & Daves, 2004).

It is usually the abnormal risks that are taken long before bankruptcy is apparent that are the fundamental causes of failure—not what occurs as the market perceives the bankruptcy risk more clearly (Altman, 1983).

1.2 Statement of the problem

Although causes of financial difficulty are numerous, many failures are attributable either directly or indirectly to management. Usually, non-financial problems lead to losses, which in turn lead to financial strain and eventual failure. Very seldom is one bad decision the cause of difficulty; usually the cause is a series of errors, and the distress evolves gradually (Van Horne, 1991). Yet financial distress will usually precede corporate failure. The question then is whether financial distress can be predicted so that corrective action may be taken in good time.

Business failure identification and early warnings of impending financial crisis are important not only to analysts and practitioners in the US but to countries throughout the world. Developing countries and smaller economies, as well as larger industrialized nations of the world are vitally concerned with avoiding financial crisis in the private and public sectors. Some policy makers in smaller nations are particularly concerned with financial panics resulting from failures of individual entities (Choi, 2003).

The existing bankruptcy models are of course very useful in understanding and predicting companies that are likely to face some financial difficulties. However, it is important to note that financial ratios are numerous and no two previous bankruptcy studies or models have made use of exactly the same set of financial ratios (Horrigan, 1965).

In other words, each researcher in his/her study deduces a set of significant financial ratios for predicting bankruptcy. This suggests two things; that the choice of financial ratios used by an individual research is based on the researcher’s objective thinking (subjectivity). Secondly,
that each financial ratio has a unique property making it more relevant or irrelevant than the others. Similarly, researchers hold the view that the most important and fundamental statistical nature of financial ratios is colinearity. This means some financial ratios tend to move in the same direction as others and therefore have a high degree of correlation with each other (Horrigan, 1965).

Therefore account users will need only a small number of financial ratios to make crucial decisions about a company’s state of affairs. Hence, it will be costly and waste of resources for corporate stakeholders to focus on the numerous financial ratios in order to make critical business decisions. There is also the risk of focusing on less important, ambiguous or the wrong type of ratios. There is need to determine which ratios are more statistically significant than others in predicting financial distress. The ratios in themselves may not be as useful when applied individually. It is therefore necessary to combine several ratios. The problem then is to determine which ratios are more significant in such decision making process. It would not be viable for analysts, creditors investors to apply all the over 50 financial ratios.

According to Polemis et al (2012) vast changing environment and the financial crisis highlight the need for future research on the world trade implications, as well as individual macroeconomic variables of each country. This study looks at the Kenyan companies listed in the Nairobi Stock Exchange.

1.3 Purpose of the study

The study sought to determine whether there are certain characteristics in financial ratios that pre-dominate financially distressed companies and whether these characteristics can be identified and used for prediction purposes.

1.4 Research Questions

1.4.1 What financial variables reveal conditions conducive to financial distress?
1.4.2 How good are financial ratios in predicting financial distress?
1.4.3 Which financial ratios are most accurate in predicting financial distress?

1.5 Importance of the Study

There is a lot of turbulence in the business environment these days. Stakeholders are increasingly interested in knowing the healthy or the distressed firms. Even though the adage that the higher the risk the higher the returns holds to a large extent, investors would want to
avoid investing in a company which is destined to fail. It is also necessary that the investors maximize their returns by investing more in companies with a brighter future and investing less in companies with a bleak future. In this regard researchers have come up with models that can help determine whether a firm is healthy or it is financially distressed. Regulatory bodies have also come up with criteria and policies to guide classification of firms as either healthy or financially distressed.

Signs of potential financial distress are generally evident in a ratio analysis long before the firm actually fails, and researchers use ratio analysis to predict the probability that a given firm will go bankrupt (Brigham & Daves, 2004).

According to International Financial Reporting Standards (IFRS) 2013, the objective of financial statements is to provide information about the financial position, financial performance and cash flows of an entity that is useful to a wide range of users in making decisions. The information on assets, liabilities, equity, income and expenses, contributions by and distributions to owners and cash flow along with other information in the notes, assists users of financial statements in predicting the entity’s future cash flows, in particular their timing and certainty.

A common use of financial statements analysis is in identifying areas needing further investigation and analysis. One of these applications is in predicting financial distress. Research has made substantial advances in suggesting various ratios as predictors of distress. The research is valuable in providing us additional tools of analyzing long term solvency (Bersten & Wild, 1999).

There are over 50 financial ratios and it would be very difficult and confusing to use all of them in analyzing a given financial statement. This study helps in narrowing down the number of ratios to be used by identifying the most significant ratios in predicting financial distress.

Models for predicting financial distress, commonly referred to as bankruptcy models, examine the trend and behavior of selected ratios. Characteristics of these ratios are used in identifying the likelihood of future financial distress. Models presume evidence of distress appears in the financial ratios and we can detect it sufficiently early for us to take action to avoid risk of loss or to capitalize on this information (Bersten & Wild, 1999). Models for predicting financial distress have over time moved from the traditional ratio analysis in the 1930s to single ratio.
predictors developed from univariate to today’s multivariate predictive models. Thus the models for predicting financial distress using financial ratios fall into two categories; univariate and multivariate models.

Different studies in the field of economics and finance, credit risk management and accounting have established models for predicting bankruptcy. Most of these studies are multivariate in the sense that they incorporated different financial ratios in a single equation in order to predict corporate failure. However, other studies especially the work of Beaver (1966) was a cornerstone for most multivariate models. This study explores the behavior of different financial ratios on financially distressed companies and financially healthy firms. This research study like that of Beaver is univariate since it independently examines the impact of financial ratios on financial distress probability with the objective of indicating a set of most significant ratios for predicting business failure. This is important because it would enable remedial action to be taken in good time.

Different models and ratios or combination of ratios work best in different countries (Rahman, Tan, Hew, & Tan, 2004). Even though previous studies have been done to determine the best models or ratios or combination of ratios in predicting financial distress, the findings may not be applicable in Kenya. It is therefore important to verify which ratios or combination of ratios work best in Kenya, which is what this study does. Even though the study is similar to that by Polemis et al (2012). The model is expected to be more relevant to Kenya since the variables and weights will be based on the financial statements of Kenyan companies.

In general terms, this study sought to determine the most significant financial ratios for predicting corporate failure. Unlike in previous bankruptcy studies which compromised generalization by using small sample sizes (Grice and Dugan, 2001), this study uses large sample.

Business entities and even individuals often need to invest in a project or enter into some credit or debt arrangement. All those who invest their funds do so in the hope of making gains. Those who lend do so in the hope of getting profits in the form of interest. In both cases it is important that such hope be based on some verifiable factors. Hence the need to look at performance indicators which include profitability and earnings ability among others. However there is a further need to be able to forecast and tell, with some degree of accuracy,
how long a given trend, say profitability, will be sustained. This will enable one to take any necessary action in good time. Predictive models come in handy in enabling such forecasts. This study looks at how financial ratios can be used to predict financial distress in Kenya.

1.6 The Scope of the Study

The research is based on companies listed in the Nairobi Stock Exchange in the non-financial sector during the period under study, that is, 2003 to 2011. These companies are all based in Nairobi.

The study has the following limitations:

Not all financial ratios are considered and so the results obtained are based on the financial ratios considered.

1.7 Definition of Terms

1.7.1 Bankruptcy

This is the state of being unable to pay debts, thus the ownership of the firm’s asset is transferred from the stockholders to the bondholders (Ross, Westerfield, & Jaffe, Corporate Finance, 2001). It is a legal procedure by which an individual, house hold, or business that cannot meet its financial obligation is relieved of these obligations by having the court divide its assets and/or income among creditors.

1.7.2 Financial distress

These are events preceding and including bankruptcy, such as violation of loan contracts (Ray and Mahavidyalaya 2011). It is a condition when a company cannot meet (or has difficulties paying off) its financial obligations to its creditors. Operating cash flows are not sufficient to satisfy current obligations and the firm is forced to take corrective actions

1.7.3 Ratio Analysis

This is an examination of the relationship between two numbers or sets of numbers on financial reports (Slater, 2007). It is the systematic use of ratios to interpret the financial statements so that the strengths and weaknesses of the firm, as well as its historical performance and current condition, can be determined.
1.7.4 Profitability ratios

These are those that measure the ability of the firm to earn an adequate return on sales, total assets and invested capital (Hirt & Block, 2003).

1.7.5 Liquidity ratios

These are ratios that show the relationship of a firm’s cash and other current assets to its current liabilities (Brigham & Daves, 2004). It measures the ability of the firm to meet its short-term obligations and reflect the short-term financial strength/solvency of a firm.

1.7.6 Capital structure or leverage ratios

Capital structure or leverage ratios are financial ratios which throw light on the long term solvency of a firm as reflected in its ability to assure the long-term lenders.

1.7.7 Activity ratios

These are a group of ratios that measure the speed at which the firm is turning over or utilizing its assets (Block, Hirt, & Danielson, 2009) It is also called efficiency ratios or asset utilization ratios are concerned with measuring the efficiency in asset management.

1.7.8 Current ratio

This is calculated by dividing current assets by current liabilities; it indicates the extent to which current liabilities are covered by those assets expected to be converted to cash in the near future (Brigham & Houston, Fundamentals of Financial Management, 2004).

1.7.9 Acid test ratio

Also known as quick ratio, it is the ratio between those assets that are most easily converted to cash are divided by current liabilities to indicate the ability to pay-off short-term debts (Slater, 2007).

1.7.10 Capital structure or leverage ratios

These are financial ratios which throw light on the long-term solvency of a firm as reflected in its ability to assure the long-term lenders regard to periodic payment of interest during the
period of the loan and the repayment of the principal on maturity or in the predetermined installments at due dates (Block, Hirt, & Danielson, 2009).

**1.7.11 Debt/Equity ratio**

Provides an indication of how well the share holder’s investment in the company protects the creditor’s debt. It measures how much the shareholders have at risk versus how much the creditors have at risk. And thus, the strength of the company’s capital structure (McKinley, Johnson, Downey, Zimmerman, & Bloom, 1988).

**1.7.12 Average collection period**

This is the average amount of time that the accounts receivables are held in the books. It is computed by dividing accounts receivables by average daily credit sales (Block, Hirt, & Danielson, 2009).

**1.7.13 Debtors turnover ratio**

Measures how rapidly receivables are collected. It is determined by dividing the credit sales by receivables outstanding during the year (Block, Hirt, & Danielson, 2009).

**1.7.14 Assets turnover ratio**

This indicates how efficiently a company uses its assets to generate sales and thus helps to measure the overall efficiency of the company (Slater, 2007).

**1.8 Chapter Summary**

The chapter details the methodology of the study, the objectives (general and specific), the justification and the scope of the study. It looks at the use of financial ratios in predicting financial distress in companies listed in the Nairobi Stock Exchange in the non-financial sector. By identifying characteristics that distinguish healthy companies from financially distressed companies, ratios help in showing the performance of a company, both current and into the future.

The next chapter will look at literature review on the topic. This includes relevant theories, outcomes, suggestions and recommendations from previous studies. Chapter 3 presents the research organization and methodology applied by the study in examining the usefulness of
financial ratios in predicting financial distress. Chapter 4 includes the results and findings of
the study while chapter 5 comprises of the conclusions and recommendations.
CHAPTER TWO

2.0 LITERATURE REVIEW

2.1 Introduction

This chapter looks at the overview of the basic concepts relating to financial distress or failure. The chapter contains previous literature on financial distress and bankruptcy and the various predictive models used in previous studies. The literature on predicting financial distress using financial ratios will be looked at by way of research questions. Section 2.2 looks at variables that reveal conditions that are conducive to financial distress. Section 2.3 looks at how good financial ratios are in predicting financial distress. Section 2.4 looks at the ratios that are most accurate in predicting financial distress. Section 2.5 is the chapter summary which summarizes the literature review of this study.

2.2 Financial variables that reveal conditions conducive to financial distress

2.2.1 Forecasting the probability of failure

In their study; forecasting the probability of failure of Thailand financial companies in the Asian financial crisis, Stephen Reynolds et al (2002) examined the financial capital structure of major financial companies in Thailand over the period 1993-98. They used both probit and logistic binomial regression analysis and were in addition also able to estimate the probability of a firm surviving to and operating in 1998. This estimation required the use of a multinomial ordinal logistic model.

The sample studied included 91 major financial companies with the methodology consisting of postulating a relationship between the probability of a financial company surviving to 1997 and certain key economic determinants; firm size in terms of assets, total assets, net profit, net income and borrowing and lending structures. The researchers used three comparative risk-response models namely probit, logistic and cumulative logistic regression.

The model used by Stephen Reynolds et al (2002) differs from the traditional methodology used in accounting and auditing research in that the traditional approach is concerned with using financial ratios to predict firm failure per se and not the probability of failure. The
central hypothesis of the study was that as a firm size (assets) increases, the probability of survival decreases. The reasoning behind this hypothesis involves the nature of financial intermediaries, the market of risky borrowers and moral hazard.

The findings of the study was that the firm size (measured in total assets) is inversely related to the probability of survival (or odds of survival), indicating that large companies have less of a chance of surviving to 1997 than relatively smaller companies. They also found that time-variable coefficient is positive, indicating that, as time goes on, the probability of survival increases. This was a surprise. It may have been because of the implicit bias in the "survival of the fittest" approach to identifying the more risky firms. Positively, it could indicate that the less risky firms became more healthy financially over time and that is why they were selected (by the market, in effect) to survive.

Stephen Reynolds et al concluded that Companies with relatively more short-term debt and more non-performing loans appear more likely to survive and, by implication, are more cautious about their lending practices. These results are not consistent with the moral hazard conjecture. It appears, then, that the large financial companies with relatively less (not more) short-term debt and nonperforming loans are more apt to practice "moral hazard." In terms of public policy implications, the results of the research suggest that smaller rather than larger financial intermediaries should be encouraged.

However the study cannot be conclusive enough since it fails to consider long-term debts and other determinants such as liquidity.

### 2.2.2 Relationship between financial distress and insolvency

The definition of financial distress can be expanded somewhat by linking it to insolvency (Ross, westfield, & Jaffe, 2005). Insolvency is defined in Black’s Law Dictionary as the inability to pay one’s debts; lack of means of paying one’s debts. Such a condition of a woman’s (or man’s) assets and liability that the former made immediately available would be insufficient to discharge the later.

This definition has two general themes, stock and cash flows. The stock based insolvency occurs when firm has negative net worth, and so the value of assets is less than the value of its debts. While flow–based insolvency occurs when operating cash flow is insufficient to meet
current obligations (Ross, westerland, & Jaffe, 2005). Flow-based insolvency thus refers to the inability to pay one’s debts.

According to Ross et al., 2005 firms deal with financial distress in several ways, such as selling major assets, merging with another firm, reducing capital spending and research and development, issuing new securities, negotiating with banks and other creditors, exchanging debts for equity and filing for bankruptcy.

Financial distress can serve as a firm’s ‘early warning’ system for trouble. Firms with more debts will experience financial distress earlier than firms with less debt. However, firms that experience financial distress earlier have more time for private workouts and reorganization. Firms with low leverage experience financial distress later, and in many instances, are forced to liquidate (Ross, westerland, & Jaffe, 2005).

2.2.3 Identifying financial distress indicators

In their study Rahman et al. (2004) examined the indicators that led to the problems suffered by banks in South Asian countries in 1997. The countries in study included Indonasia, South Korea and Thailand. The banks in this countries were found to be ideal for the study since they enjoyed profitability during the pre-crisis period and were the most severely affected by the financial crisis of 1997.

The onset of the Asian economic and financial crisis shocked the world, because it occurred in those countries that were the most successful in achieving their economic objectives during the past thirty years (Rahman, Tan, Hew, & Tan, 2004). One of the main reasons often cited was that the financial sectors were not properly supervised and regulated.

Bankers, economists, and regulators generally accept that banks are special and that bank runs or failures are costly to the economy. Therefore banking stability is afforded the utmost importance (Rahman, Tan, Hew, & Tan, 2004). There is therefore an urgent need to identify banks that are more prone to financial distress, before the effects of its financial instability can be felt in the economy. The aim of the study by Rahman et al. (2004) was to construct an empirical model that identify banks experiencing financial distress in Indonasia, South Korea and Thailand, as a function of financial ratios obtained from balance sheet and income statement.
Rahman et al (2004) used logistic regression model to investigate banks’ financial distress indicators. This model is appropriate when the independent variable can be grouped into discrete states. To sequentially add the best variable to the model, forward stepwise selection procedure in logistic regression was used. Forward stepwise selection method is based on the principle that repressors’ are added one at a time until there are no remaining regressors that would significantly affect improve the regression.

The population under study included financial statements of banks in the three countries Indonesia, South Korea and Thailand for the period from 1995 to 1997.

The sample data consisted of financial statements of banks from Indonesia, South Korea and Thailand with the data being collected from the electronic database. The sample consisted of banks whose data for the period 1995 to 1997 were available. The banks in the three countries were categorized as ‘problem’ and ‘non-problem’ banks.

The data included explanatory variables on capital adequacy, interest income/interest expense, Liquidity, loan quality, loan volume, management efficiency, operating efficiency, profit margin, ROA, ROE and source of revenue.

The findings of the study was that capital adequacy, interest income/interest expense and operating efficiency are three common financial indicators found to be able to identify problem banks in all the three countries. Capital adequacy indicates whether a bank has sufficient reserves at its disposal. Interest income/interest expense measures the number of times interest expense is covered by the interest income. Interest rates are positively related to profitability. Operating efficiency measures the effects of inefficient bank operations on profitability. In their study Rahman et al found that Asset Quality did not appear to be able to indicate financial distress of the banks.

They concluded that for each country, separate identification models should be developed for individual and overall time periods. The financial indicators represent measures of capital adequacy, loan management and operation efficiency and are essential to the financial health of banks in Asia.
Rahman et al recommended research extension using the Cox proportional hazards model in financial distress applications. The greatest usefulness of the Cox model in such financial distress application is its ability to provide information regarding the expected time to failure. This information is not available from traditional classification techniques such as logistic regression and MDA.

2.4 Financial ratios as predictors of financial distress

2.4.1 Ratio Analysis

A ratio expresses the mathematical relationship between one quantity and another. The relationship is expressed in terms of either a percentage, a rate, or a simple proportion (Kimmel, Weygandt, & Kieso, 2000). Apart from being expressed as a percentage or as a simple proportion, a ratio can also be expressed in terms of some other scalar values such as number of days or months (Ryan, 2004).

Ratio analysis expresses the relationship among selected items of financial statement data. Ratios can provide clues to underlying conditions that may not be apparent from inspection of the individual components of a particular ratio. However a single ratio by itself is not very meaningful (Kimmel, Weygandt, & Kieso, 2000).

Ratios give more information when compared either for the same company over time, Intra-company Comparisons, or with a competitor in the same industry, Intercompany Comparison, or based on average for particular industry, Industry Average Comparison (Kimmel, Weygandt, & Kieso, 2000).

When constructing financial ratios the numerator will always be a financial value drawn from one or other of the principal statement of account. The denominator may be a financial value or it may be some other physical measure such as the number of passenger flights, the number of employees or the square meters of floor space (Ryan, 2004).

Financial ratios are traditionally grouped into five categories or pillars (Ross, Westerfield, & Jordan, 2008). These include Short-term solvency, or liquidity ratios, Long-term solvency, or financial leverage, ratios, Asset management, or turnover, ratios, Profitability ratios, and Market value ratios.
2.4.2 Limitations of financial ratios

Ratios like any other financial technique need to be interpreted with care. There will be a number of potential biases and inaccuracies in the underlying data, as well as alternative methods for calculating the ratios themselves that can cause difficulty (Ryan, 2004). Some of the pitfalls include the following:

2.4.2.1 Underlying accounting principles;

Any ratio is necessarily dependent on the accuracy of the financial data on which it is based but also on the fairness with which the financial data represent the underlying economic reality. The journey from fundamental transaction of a business to the final audited accounts involves collecting, categorizing and manipulating figures, and each stage involves the applications of both rules and judgment as various accounting principles are applied (Ryan, 2004).

2.4.2.2 Timing problems;

Many businesses are subject to heavy seasonality in their pattern of sales (Ryan, 2004). So a company with heavy sales towards its year-end may show low levels of stock, high cash balances and increased debtors. It is thus worth enquiring, for any particular company, whether the nature or seasonality of its trade may have a distorting effect on the accounts it publishes and, therefore any ratios that you may produce.

2.4.2.3 Fraudulent manipulation and window dressing;

High-profile cases such as Eron and WorldCom have led many to question the underlying truthfulness of accounting numbers (Ryan, 2004). Distortion may arise from the fraudulent misappropriation of company funds or assets and use of creative accounting practices to present financial reports that favour the view that management is trying to put across.

2.4.2.4 The impact of price changes;

If the balance sheet has been maintained at historic cost rather than fair value then any balance sheet components within a ratio are likely to be understated because of the impact of price changes on the business (Ryan, 2004). Even though it is possible to correct the figures
by adjusting the values in the balance sheet to reflect changing prices, such adjustments will only be approximations at best.

2.4.3 Usefulness of financial ratios in predicting financial distress

In their study of Financial Distress Prediction in China; Chen, Marshal, Zhang and Ganesh (2006) examined the usefulness of financial ratios in predicting business failure in China. The study was based on China’s stock market which was noted to be assuming more importance in the global financial system yet relatively very little is known about its stock price behavior.

They applied a cross-validation procedure which involved using repeated random partitioning where an estimating sample set is divided into training and validation set. The training subset is used for preliminary model fitting and the validation set is used to test and tune the mode weights during estimation.

The study by Chen et al (2006) also examined several models used in the prediction of financial distress. These included the Linear Discriminant Analysis (LDA), Logistic Regression Model (LRM), Decision Trees (DTs) and Neural Network (NN). The models were analyzed for their respective accuracies.

The population under study was the companies listed in the Chinese Stock Exchange. According to the Chinese Securities Regulatory Commission (CSRC) regulations, listed corporations are given the label of “ST” (short for Special Treatment), if any of the following four criteria has been met: (1) the external auditors express negative opinions or clearly state that they are unable to express opinions on a firm’s annual report; (2) the firm’s financial conditions are considered to be abnormal by the stock exchange or the China Security Regulator Commission (CSRC); (3) a firm shows that the company has suffered losses for two straight years or (4) the audited report shows that the shareholder’s equity is lower than registered capital. Criteria (3) and (4) are the most common reasons for a firm being designated ST (Chen, Marshal, Zhang, & Ganesh, 2006). The study took ST as distressed firms and NON-ST as healthy firms.

Chen et al collected financial information for publicly traded corporations from China’s stock Market and Accounting Research Database and Data Stream. The information was for the period December 1999 to June 2003 and involved 1029 firms; 89 of them ST while 940 were NON-ST. Ratios of firms in 1999 were used to predict ST announcements in 2001 in the
Estimation Sample. The sample was further divided into two parts; the training portion, used to generate parameters and the validation portion used to confirm the accuracy of the parameters. Tests were then conducted on the ability of ratios in 2001 to predict business failure in 2003.

Based on extensive literature review, Chen et al computed 34 ratios which were classified in seven broad categories: Liquidity, Asset Utilization, Long-Term Solvency, Profitability, Cash Flow, Market Valuation, and Size.

The research found that the number of ratios selected by each model were significantly different with the Decision Tree model and Logistic Regression Model having the minimum number of predictors, only two variables. LDA model had ten ratios while the Neural Network (NN) model had twenty ratios.

The study found that the predictor which was common to all the models was the Earnings Per Share (EPS). It was also found that the ratios selected by each technique lacked consistency.

The study concluded that the five most significant financial ratio predictors are Earning Before Interest to Total Asset (EBITTA), Earning Per Share (EPS), Total Debt to Total Asset (TDTA), Price to Book ratio (PB) and Current Ratio (CR). The selected predictors propose that firms with illiquidity, low operating efficiency and high financial leverage could have high probability of business failure.

The study emphasizes the importance of looking at financial distress in its various stages of financial distress including cash shortage, financial insolvency and total insolvency.

The study also concluded that the four models Linear Discriminant Analysis (LDA), Logistic Regression Model (LRM), Decision Trees (DTs) and Neural Network (NN) achieved a prediction accuracy ranging from 78% to 93% of correct classification of all failed firms for two years prior to ST announcement date. The results also indicated that Logistic Regression and Neural Network models were the optimal prediction models.
2.5 Accuracy of predictive models for financial distress

2.5.1 Financial characteristics that assess and predict corporate financial distress


Their model had two stages; the first stage discriminates financially healthy or distressed firms utilizing binary logit regression. The second stage made use of univariate analysis. The firms were further categorised into four possible outcomes: financially healthy, potentially healthy targets and financially distressed and potentially distressed acquisition targets.

Polemis and Gounopoulos (2012) argued that influential moral hazard models were more appropriate than single period (static) models such as Altman’s Z-score model for predicting bankruptcy. Hazard models are preferred due to three reasons: the first is when the sample period is long, it is important to realize that some companies file for bankruptcy after many years of being at risk. Secondly hazard models encompass explanatory variables that change with time. Lastly they generate more efficient out of sample forecasts by employing additional data.

The population covered by the study was companies in the United Kingdom (UK) as contained in the WorldScope European Disclosure database and were mainly those from manufacturing and retailing.

The analysis in the first stage of the model concentrates on the financial condition of firms (healthy or distressed) and based on a set of 76 distressed/non-survived and continuing UK companies between 1998 and 2003. Distressed companies and healthy companies were pair-matched in accordance with the fiscal year, industry and size measured from their total assets five years prior to liquidation, de-listing and so on. The sample of 76 firms chosen had 38 of them being either bankrupt or distressed in the period of study while 38 were continuing firms.

A stepwise discriminant analysis and a backward discriminant analysis was conducted on the two years data for every firm in the sample from a list of 10 potential significant variables.

Only five variables were found to be statistically significant. These are:
1. working capital to market value plus total debt; a negative value for this ratio signals that the firm might encounter problems in meeting its short-term obligations because there are not enough current assets to cover them.
2. Total debt to market value plus total debt; this ratio measures the extent to which borrowed funds have been used to finance the company’s operations.
3. Pre-tax earnings to market value plus total debt;
4. Earnings before interest and tax to market value plus total debt; a high value of this ratio can provide a sign of solid operational performance.
5. Log of market value plus total debt (LGMVTD); this is a measure of total assets.

Correlation analysis was then done and the explanatory variables 3. and 4. Were found to be highly correlated. Since the financial ratio 3. was more statistically significant that financial ratio 4. The later was discarded with minimum loss of prediction accuracy. Thus the binary logit model by Polemis and Gounopoulos (2012) uses four significant explanatory variables and five years data from every sample. Variable MVTD (market value plus total debt) was transformed into a logarithm because it provided a better fit for the model. They then came up with the estimated model’s variables and weights as follows:

$$Z= -2.8\times \text{Constant} + 1.29\times R1 - 1.34\times R2 + 1.68\times R3 + 0.65\times \text{LGMVTD}.$$ 

The multivariate techniques employed in this study are principal component analysis, factor analysis, discriminant analysis and cluster analysis.

They found that financial distress could be identified as early as three years prior to the event. The model attained an accuracy rate of 79 per cent one year prior to distress, 70 per cent two years prior to distress and 60 per cent three years prior to distress.

The richness and importance of the subject of prediction of financial confirmed by the uncertainty created by the continually changing business environment. More research should be aimed at overcoming the limitations of dichotomous classifications. The study also recommended that the inclusion of macroeconomic variables as well as non-financial ratios to improve the predictive abilities of the model.
2.5.2 Ratios as predictors of financial distress

Mbanwie and Ngam (2009) in their study, financial ratios as bankruptcy indicators examined some financial ratios using financial reports of groups of Swedish bankrupt and active companies for the period 1996 to 2003 with the aim of determining the most significant and reliable ratios for predicting bankruptcy.

The study involved the use of cross sectional analysis to compare similar financial ratios for the two groups of companies with the aim explain the association between the explanatory variables and business failure. Statistical models were then used to test the predictive power of the financial ratios. Data from both groups were collected at a single point in time, at a particular bankruptcy year, in order to minimize the externality effects which arise with changes in time.

The ratios indicated that on average the healthy firms were more likely to repay their short term obligations using cash or near cash assets than firms that are likely to go bankrupt. For bankrupt firms the expenses were in excess of revenue while the active firms managed to generate revenue in excess of costs.

The mean of CSTS ratio for bankrupt and active firms are 50.175 and 43.513 respectively. These values indicate that on average, financially distressed firms take approximately 50 days to recover cash from credit sales as supposed to 44 days for healthy firms. The values for both groups of firms are fairly high. The lower value for group 2 firms also showed that their risk associated with bad debts is lower and therefore benefits from cash flow than group 1 firms. Lower CSTS may also be implied that group 2 firms have better debt control measures than group 1 firms.

The mean of TSTA ratio of bankrupt firms (2.601) is lower than that of active firms (2.284). This signifies that group 2 firms are more profitable than group 1 firms. It also indicates that smaller investments are needed for group 2 firms than in group 1 firms to generate sales from its total assets.

Financial ratios are useful and will provide valuable decision making information about a business if used intelligently and with good judgment. The study reveals that profitability ratios, liquidity ratios and financial leverage ratios are the most significant ratios for predicting the probability of bankruptcy. The significant financial ratios are ranked based on
their predictive ability with the ratios of net profit to total assets ranked first, operating profit to turnover second, liquid assets to current liabilities (quick ratio) third, long term debt to total equity, current assets to current liabilities and total debts to total equity ranked fourth, fifth and sixth respectively.

These results are consistent with those of previous studies that explained business failure using financial ratios. Prior studies indicate that companies are more likely to go bankrupt if it suffers depleting profitability, high leverage, and liquidity problems.

Findings also showed that debtors’ collection period (CSTS) and sales-total assets (TSTA) ratios are not related to bankruptcy. Therefore high debtors’ collection period does not necessarily mean a company is inefficient or that it has potential bad debts. Increasing CSTS might mean that a company has adopted a strategy for attracting new customers (by allowing longer collection period. More so, the claim that companies with low or decreasing sales to total assets (TSTA) ratio are more likely to go bankrupt is rejected. Increase in TSTA does not necessarily mean a company has credible performance. The increase might be caused by decrease in total assets as a result of written down obsolete inventories which is a loss to the company.

Mbanwie and Ngam (2009) observed further investigations may be required to determine why certain ratios fluctuate. Secondly, the predictive ability of financial ratios is discriminative; some financial ratios are more powerful indicators of bankruptcy than others irrespective of their categorization. Thirdly, univariate statistical test is crucial in generating most significant single bankruptcy ratios. The financial ratios are related to each other and a combination of financial ratios will do a better job than a single predictive bankruptcy ratio.

2.5.3 Financial ratios that one should use for analysis of a firm’s financial status

Ratios are many and it is rarely possible or practical to use all of them when analyzing a firm’s financial statement. This is more so because some of them are complex and it would be take a longer time to compute and apply them. The statistical value of each ratio as a predictor is also different. It is therefore necessary to know which ratios to use.

Hossari and Rahman, (2005) in their paper, A Comprehensive Formal Ranking of the Popularity of Financial Ratios in Multivariate Modeling of Corporate collapse, identified and analyzed 48 financial ratios and ranked them according to their usefulness as portrayed in 53
studies that have utilized such ratios. The 53 studies extend from the years 1966 to 2002 and the methodologies adopted are predominantly of the multivariate type.

Not only is such a ranking possible, but also necessary as well as desirable. What has been identified while reviewing the literature on corporate collapse is a collection of dispersed statements here and there alluding to the popularity of certain financial ratios in preceding empirical studies. However, no formal ranking of popularity had been put forward. This becomes important when such fragmented statements are considered within the context in which they were made: usually, to justify the utilization of specific financial ratios based on their popularity in preceding studies Hossari & Rahman, (2005).

The results of the study are based on the popularity of the various variables. Table 2.1 below shows how the 48 ratios identified in their study relate to each other.

The study by Hossari & Rahman (2005) provided a formal ranking of 48 financial ratios based on relative usefulness in 53 studies that have attempted to model corporate collapse using multivariate approach. The 53 studies extend from 1966 to 2002, both years inclusive. The result indicated that on average a particular ratio has been utilized only 12% of relevant empirical investigations of corporate failures. In addition only five of the 48 ratios have been found useful amongst more than one quarter of the relevant literature.

**Table 2.1: Ratios ranked according to their popularity**

<table>
<thead>
<tr>
<th>RATIO</th>
<th>Rank</th>
<th>RATIO</th>
<th>Rank</th>
<th>RATIO</th>
<th>Rank</th>
</tr>
</thead>
<tbody>
<tr>
<td>NI/TA</td>
<td>43%</td>
<td>NI/TE</td>
<td>13%</td>
<td>AR/Inv.</td>
<td>4%</td>
</tr>
<tr>
<td>CA/CL</td>
<td>42%</td>
<td>EBIT/I</td>
<td>11%</td>
<td>C+MS/CL</td>
<td>4%</td>
</tr>
<tr>
<td>TL/TA</td>
<td>40%</td>
<td>TE/TA</td>
<td>9%</td>
<td>C+MS/TA</td>
<td>4%</td>
</tr>
<tr>
<td>WC/TA</td>
<td>34%</td>
<td>Inv/S</td>
<td>9%</td>
<td>CF/CL</td>
<td>4%</td>
</tr>
<tr>
<td>EBIT/TA</td>
<td>30%</td>
<td>QA/S</td>
<td>9%</td>
<td>CF/S</td>
<td>4%</td>
</tr>
<tr>
<td>CF/TL</td>
<td>23%</td>
<td>WC/S</td>
<td>9%</td>
<td>CL/TA</td>
<td>4%</td>
</tr>
<tr>
<td>TL/TE</td>
<td>23%</td>
<td>QA/TA</td>
<td>8%</td>
<td>CL/TE</td>
<td>4%</td>
</tr>
<tr>
<td>RE/TA</td>
<td>21%</td>
<td>S/FA</td>
<td>8%</td>
<td>Div/NI</td>
<td>4%</td>
</tr>
<tr>
<td>S/TA</td>
<td>21%</td>
<td>TE/TL</td>
<td>8%</td>
<td>EBT/TA</td>
<td>4%</td>
</tr>
<tr>
<td>C/TA</td>
<td>19%</td>
<td>C/CL</td>
<td>6%</td>
<td>Exp/S</td>
<td>4%</td>
</tr>
<tr>
<td>CA/S</td>
<td>17%</td>
<td>C/S</td>
<td>6%</td>
<td>Inv/WC</td>
<td>4%</td>
</tr>
<tr>
<td>CA/TA</td>
<td>17%</td>
<td>EBIT/S</td>
<td>6%</td>
<td>LTL/TE</td>
<td>4%</td>
</tr>
<tr>
<td>MVE/TL</td>
<td>15%</td>
<td>EBIT/TE</td>
<td>6%</td>
<td>OpEx/TA</td>
<td>4%</td>
</tr>
<tr>
<td>QA/CL</td>
<td>15%</td>
<td>FA/TA</td>
<td>6%</td>
<td>S/Inv</td>
<td>4%</td>
</tr>
<tr>
<td>CF/TA</td>
<td>13%</td>
<td>FA/TE</td>
<td>6%</td>
<td>S/TE</td>
<td>4%</td>
</tr>
<tr>
<td>NI/S</td>
<td>13%</td>
<td>LTL/TA</td>
<td>6%</td>
<td>TE/LTL</td>
<td>4%</td>
</tr>
</tbody>
</table>
The comprehensive ranking of the usefulness of financial ratios in multivariate modeling of corporate failure provides a common ground for researchers to refer to in selecting financial ratios in future empirical investigations of corporate failures particularly with respect to model building using multivariate approach. The common ground will also make comparative analysis more affordable in future.

### 2.5.4 Predicting financial Distress using Rough Set Methodology

Zongjun et al (2007) did a study to empirically estimate a Rough set model in financial distress prediction of Chinese listed companies. The study also assessed model’s classification accuracy.

The methodology used by Zongjun et al, rough set method, is a mathematical tool used to analyze data which is generally indiscernible based on existing information. Vague information causes indiscernibility of objects due to the nature of data available. This prevents their precise assignment to particular set or class. A rough set is thus considered as a collection of objects that, in general, cannot be precisely characterized in terms of value of the set of attributes. The collection of objects cannot be precisely characterized in terms of the value of the set attributes but a lower and upper approximation can be.

A decision table which contain condition and decision attributes specifies what decision (actions) should be undertaken when some conditions are satisfied. The researchers then performed a rough set analysis using ROSE software provided by the institute of Computing Science of Pognan university of Technology.

The population under study included the companies listed in the Chinese stock exchange which numbered 1,365 in the period 2005 for Shanghai stock exchange (SHSE), 829, and Shenzhen Stock Exchange (SZSE), 536.

The study employed samples consisting of companies experiencing financial distress in the years 1998 through 2005 in the combination with their matching companies which are non-distressed. The matching was done based on the first two digits of the principle four-digit SIC code and the average total assets of the last three years prior to finance distress.
The final sample consisted of 212 financial distressed companies together with 212 matching, referred to as, ST, Serial Treatment, while healthy companies being referred to as non-ST. The data was derived from CCER (China Centre for Economic Research database. The analysis used data one year prior to failure to obtain decision rules. Thus if a financially distressed firm is ST in the year 2005 then data collected is that for year 2004 and the matching company is dealt with the same way.

The study found that the growth ratio per share of equity, net return on assets, earnings per share, interest coverage, ownership concentration coefficient, net profit margin, pledge, retained earnings ratio and total asset turnover have a strong classification power in financial distress prediction of Chinese listed companies. Prediction models that combine both financial and non-financial ratios outperform the ones just containing financial ratios. The prediction accuracy of the model was 88.9 percent with an error factor of 11.1 percent.

In conclusion Zongjun et al study is one of the first efforts to explore the prediction of financial distressed firms in China using rough set. So it adds to the growing financial distress prediction literature and add new dimension to the asset business failure literature. The study is of interest, firstly because China’s stock market has experienced rapid expansion. Secondly Chinese market is independent of US stock market and so provided valuable out of sample test of the current literature which has focused mainly on that market.

The study recommends that it is important to consider all assets of the firm, not just financial information but non-financial characteristics as well. Non-financial variables including ownership concentration coefficient, affiliated debt, pledge (ownership reformation) are powerful to some extent. In particular, ownership structure and governance have great influence in the company’s situation.

2.5 Chapter Summary:

This chapter looked at previous studies on financial ratios and their ability to predict financial distress. Various predictive models are reviewed and compared in the chapter. The next chapter details the research methodology that the study will apply. This includes the research design, population and sample design, data collection methods, research procedure and data analysis.
CHAPTER THREE

3.0 RESEARCH METHODOLOGY

3.1 Introduction

This chapter details the research design and the methodology, followed by a description of the population and sample design. Thereafter the chapter provides the sample size, data collection method and the research procedures. The last sub section provides the procedure applied in the analysis of the data.

3.2 Research Design

A research design is the arrangement of conditions for collection and analysis of data in a manner that aims to combine relevance to the research purpose with economy in procedure. The research design is the conceptual structure within which is conducted; it constitutes the blueprint for the collection, measurement and analysis of data (Kothari & Garg, 2014).

If we can provide a plausible explanation for an event which has occurred, it is desirable to be able to predict when and in what situations the event will occur. A predictive study is as rooted in theory as in explanation (Cooper & Schindler, 2000).

The research design is the blueprint for fulfilling objectives and answering questions. Selecting a design may be complicated by the availability of a large variety of methods, techniques, procedures, protocols and sampling plans (Cooper & Schindler, 2000).

The techniques employed in data collection, sample and variable selection must be carefully thought-out. If the technique is not well planned, it is very likely that we collect data that is not in-line with our research interest thus, rendering analysis and results faulty.

A descriptive study is concerned with specific predictions, narration of facts and characteristics of variables under study (Kothari & Garg, 2014). This research sought to firstly, find the variables that reveal conditions conducive to financial distress. Secondly, the study sought to find how good financial ratios are in predicting financial distress and finally which financial ratios are most accurate in predicting financial distress. This study is predictive in nature and so it is a descriptive study.
This study used regression analysis and discriminant function analysis. This type of research design is used to model dichotomous outcome variables. The aim of the regression analysis is to assess the significance of the model as composed by the variables under study. The primary goals of discriminant function analysis are to find the dimension or dimensions along which groups differ and to find classification functions to predict group membership (Tabachnick & Fidell, 1996). The outcome is modeled as a combination of the predictor variables.

Discriminant function analysis allows one to predict a discrete outcome such as group membership from a set of variables that may be continuous, discrete, dichotomous, or a mix (Tabachnick & Fidell, 1996). The goal of the analysis is to correctly predict category of outcome for individual cases.

Once a relationship between the outcome and the set of predictors is established the next step is to simplify the model by eliminating some predictors while still maintaining strong prediction. Stepwise discriminant analysis will be used to assign some predictors higher priority than others. This will enable selecting the best variables for forming the discriminant function.

In this study we are interested in finding out how variables such as financial ratios (independent variables) affect the categorization of a firm in to financially distressed or non-distressed (dependent variables). The outcome variable is binary (1,2); healthy firms or distressed firms. The independent variables also referred to as predictor variables are the financial ratios which can number over 50 but this study will involve only the first 12 of them, as presented in Table 4.1 and as ranked by Hossari and Rahman, (2005) in their paper, A Comprehensive Formal Ranking of the Popularity of Financial Ratios in Multivariate Modeling of Corporate collapse. The data to be used is continuous over a period of 5 years from the year 2002 to 2006.

This study uses longitudinal design to ensure a satisfactory level of validity and reliability. This type of research design is used for studies that drawing of phenomena at vertical and horizontal levels of analysis and the interconnections between those levels through time with the purpose to detect and explain correlation between the explanatory variables and the condition under investigation (Bryman & Bell, 2007). The study examines financial ratios on more than one case study (financially distressed and non-distressed) because the interest is in variation. Since financial ratios are quantitative, variation between the two groups could
easily be gauged. Data from both groups was collected for the period under study with a view to establish association of variables and to minimize ambiguity in conclusions.

3.3 Population and Sampling Design

3.3.1 Population

The sample is drawn from the companies listed in the Nairobi Stock Exchange in the non-financial sector between the years 2002 to 2006. The total number of these companies is 41 and they are specified in APPENDIX 3.

3.3.2 Sampling design

Sampling is defined as the selection of some part of an aggregate or totality on the basis of which a judgment or inference about the aggregate or totality is made. It is the process of obtaining information about an entire population by examining only a part of it (Kothari & Garg, 2014). A sample design is a definite plan for obtaining a sample from a given population. It refers to the technique or the procedure the researcher would adopt in selecting items for the sample.

If the comparison of distressed and non-distressed firms is to be meaningful, the sample of non-distressed firms should be drawn from the same population as that of the distressed firms. All the companies are taken from the non financial sector.

Financially healthy firms were listed alongside the financially distressed firms on the other hand but marked or grouped as ‘1’ and ‘2’ respectively. The sample design offers a sampling technique for selecting non-distressed firms from a relevant population, because it draws non-distressed firms only from the same industry class or where distress has actually occurred. The sample design is not the only acceptable approach but is a convenient one, in view of the earlier study (Beaver, 1966).

3.3.2.1 Sample Frame

A decision has to be taken concerning a sample unit before selecting the sample. The list of sampling units is the sample frame. Sample frame contains all items of a universe (Kothari &
In this study the sample frame is the non-financial sector of the Nairobi Stock Exchange.

### 3.3.2.2 Sample Technique

The technique applied is judgment sampling which is a non-probability sampling technique and involves the researcher’s judgment being used for selecting items which he/she considers as representative of the population (Kothari & Garg, 2014). Judgment was used to select those companies whose financial statements had complete information. Those with incomplete information were left out as they would have affected the validity of the information.

### 3.3.2.3 Sample Size

As a general rule the sample must be of an optimum size; it should neither be excessively large nor too small. Technically, the sample size should be large enough to give a confidence interval of desired width (Kothari & Garg, 2014).

Krejcie and Morgan (1970) greatly simplified the size decision by providing a table that ensures good decision model. The table provides generalized scientific guide lines for sample size decisions (Uma, 2003). Table 3.1 below is an extract of the generalized scientific guideline:

<table>
<thead>
<tr>
<th>N</th>
<th>S</th>
</tr>
</thead>
<tbody>
<tr>
<td>10</td>
<td>10</td>
</tr>
<tr>
<td>15</td>
<td>14</td>
</tr>
<tr>
<td>20</td>
<td>19</td>
</tr>
<tr>
<td>25</td>
<td>24</td>
</tr>
<tr>
<td>30</td>
<td>28</td>
</tr>
<tr>
<td>35</td>
<td>32</td>
</tr>
<tr>
<td>40</td>
<td>36</td>
</tr>
<tr>
<td>45</td>
<td>40</td>
</tr>
<tr>
<td>50</td>
<td>44</td>
</tr>
<tr>
<td>55</td>
<td>48</td>
</tr>
</tbody>
</table>
Where: N is the population

S is the appropriate sample size

### Table 3.2: Sample Size

<table>
<thead>
<tr>
<th>Company Group</th>
<th>Total Number</th>
<th>% of Population</th>
<th>Sample Size</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Financially Distressed</td>
<td>33</td>
<td>80.5</td>
<td>26</td>
</tr>
<tr>
<td>Financially Distressed</td>
<td>8</td>
<td>19.5</td>
<td>7</td>
</tr>
<tr>
<td>Total</td>
<td>41</td>
<td>100</td>
<td>33</td>
</tr>
</tbody>
</table>

All the companies whose financial statements were found complete for the period under study were considered in the study. The sample is thus a good representation of the population.

### 3.4 Data Collection Methods

The study used secondary data. This included the financial statements of the various companies listed in the Nairobi Stock Exchange in the non-financial sector. The study used the financial statements as contained in the Nairobi Stock Exchange Handbooks for the years 2005, 2007 and 2012. From the list of companies the study considered only those in the non-financial sector. Some ratios are provided in the financial statements. However those ratios not provided and the averages were computed using excel spreadsheets. It is the averages that formed the data to for analysis.

### 3.5 Research Procedure

Financial statements of companies listed in the Nairobi Stock Exchange and in the non-financial sector were taken. Twelve financial ratios were computed for each company. The 12 ratios listed as the most popular by previous studies. The means of each ratio over the period understudy are then computed for each company. The mean is important as it summarizes the data and is a central tendency.
The companies are listed with the means of the various ratios. The companies are then grouped into financially healthy indicated as ‘1’ and financially distressed indicated as ‘2’. The criteria to distinguish the financially distress is those companies that made losses for two (2) straight years or where the share holders equity is lower than the registered capital.

The study then carried out discriminant function analysis on the data and came up with a predictive model. One method of including variables in multiple regression is the stepwise method. This is used when there are a large number of possible independent variables that are to be explored so as to find a smaller set of these variables to use in predicting the dependent variable, eliminating other variables that add only insignificant or trivial amount of explained variation in the dependent variable beyond the smaller set (Allen, 2010).

The stepwise discriminant analysis can either be forward stepwise method or backward elimination method. In forward stepwise method the analysis starts without any variables and successively adds and deletes variables until a pre-specified stopping criterion is satisfied. The stopping criterion is usually based on the $p$ value of the F statistic associated with a test of determining if including or deleting the next variable adds significantly to explaining the group separation, beyond the contribution of those variables that are already present in the model (Grimm & Yarnold, 1994)

Stepwise backward elimination methods starts the analysis with all the variables included in the model and successively eliminating the least important variables from the model, until only significant variables remain (Grimm & Yarnold, 1994).

Situations arise when a number of potential discriminator variables are known, but there is no indication as to which would be the best set of variables for forming the discriminant function. Stepwise discriminant analysis is a useful technique for selecting the best set of discriminating variables to form the discriminant function (Sharma, 1996).

The study will use backward stepwise method where by all the variables will be entered in the equation then the variable with the lowest partial correlation is removed from the batch and the equation computed again. This identifies the next variable to be eliminated based on the partial correlation. The process is repeated until the only remaining variable left in the equation are those that add significant or meaningful amount of explained variation in the dependent variable.
3.6 Data Analysis Methods

The study computed the selected financial ratios for each of the companies in the sample. The study then computed the average for each ratio for each company in the sample over the period under study. The data was summarized in a table form with the columns including company number, group and the twelve ratios in the other columns. The data was then fed into computer statistical software, (Statistical Package for Social Sciences) for analysis. SPSS helped to measure central tendencies; relationship between variables and determine to what extent independent variables affected the dependent variable. The analyzed data was then presented in table form to facilitate ease of interpretation.

3.7 Chapter Summary

This chapter focused on the methodology that was used in conducting the study. The research design that was applied was descriptive. The population, the sample frame, the Sample size and the sampling technique used have been specified. Secondary data will be used. Data will be analyzed using SPSS and summarized for presentation in tables and figures. The next chapter presents the research findings as guided by the research questions.
CHAPTER FOUR

4.0 RESULTS AND FINDINGS

4.1 Introduction

This chapter gives the results and findings of the study by presenting and explaining the data. The study intended to find out whether there are financial variables that reveal financial distress, how good financial ratios are in predicting financial distress and which financial ratios are most accurate in predicting financial distress.

The study is based on secondary data which was obtained from financial statements in the Nairobi Stock Exchange (NSE) year books for the years 2005, 2007 and 2012. The population included financial ratios computed from the financial statements companies listed in the NSE which are in the non financial sector.

The chapter has two parts; the first part gives an analysis of the general information as observed in the statements and tables. The second part analyses and explores the observations in relation to the research questions which the study set out to answer.

4.2 General Information

4.2.1 Financial Statements

The study looks at financial statements for non financial sector companies listed in Nairobi stock Exchange (NSE) for the period 2002 to 2011. For purposes of the research questions the study considered the statements for the five years from 2002 to 2006. The financial statements under study are for 33 companies out of a total of 44 as some companies were left out due to lack of complete data. A list of the companies is given in Appendix III.

4.2.2 Financial Ratios

From the financial statements twelve (12) ratios were computed for each of the companies. The 12 ratios are listed and explained in Table 4.1 below. The ratios were considered for a period of five years from 2002 to 2006. The means of each of the ratios for the same period was computed.
Table 4.1: Financial Ratios used in the Study

<table>
<thead>
<tr>
<th>Ratio</th>
<th>Abbreviation</th>
<th>Definition</th>
</tr>
</thead>
<tbody>
<tr>
<td>Net Income to Total Assets</td>
<td>NI/TA</td>
<td>Shows Liquidity; short term solvency</td>
</tr>
<tr>
<td>Current Assets to Current Liabilities</td>
<td>CA/CL</td>
<td>Shows Liquidity; short term solvency</td>
</tr>
<tr>
<td>Total Liabilities to Total Assets</td>
<td>TL/TA</td>
<td>Shows Liquidity; long term solvency</td>
</tr>
<tr>
<td>Working Capital to Total Assets</td>
<td>WC/TA</td>
<td>Shows Liquidity; short term solvency</td>
</tr>
<tr>
<td>Earnings Before Interest and Tax to Total Assets</td>
<td>EBIT/TA</td>
<td>Shows Liquidity; long term solvency</td>
</tr>
<tr>
<td>Total Liabilities to Total Equity</td>
<td>TL/TE</td>
<td>Shows Liquidity; long term solvency</td>
</tr>
<tr>
<td>Retained Earnings to Total Assets</td>
<td>RE/TA</td>
<td>Shows Liquidity; long term solvency</td>
</tr>
<tr>
<td>Sales to Total Assets</td>
<td>S/TA</td>
<td>Show efficiency in asset usage</td>
</tr>
<tr>
<td>Current Assets to Sales</td>
<td>CA/S</td>
<td>Show operational efficiency</td>
</tr>
<tr>
<td>Current Assets to Total Assets</td>
<td>CA/TA</td>
<td>Shows short term solvency</td>
</tr>
<tr>
<td>Market Value of Equity to Total Liabilities</td>
<td>MVE/TL</td>
<td>Long term solvency</td>
</tr>
<tr>
<td>Net Income to Sales</td>
<td>NI/S</td>
<td>Show operational efficiency</td>
</tr>
</tbody>
</table>

4.2.3 Grouping of Companies

The study used the criteria of grouping a company as financially distressed, Group 2, if a company makes losses for two straight years during the five year period of 2002 to 2006 and/or if the shareholders equity is lower than registered capital; otherwise it is grouped as non-distressed or healthy, Group 1. Table 4.2 gives the list of companies while Table 4.3 gives the list of companies as numbered in the previous table with each company’s mean ratios and respective group indicated. The ratios indicated for each company are the first twelve ratios as ranked according to popularity by previous studies as indicated in Table 2.1. The twelve ratios are NI/TA, CA/CL, TL/TA, WC/TA, EBIT/TA, TL/TE, RE/TA, S/TA, CA/S, CA/TA, MVE/TL and NI/S as explained in Table 4.1 above.

The financially distressed companies are indicated as Group 2 and the non-distressed are indicated as Group 1 in the second column of Table 4.3.
<table>
<thead>
<tr>
<th></th>
<th>Names of Companies in the analysis</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>A. Bauman</td>
</tr>
<tr>
<td>2</td>
<td>Athi-River Mining Limited</td>
</tr>
<tr>
<td>3</td>
<td>Bamburi Cement Company Limited</td>
</tr>
<tr>
<td>4</td>
<td>Boc Kenya Limited</td>
</tr>
<tr>
<td>5</td>
<td>British American Tobacco Kenya Limited</td>
</tr>
<tr>
<td>6</td>
<td>Car And General (Kenya) Limited</td>
</tr>
<tr>
<td>7</td>
<td>City Trust</td>
</tr>
<tr>
<td>8</td>
<td>Cmc Holdings Limited</td>
</tr>
<tr>
<td>9</td>
<td>Crown-Berger Kenya Limited</td>
</tr>
<tr>
<td>10</td>
<td>Eaagads Limited</td>
</tr>
<tr>
<td>11</td>
<td>East African Breweries Limited</td>
</tr>
<tr>
<td>12</td>
<td>East African Cables Limited</td>
</tr>
<tr>
<td>13</td>
<td>East African Portland Cement Company</td>
</tr>
<tr>
<td>14</td>
<td>Express Kenya Limited</td>
</tr>
<tr>
<td>15</td>
<td>Kakuzi Limited</td>
</tr>
<tr>
<td>16</td>
<td>Kapchorua Tea Company Limited</td>
</tr>
<tr>
<td>17</td>
<td>Kenya Airways Limited</td>
</tr>
<tr>
<td>18</td>
<td>Kenya Oil Company Limited</td>
</tr>
<tr>
<td>19</td>
<td>Limuru Tea Company Limited</td>
</tr>
<tr>
<td>20</td>
<td>Marshalls (Ea) Ltd</td>
</tr>
<tr>
<td>21</td>
<td>Mumias Sugar Company Ltd</td>
</tr>
<tr>
<td>22</td>
<td>Nation Media Group Limited</td>
</tr>
<tr>
<td>23</td>
<td>Olympia Capital Holdings Limited</td>
</tr>
<tr>
<td>24</td>
<td>Rea Vipingo Plantations Ltd</td>
</tr>
<tr>
<td>25</td>
<td>Sameer Africa Limited</td>
</tr>
<tr>
<td>26</td>
<td>Sasini Tea And Coffee Limited</td>
</tr>
<tr>
<td>27</td>
<td>Standard Group Limited</td>
</tr>
<tr>
<td>28</td>
<td>The Kenya Power &amp; Lighting Co. Ltd</td>
</tr>
<tr>
<td>29</td>
<td>Total Kenya Ltd</td>
</tr>
<tr>
<td>30</td>
<td>TPS Eastern Africa Limited (Serena Hotels)</td>
</tr>
<tr>
<td>31</td>
<td>Unga Group Limited</td>
</tr>
<tr>
<td>32</td>
<td>Unilever Tea</td>
</tr>
<tr>
<td>33</td>
<td>Williamson Tea Kenya Limited</td>
</tr>
</tbody>
</table>
This study used the SPSS software for data analysis. The commands were as follows:

```
GET DATA /TYPE=XLS /FILE='H:\DOCS\FINANCIAL RATIOS FOR DATA ANALYSIS WITH SPSS.xls' /SHEET='name 'Sheet1' /CELLRANGE=full /READNAMES=on
```
4.3 Variables that reveal financial distress

One of the questions that the study set to answer was whether there are variables that reveal financial distress or conditions conducive to financial distress. To determine the financially distressed companies the study looked two conditions; the first is if the company made losses for at-least two consecutive years and/or the second of if the company’s shareholders equity is lower that the registered capital. This guided the separation of companies into the two groups namely; Group 1, the financially healthy firms and Group 2, the financially distressed firms. The result of the analysis was that 93.5% of the firms were classified correctly. This indicates that variables that reveal financial distress are those related to profitability and shareholders’ equity. Table 4.4 gives a summary of results while Table 4.5 gives the details of the classification results.

The results indicate that two companies, Unilever Tea and Williamson Tea were wrongly classified as financially healthy, that is belonging to Group 1, but the analysis found them to belong to the financially distressed category, Group 2. All the companies that had been categorized as financially distressed were found to be so after the analysis.

**Table 4.4: Classification Results**

<table>
<thead>
<tr>
<th>GROUP</th>
<th>Predicted Group Membership</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Original Count</td>
<td></td>
<td></td>
</tr>
<tr>
<td>1</td>
<td>24</td>
<td>2</td>
</tr>
<tr>
<td>2</td>
<td>0</td>
<td>7</td>
</tr>
<tr>
<td>%</td>
<td>92.3</td>
<td>7.7</td>
</tr>
</tbody>
</table>

a. 93.9% of original grouped cases correctly classified.
The summary classification results above indicate that two (2) of the firms belonging to Group 1, financially healthy, were misclassified into Group 2, financially distressed firms while all the Group 2 firms were classified correctly. This gives an overall classification rate of 93.9%.

Table 4.5: Casewise Statistics

| Case Number | Actual Group | Predicted Group | P(G1 | G2) | Squared Mahalanobis Distance to Centroid | Group | P(G2 | G1) | Squared Mahalanobis Distance to Centroid | Discriminant Scores |
|-------------|--------------|-----------------|-------|-------|----------------------------------------|-------|-------|----------------------------------------|----------------------|
| Original    | 2            | 2               | 1.000 | 1.956 | 2                                    | 1     | 0.003 | 28.936                                | -4.560               |
| 2           | 1            | 1               | 0.878 | 0.958 | 2                                    | 2     | 0.002 | 12.288                                | 1.171                |
| 3           | 1            | 1               | 0.978 | 0.981 | 2                                    | 2     | 0.019 | 7.890                                 | 0.745                |
| 4           | 1            | 1               | 0.999 | 0.988 | 2                                    | 2     | 0.012 | 8.767                                 | 0.527                |
| 5           | 1            | 1               | 0.284 | 0.999 | 2                                    | 2     | 0.001 | 16.277                                | 1.701                |
| 6           | 1            | 1               | 0.507 | 0.998 | 2                                    | 2     | 0.002 | 13.147                                | 1.292                |
| 7           | 1            | 1               | 0.525 | 0.958 | 2                                    | 2     | 0.002 | 12.949                                | 1.264                |
| 8           | 1            | 1               | 0.598 | 0.997 | 2                                    | 2     | 0.003 | 12.178                                | 1.156                |
| 9           | 1            | 1               | 0.726 | 0.966 | 2                                    | 2     | 0.034 | 6.821                                 | 0.276                |
| 10          | 2            | 2               | 0.545 | 0.958 | 1                                    | 1     | 0.102 | 4.900                                 | -1.580               |
| 11          | 1            | 1               | 0.675 | 0.996 | 2                                    | 2     | 0.004 | 11.437                                | 1.048                |
| 12          | 1            | 1               | 0.523 | 0.998 | 2                                    | 2     | 0.002 | 12.970                                | 1.267                |
| 13          | 1            | 1               | 0.623 | 0.987 | 2                                    | 2     | 0.003 | 11.934                                | 1.121                |
| 14          | 2            | 2               | 0.125 | 1.000 | 1                                    | 1     | 0.000 | 29.841                                | -4.834               |
| 15          | 1            | 1               | 0.384 | 0.859 | 2                                    | 2     | 0.141 | 4.375                                 | -2.242               |
| 16          | 2            | 2               | 0.234 | 0.703 | 1                                    | 1     | 0.297 | 3.141                                 | -1.144               |
| 17          | 1            | 1               | 0.661 | 0.997 | 2                                    | 2     | 0.003 | 11.570                                | 1.068                |
| 18          | 1            | 1               | 0.737 | 0.995 | 2                                    | 2     | 0.005 | 10.877                                | 0.964                |
| 19          | 1            | 1               | 0.689 | 0.961 | 2                                    | 2     | 0.039 | 6.562                                 | 0.228                |
| 20          | 1            | 1               | 0.592 | 0.997 | 2                                    | 2     | 0.003 | 12.240                                | 1.160                |
| 21          | 1            | 1               | 0.657 | 0.956 | 2                                    | 2     | 0.044 | 6.343                                 | 0.185                |
| 22          | 1            | 1               | 0.662 | 0.957 | 2                                    | 2     | 0.003 | 11.554                                | 1.065                |
| 23          | 1            | 1               | 0.978 | 0.967 | 2                                    | 2     | 0.013 | 8.609                                 | 0.600                |
| 24          | 1            | 1               | 0.888 | 0.961 | 2                                    | 2     | 0.019 | 7.961                                 | 0.488                |
| 25          | 1            | 1               | 0.447 | 0.854 | 2                                    | 2     | 0.106 | 4.850                                 | -1.322               |
| 26          | 2            | 2               | 0.331 | 0.926 | 1                                    | 1     | 0.074 | 5.458                                 | -1.708               |
| 27          | 2            | 2               | 0.320 | 0.909 | 2                                    | 2     | 0.001 | 15.654                                | 1.623                |
| 28          | 2            | 2               | 0.363 | 0.844 | 2                                    | 2     | 0.156 | 4.210                                 | -1.423               |
| 29          | 2            | 2               | 0.831 | 0.978 | 2                                    | 2     | 0.022 | 7.599                                 | 0.423                |
| 30          | 1            | 1               | 0.662 | 0.957 | 2                                    | 2     | 0.043 | 6.374                                 | 0.191                |
| 31          | 2            | 2               | 0.211 | 0.564 | 1                                    | 1     | 0.336 | 2.929                                 | -1.083               |
| 32          | 1            | 2               | 0.321 | 0.810 | 1                                    | 1     | 0.190 | 3.884                                 | -1.343               |
| 33          | 1            | 2               | 0.321 | 0.810 | 1                                    | 1     | 0.190 | 3.884                                 | -1.343               |

** Misclassified case

The structure matrix, in Table 4.6 shows the correlation of each predictor variable with the discriminant function. The ordering in the structure matrix is the same as that suggested by the tests of equality of group means and is different from that in the standardized coefficients table. This disagreement is likely due to the colinearity between some variables.
Based on the Wilks λ s (Lamdas) and the equivalent F-ratios given in Table 4.7 below it is evident that NI/TA and EBIT/TA would be the best discriminators because they have the lowest value for Wilks λ. However the stepwise discriminant analysis did not select EBIT/TA because the variables are correlated among themselves. In other words there is multicollinearity in the data. This means that even though the two ratios are both important, with the inclusion of NI/TA the other ratio, EBIT/TA will not cause significant difference, that is, it will be redundant. Variables with high correlation with other variables are similarly excluded.

Table 4.7: Tests of Equality of Group Means

<table>
<thead>
<tr>
<th>Variable</th>
<th>Wilks' Lambda, λ</th>
<th>F</th>
<th>df1</th>
<th>df2</th>
<th>Sig.</th>
<th>Ranking.</th>
</tr>
</thead>
<tbody>
<tr>
<td>NI/TA</td>
<td>.656</td>
<td>16.220</td>
<td>1</td>
<td>31</td>
<td>.000</td>
<td>1</td>
</tr>
<tr>
<td>CA/CL</td>
<td>.959</td>
<td>1.337</td>
<td>1</td>
<td>31</td>
<td>.256</td>
<td>8</td>
</tr>
<tr>
<td>TL/TA</td>
<td>.993</td>
<td>.212</td>
<td>1</td>
<td>31</td>
<td>.648</td>
<td>10</td>
</tr>
<tr>
<td>WC/TA</td>
<td>.903</td>
<td>3.321</td>
<td>1</td>
<td>31</td>
<td>.078</td>
<td>.5</td>
</tr>
<tr>
<td>EBIT/TA</td>
<td>.670</td>
<td>15.238</td>
<td>1</td>
<td>31</td>
<td>.000</td>
<td>2</td>
</tr>
<tr>
<td>TL/TE</td>
<td>.863</td>
<td>4.941</td>
<td>1</td>
<td>31</td>
<td>.034</td>
<td>3</td>
</tr>
<tr>
<td>RE/TA</td>
<td>.985</td>
<td>.486</td>
<td>1</td>
<td>31</td>
<td>.491</td>
<td>9</td>
</tr>
<tr>
<td>S/TA</td>
<td>.997</td>
<td>.099</td>
<td>1</td>
<td>31</td>
<td>.755</td>
<td>11</td>
</tr>
<tr>
<td>CA/S</td>
<td>.997</td>
<td>.083</td>
<td>1</td>
<td>31</td>
<td>.775</td>
<td>12</td>
</tr>
<tr>
<td>CA/TA</td>
<td>.897</td>
<td>3.553</td>
<td>1</td>
<td>31</td>
<td>.069</td>
<td>4</td>
</tr>
<tr>
<td>MVE/TL</td>
<td>.956</td>
<td>1.427</td>
<td>1</td>
<td>31</td>
<td>.241</td>
<td>7</td>
</tr>
</tbody>
</table>
4.3 How good are financial ratios in predicting financial distress

The variables are financial ratios which have been found to be the most popular as seen in previous studies. They include NI/TA, CA/CL, TL/TA, WC/TA, EBIT/TA, TL/TE, RE/TA, S/TA, CA/S, CA/TA, MVE/TL and NI/S. These are listed and defined in Table 4.1.

To find the predictive power of the ratios the study looked at Significance levels, R-square statistic, Beta statistic, Residual statistic and the F-statistic.

Table 4.8; ANOVA\(^b\)

<table>
<thead>
<tr>
<th>Model</th>
<th>Sum of Squares</th>
<th>Df</th>
<th>Mean Square</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Regression</td>
<td>3.630</td>
<td>12</td>
<td>.303</td>
<td>3.210</td>
<td>.010(^a)</td>
</tr>
<tr>
<td>Residual</td>
<td>1.885</td>
<td>20</td>
<td>.094</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>5.515</td>
<td>32</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


b. Dependent Variable: GROUP

Significance levels of 0.05 and below indicates that the variable in question is statistically significant while significance levels of above 0.05 indicate that the variable is less statistically significant. Generally the nearer the significance level is to 0.000 the higher the statistical significance of a variable. Table 4.8 ANOVA, indicates that the significance levels of the variables average as 0.010. This implies that the variables are highly statistically significant and therefore good predictors.
The residuals statistics are the differences between the actual outcome and the predicted values of the outcome based on the model. The residual statistic confirms how well the predicted values as depicted by the regression line fit the dataset. As depicted by table 4.8 above, a model composed of the 12 ratios understudy has a residual statistic with a sum of squares of 1.885 and a mean square of 0.094. This implies that the variation not explained by the model is only about 34 per cent, that is, 1.885 divided by the total of 5.515. This indicates that the predicted value of the outcome will be a good estimate of the actual outcome.

From Table 4.8 the average significance level is \( p = 0.010 \). This further indicates that the model applied is good in predicting the outcome variable. Thus the regression model predicted the outcome considerably well.

**Table 4.9: Model Summary**

<table>
<thead>
<tr>
<th>Model</th>
<th>R</th>
<th>R Square</th>
<th>Adjusted R Square</th>
<th>Std. Error of the Estimate</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>.811(^a)</td>
<td>.658</td>
<td>.453</td>
<td>.307</td>
</tr>
</tbody>
</table>


From Table 4.9 R – value represents simple correlation and an R-value of 0.811 indicates a high degree of correlation. The R Square statistic of the variables, as shown in Table 4.9, is 0.658 which is significantly different from zero. This R Square statistic of 0.658 implies that the 12 independent variables in the regression model would account for 65.8 percent of the total variation of the outcome. Thus 65.8 per cent of the variation is explained by the model. The higher the R Square the better the model fits the data.

**4.4 Financial ratios that are most accurate in predicting financial distress**

After conducting the stepwise discriminant analysis on the five years data for every company in the sample only four (4) variables out of the initial twelve (12) were found to be statistically significant. These are NI/TA, TL/TA, TL/TE and CA/S which are listed in Table 4.9 and are also shown by the structure matrix, Table 4.6, as having been retained, are explained as follows:
Net Income (NI) to Total Assets (TA) hereafter denoted as $X_1$ measures how efficiently the assets of the company are applied in earning the profits. The higher this ratio the better the assets are being applied. A negative figure here is a sign of problems as it indicates the firm is using up the assets.

Total Liability (TL) to Total Assets (TA) hereafter denoted as $X_2$ measures how well the liabilities are covered by the existing assets. The company is better off if this ratio is less than one as this will mean the assets are adequate to cover the liabilities. This is a debt ratio and measures the extent of the firm’s financing with dept. The amount and proportion of debt in a company’s capital structure is extremely important to the financial analyst because debt level shows the trade-off between risk and return (Fraser & Ormiston, 1998).

Total Liability (TL) to Total Equity (TE) hereafter denoted as $X_3$, measures the extent to which the company uses debt to finance its operations. This can lead to increased interest expenses and in this way affect the earnings. The share holders benefit more if the earnings from the increased debt is higher than the cost of debt, interest. If the cost of debt financing outweighs the earnings that the company generates from the debt, this may lead to financial distress and if not checked bankruptcy.

Current Assets (CA) to Sales (S) hereafter denoted as $X_4$ measures how well the company is using its assets to generate revenue. This ratio represents the return on total assets, ROA or ROI and measures the overall efficiency of the firm in managing its total investments in assets and in generating return to share holders.

### 4.4.1 Computation of the financial distress prediction model

Using the stepwise discriminant analysis it was found that only four variables were statistically significant. These are NI/TA, TL/TE, TL/TA and CA/S denoted as $X_1$, $X_2$, $X_3$ and $X_4$ respectively. The coefficients, the constant and the slope are computed by the discriminant analysis as depicted in Table 4.11.

The stepwise statistics in Table 4.10 below shows that four variables were selected in the process. The four were included since each of them was found to be contributing or adding some predictive power to the model. As indicated in Table 4.10 all the four variables including NI/TA, TL/TA, TL/TE and CA/S are statistically significant. The other variables were not included because they were not contributing to the predictive power of the discriminant function.
Table 4.10: Stepwise Statistics

<table>
<thead>
<tr>
<th>Statistic</th>
<th>df1</th>
<th>df2</th>
<th>df3</th>
<th>Exact F Statistic</th>
<th>df1</th>
<th>df2</th>
</tr>
</thead>
<tbody>
<tr>
<td>.656</td>
<td>1</td>
<td>1</td>
<td>31.000</td>
<td>16.220</td>
<td>1</td>
<td>31.000</td>
</tr>
<tr>
<td>.578</td>
<td>2</td>
<td>1</td>
<td>31.000</td>
<td>10.971</td>
<td>2</td>
<td>30.000</td>
</tr>
<tr>
<td>.470</td>
<td>3</td>
<td>1</td>
<td>31.000</td>
<td>10.915</td>
<td>3</td>
<td>29.000</td>
</tr>
<tr>
<td>.390</td>
<td>4</td>
<td>1</td>
<td>31.000</td>
<td>10.929</td>
<td>4</td>
<td>28.000</td>
</tr>
</tbody>
</table>

At each step, the variable that minimizes the overall Wilks' Lambda is entered.

a. Maximum number of steps is 24.

b. Minimum partial F to enter is 3.84.

c. Maximum partial F to remove is 2.71.

d. F level, tolerance, or VIN insufficient for further computation.

The analysis estimates a classification model as depicted by Table 4.11 below. The table provides an index of the significance or importance of each predictor variable. The sign, +ve or –ve, indicates the direction of the relationship. Net Income to Total Assets (NI/TA) ratio was found to be the strongest predictor. Total Liability to Total Assets (TL/TA) was found to be next in importance. Total Liability to Total Equity (TA/TE) and Current Assets to Sales (CA/S) ratios were found to be less important as predictors, that is, they contributed but very little to the predictive power of the function. However they add some predictive power to the model so that the combination of predictor variables is still much better than if only the strongest predictor was used.
Table 4.11: Canonical Discriminant Function Coefficients

<table>
<thead>
<tr>
<th>Function</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>NI/TA</td>
<td>16.822</td>
</tr>
<tr>
<td>TL/TA</td>
<td>7.025</td>
</tr>
<tr>
<td>TL/TE</td>
<td>-.417</td>
</tr>
<tr>
<td>CA/S</td>
<td>1.488</td>
</tr>
<tr>
<td>(Constant)</td>
<td>-4.104</td>
</tr>
</tbody>
</table>

Unstandardized coefficients

From the analysis the model is

\[ Z = -4.104 + 16.822X_1 + 7.025X_2 - 0.417X_3 + 1.488X_4 \]

The model uses the four explanatory variables and the five years of data for the companies listed in the sample. It uses a cut-off point of 0.5 for classification of companies as healthy or financially distressed. The classification results are presented in Table 4.4.

All the healthy companies were classified correctly giving the model a classification accuracy of 100% in this regard. Seven distressed companies were classified correctly giving a classification accuracy of 77.78%. Overall the model was 93.94% accurate in classification.

The analysis of financial statements of the sampled companies for the period 2002 to 2006 classified nine companies as likely to be financially distressed. According to the Nairobi Stock Exchange Handbook for 2012 and the financial statements therein, four of the companies were no longer listed while the other five are either not doing well or struggling. These details are summarized in Table 4.12 below.

Table 4.12: Current Status of Companies categorized as Distressed, Group 2

<table>
<thead>
<tr>
<th>COMPANY</th>
<th>STATUS AS AT END OF YEAR 2011</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 A Bauman</td>
<td>Not listed</td>
</tr>
<tr>
<td>10 Eagaads Limited</td>
<td>Not doing well</td>
</tr>
<tr>
<td>14 Express Kenya Limited</td>
<td>Not doing well</td>
</tr>
<tr>
<td>16 Kapchorua Tea Company Limited</td>
<td>Not doing well</td>
</tr>
<tr>
<td>26 Sasini Limited</td>
<td>Not doing well</td>
</tr>
<tr>
<td>28 Kenya Power &amp; Lighting Company</td>
<td>Not doing well</td>
</tr>
<tr>
<td></td>
<td>Company Name</td>
</tr>
<tr>
<td>---</td>
<td>------------------------------</td>
</tr>
<tr>
<td>31</td>
<td>Unga Limited</td>
</tr>
<tr>
<td>32</td>
<td>Unilever Tea</td>
</tr>
<tr>
<td>33</td>
<td>Williamson Tea Kenya</td>
</tr>
</tbody>
</table>

4.5 Summary

This chapter presents the findings in respect of the data under study. The first part introduces the chapter and this is followed by general information on the study. The next part deals with the findings on factors/conditions that reveal financial distress. This is followed by findings on whether the ratios under study are a good predictor of financial distress. The last part presents findings on the most accurate ratios, among those under study, for predicting financial distress and these ratios are used in estimating a model for predicting financial distress. The next chapter provides a summary, discussion and conclusion as well as recommendations.
5.0 SUMMARY, DISCUSSIONS, CONCLUSIONS AND RECOMMENDATIONS

5.1 Introduction

This chapter consists of four sections which include summary, discussion, conclusion and recommendation. The summary includes the important aspects of the study which includes the purpose of the study, research questions, or specific objectives, research methodology and findings. The next part discusses the findings which respect to the research questions. This is followed by a discussion on the conclusion based on the specific objective as per the findings and results. The chapter then ends with recommendation for practice or for improvement and suggestions for future studies.

5.2 Summary

The objective of the study was generally to explore and explain whether ratios can predict financial distress. The purpose of the research was to determine which financial ratios are the best predictors. The study was guided by three objectives to: find out what reveal financial distress, how good are financial ratios in predicting financial distress and which financial ratios or set of ratios are most accurate in predicting financial distress and use the set to estimate a model for predicting financial distress.

The study applied a predictive research design and involved secondary data. The sample frame was obtained from the list of non financial sectors companies listed in the Nairobi stock exchange. The population was comprised of financial ratios obtained from financial statement of companies listed in the Nairobi Stock exchange. To determine the sample size a purposive sampling method was used to select the companies. Specifically judgment sampling was used to select companies from the non financial sector and to involve only those companies which had complete information.

The study computed 12 financial ratios of each of the selected companies. The 12 ratios included NI/TA, CA/CL, TL/TA, WC/TA, EBIT/TA, TL/TE, RE/TA, S/TA, CA/S, CA/TA, MVE/TL and NI/S. These are listed and defined in Table 4.1. These ratios were selected from a list of most popular financial ratios as determined for previous studies. The means of each ratio was computed for each of the company to form the data for analysis.
The companies were categorized into two groups, healthy firms and financially distressed firms, using profitability and shareholders’ equity as compared with registered capital as a separation criteria. SPSS was then used to explore data and to generate descriptive statistics including mean, standard deviation, Wilks Lambda, Covariance, Eigenvalue, Chi-square, among others. The results are presented in tables.

The study found that variables that reveal the financial health of a company include those ratios under profitability, leverage, liquidity and operational efficiency. Liquidity is closely linked profitability. When a company is profitable, it unlikely to have liquidity problems. Operational efficiency is also important as it indicates how well the company is utilizing resources. The extent to which the company is financed by borrowed funds indicates how the company is exposed to solvency risks. The higher the proportion of debts the higher the risk.

The study also found that ratios are good predictors. The predictive model composed of the ratios was found to be statistically significant indicating that ratios have predictive powers and this was indicated by all the statistics in the analysis; including significance levels, R-square, Residual statistic and F-statistic.

The study found that the strongest predictor was Net Income to Total Assets ratio. It was followed by Total Liability to Total Assets ratio. The ratios of Total Liability to Total Equity and Current Assets to Sales were also found to be useful though to a lesser extent. However it is important to note that a combination of ratios gave a better predictive model compared to a single ratio.

5.3 Discussions

5.3.1 Conditions that reveal financial distress

The study mainly used profitability to group the companies to healthy ones and those with financial distress. The analysis found that the classification was 93.5% correct. This shows that profitability is a major factor in revealing financial distress and should be watched constantly. This result is in agreement with the separation criteria given by Chen et al (2006) in their study of Financial Distress Prediction in China, separation of financially distressed companies from the non-distressed. The separation criteria looked at profitability and leverage. Profitability applies such that a company which made losses or negative profits for two straight years was categorized as financially distressed.
In the study it was found that variables related to profitability including NI/TA, EBIT/TA and N/S were of highest statistical significance. The findings are consistent with the study by Rahman et al (2004) who found that financial indicators such as capital adequacy, loan management and operation efficiency are essential to financial health.

The extent to which borrowed funds were used to finance companies operations was also found to be a significant indicator of health or otherwise of a company. Working Capital to Total Asset (WC/TA) was also found to be a significant indicator. This is consistent with the findings of Polenis et al (2012) that a negative ratio in a working capital to Market Value plus total debt signals that the firm may encounter problems in meeting its short term obligations. The extent to which borrowed funds are used to finance operations is also an indicator. The more the borrowed funds the more the company is at risk of financial distress.

One must be careful when using ratios in assessing the financial health or otherwise of a company. Assurance on the accuracy of the financial information is very important. There is possibility of errors and in some cases fraudulent manipulation of the statements to make it look attractive.

5.3.2 Financial ratios as predictors of financial distress

Results for the study indicate that the variables, the financial ratios, are good predictors of financial distress. All the ratios were found to be statistically significant with average significant level of 0.10 yet the nearer the significance level is to 0.0000 the higher the statistical significance in their Study Chan et al (2006) examined the usefulness of financial ratios in predicting business failure. Their study concluded that the five most significant financial ratio predictors are Earnings before interest in total assets (EBIT/TA).

Earnings per share (EPS) Total Debt to Total Assets (TD/TA) Price to book ratio (PB) and Current Ratio (CR). Three of these ratios EBIT/TA,TD/TA and CR have been used in this study and were found to be very significant statistically which is in line with the findings of Chen et al (2006). They emphasized looking at financial distress in its various stages including cash shortages, financial insolvency and total insolvency.

Mbanwie and Ngam (2006) found that financial ratios are very useful and will provide valuable decisions making information. Their study revealed that profit ratios, liquidity ratios, and financial leverage ratios are the most significant ratios for predicting financial distress and
bankruptcy. From their study Mbanwie et al (2009) ranked the significant financial ratios according to their predictive ability as follows: Net profit to total assets, operating profit to turnover, liquid asset to current liabilities (quick ratio), long term debt to total equity, current assets to current liabilities, and total debts to total equity. Five of the above ratios are included among the 12 ratios under this study and 4 of them ranked top with Net income to Total assets being the top while Earnings before interest and tax to Total assets being second and net income over being 4th. As seen in past study Mbanwie et al (2006) found that financial ratios are related to each other and a combination of them will do a better job than a single predictive ratio.

5.3.3 Financial ratios are more accurate in predicting financial distress.

The study analyzed 12 most popular ratios and ranked them according to their statistical significance. They were found to fall in the following order; NI/TA, EBIT/TA, TL/TE, NI/S, CA/TA, WC/TA, MVE/TL, CA/CL, RE/TA, TL/TA, $/TA and CA/S. The most significant is thus NI/TA and this is consistent with most studies including; Mbamwe et al (2009), Hossari et al (2005).

Ratios are related to each other and a combination of financial ratios gives a better outcome than a single ratio. When the ratios are considered together as in this study the set of ratios found to be most significant and contributing more to the outcome were NI/TA, TL/TA, TL/TE and CA/S. This was the result of a stepwise discriminant analysis. This is in line with the study by Hossari et al (2005) which however had not considered the correlation of the variables.

The set of ratios were then applied to estimate a model which was able to correctly classify companies into the healthy and the financially distressed with an accuracy of 93.94%. The model is different from those of previous studies by Altman (1966) and Polemis et al (2012). This is probably because a different model applies in different countries since prevailing conditions are different. This finding is in line with that by Rahman et al (2004) whose study found that for each country separate models should be developed for individual and overall time periods.
5.4 Conclusions

The purpose of this study was to determine whether there are variables that reveal financial distress or conditions conducive to financial distress and to find out how good financial ratios are in predicting financial distress. The study was then to determine which financial ratios are most accurate in predicting financial distress.

5.4.1 Factors that reveal financial distress

Profitability, liquidity, leverage and operational efficiency are crucial in determining the financial health of a company. Profitability is mainly seen through financial ratios including Net income to Total assets, Earnings before interest and tax to Total assets and Net Income to Sales. Liquidity is seen through ratios Working capital to Total assets and Current assets to Total assets. Leverage is seen through the ratio of Total liability to Total equity. While operational efficiency is seen through the ratios of Sales to Total assets and Current assets to Sales.

Net income to Total assets and Earnings before interest and tax to Total assets are both indicators of how profitable the assets of the company are. They determine how well the company is utilizing its assets to generate profits. They are thus performance indicators and therefore important areas of intervention in case a company is found to be doing poorly or is facing financial distress. Net Income over sales shows the company’s net returns on sales. It measures how much of profit the company is able to earn for every shilling of sales.

Liquidity ratios show the company’s ability to settle its short term debts obligations as they fall due. The higher this value the better the company is able to cover its short term debts.

Lower liquidity ratio will indicate a company is experiencing financial distress.

Operating efficiency ratios measure how efficiently the company is generating sales given its investments in assets. The higher the ratio the better the efficiency of the company in generating revenue.

All these ratios should constantly be monitored since they are good indicators of financial performance of a company. They can provide early warning signs to whenever a company is not performing well.
5.4.2 Financial ratios as predictors of financial distress

Financial ratios are good predictors of financial distress. The study found all the 12 financial ratios statistically significant with an average significance level of 0.10. However some ratios are more significant than others and so one should be careful to select appropriately. Some ratios are highly correlated. This leads to some ratios being redundant when you include those other ratios to which they are correlated. The only ratios retained are those which contribute to the predictive power of the model. For instance the ratio EBIT/TA is a strong predictor but it is left out of the study because it becomes redundant once NI/TA is included in the model.

Profitability ratios were the most significant. However a combination of ratios will do better than a single ratio in predicting financial distress. The sum of the contributions of each of the predictors to the predictive power of the model is much more than the contribution of one ratio. Furthermore, a combination of ratios reduces the percentage error of classification.

Financial ratios also give an indication of the risk levels posed by a given investment decision. Ratios thus give the basis of measuring the risk of financial distress for a company. An interested investor may therefore choose to avoid investing in a company with high risk of financial distress or chose to invest but at a higher interest.

Whereas one may use the model to asses a company’s prospects at a point in time, the assessment of a company’s performance over a period of time give a better picture. Looking at financial data over a period of time takes care of any differences that may have been brought about by differences in application of accounting policies.

5.4.3 Financial ratio that is most accurate in predicting financial distress

Net income to Total assets (NI/TA), Total liabilities to Total assets (TL/TA), Total liabilities to Total equity (TL/TE) and Current assets to Sales (CA/S) were found to be the ratios that contributed most to the outcome. The predictive model estimated from these four ratios was found to be 93.94% accurate.

Profitability is very essential to the company. No company can survive for long and accomplish its other goals if it is not profitable. However, when assessing the prospects of a company it is important to consider the quality of earnings and not just the amounts. The quality of earnings is seen when you look at the profitability against total assets, sales and
against owner’s equity. Earnings viewed against total assets reflect the efficiency in use of resources to generate the profits.

A company must be able to pay off its liabilities. This is clearly seen when liabilities are compared with the assets. A situation where liabilities are more than assets is never desirable. The companies with large amounts of debt are often vulnerable to liquidity problems due to high interests.

5.5 Recommendations
5.5.1 Recommendation for improvements
5.5.1.1 Factors that reveal financial distress

Financial ratios are very important in guiding decision making. This may be related to expansion, of already existing investments or in entering new investments. It is important to have an idea of the future outlook of the investment one is in or is getting into. To do this it is necessary to look at ratios. Ratios indicate a lot of underlying information which is not clearly seen in the financial statements. Ratios are able to give an idea of the efficiency in utilization of resources and efficiency in operations. This is important in that it not only shows when a company is performing poorly but also points at areas that may need to be improved.

5.5.1.2 Financial ratios as predictors of financial distress

Ratios may indicate danger signals and so prompt corrective action in good time. This may help save ailing companies. A company may need to improve its profitability and debt levels to survive. Such corrective actions will help reduce incidences of company failures and or help investors in identifying failing companies and taking appropriate action. It is important to note that unfavourable ratios may not expressly mean a given company will fail. It only serves to warn that things are not going on well and some intervention is necessary before it is late.

5.5.1.2 Financial ratio that is most accurate in predicting financial distress

The Nairobi Stock Exchange should provide more information on the listed companies. They should provide more ratios especially those related to profitability, liquidity and leverage. Many users and potential users of the financial statements may not be keen to compute the ratios. Others may not even understand how they are computed. The correct interpretation may also be a problem. Providing the ratios and relevant bench marks or industry averages
can certainly help users in making the right choices. This will help stakeholders make informed decisions.

5.5.2 Recommendation for further studies

This study only covered listed companies in the non-financial sector. Further studies should be done in the financial sector. The sectors can also be compared to see if they respond differently or similarly.

Further studies should also be done using more financial ratios. This study only considered 12 ratios from among the most popular ratios. There could be other ratios which, though not popular, could be better predictors.
REFERENCE


Nairobi Stock exchange.


APPENDIX 1; CHECK LIST

CHECK LIST

- Deciding on which Sector of companies to study
- Criteria for identifying financially distressed companies
- Identify financial ratios to be used
- Identify characteristics unique/common to the distressed companies
- Identify the statistically significant predictor variables
- Identify which ratio or set of ratios are the best predictors
APPENDIX 2; LIST OF COMPANIES

LIST OF COMPANIES IN THE NON-FINANCIAL SECTOR

Agricultural Sector
1. Eaagads Limited
2. Kakuzi Limited
3. Kapchorua Tea Company Limited
4. Limuru Tea Company Limited
5. Rea Vipingo Plantations Ltd
6. Sasini Tea And Coffee Limited
7. Unilever Tea
8. Williamson Tea Kenya Limited

Automobiles And Accessories
9. Car And General (Kenya) Limited
10. Cmc Holdings Limited
11. Marshalls (Ea) Ltd
12. Sameer Africa Limited

Commercial And Services
13. Express Kenya Limited
14. Kenya Airways Limited
15. Nation Media Group Limited
16. Scangroup Limited
17. Standard Group Limited
18. Tps (Tourism Promotion Services) Eastern Africa Limited (Serena Hotels)
19. Uchumi Supermarket Ltd

Construction And Allied Sector
20. Athi-River Mining Limited
23. East African Cables Limited
24. East African Portland Cement Company

Energy And Petroleum
25. Kenya Electricity Generating Company (Kengen)
26. Kenya Oil Company Limited
27. The Kenya Power & Lighting Co. Ltd
28. Total Kenya Ltd

Investment
29. Centum Investment Company (Icdci) Limited
30. Olympia Capital Holdings Limited

Manufacturing And Allied
31. Boc Kenya Limited
32. British American Tobacco Kenya Limited
33. Carbacid Investments Ltd
34. East African Breweries Limited
35. Eveready East Africa Limited
36. Mumias Sugar Company Ltd
37. Unga Group Limited

Telecommunication And Technology
38. Accesskenya Group
39. Safaricom
Alternative Investments

40. A. Bauman & Company Limited
41. City Trust

Source: (Nairobi Stock Exchange Limited, 2012)