

**APPLICABILITY OF ALTMAN (1968) MODEL IN PREDICTING  
FINANCIAL DISTRESS OF COMMERCIAL BANKS IN KENYA**

**BY**

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## **DECLARATION**

This research project is my original work and has never been presented for any degree in any other university.

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This research project has been submitted for examination with my approval as university supervisor.

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## **DEDICATION**

This project is dedicated to my parents Qonchoro Mamo and Sabdio Qonchoro whom I respect for their love and support during my formative years as a student. To my loving wife and friend Sabla for encouraging me throughout the study.

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And may God bless all those who helped me conduct this research work but are not mentioned herein above.

## **LIST OF ABBREVIATIONS**

ANN	Artificial Neural Network
CBK	Central Bank of Kenya
KCC	Kenya Cooperative Creameries
KENATCO	Kenya National Taxi Company
LDC	Less Developed Country
MDA	Multiple Discriminant Analysis
MM	Modigliani and Miller
NBFI	Non-Bank Financial Institution
NLV	Net Liquidation Value
SPSS	Statistical Package for Social Sciences
ROS	Return On Sales
ROA	Return On Assets

## **ABSTRACT**

The study basically determines how financial distress can be predicted in banking industry using Altman(1968) model. Many corporate are faced with financial inefficiency and are not in position to correctly predict their position in short or long term. There is a dire need for prediction of business failures since the results of business failure leads to heavy losses both financially and non-financially.

The economic cost of business failures is relatively large. Evidence shows that the market value of the distressed firms declines substantially. The cost of bank failures is very difficult to estimate much of the data is not in the public domain, while the eventual cost to depositors and/or taxpayers of most of the bank failures which occurred will depend upon how much of the failed banks' assets are eventually recovered by the liquidators. The cost are almost certain to be substantial. The biggest contributor to the bad loans, poor management and political interferences of many of the failed local banks was insider lending. In at least half of the bank failures in Kenya a substantial proportion of the bad debts accounted for. Today bankruptcies, seizures and foreclosures are more than extra.

The methodology utilized examined and justified the research design to be applied in the study. It also stated the population of interest for the study and the sample to be used. The data collection method relied on 43 commercial banks identified under the population of the study. From the data each company and each year the ratio was computed. The data analysis technique applied discriminate failed versus non failed ones and the justification for its use is also given. The source of Secondary data is obtained from financial reports and prudential returns filed with Central bank of Kenya supervision department.

Edward Altman's financial distress prediction model is found to be accurate on 8 out of the 10 failed firms, 80 % validity for the model and on sampled for non failed majority proved Altman's financial distress prediction model was a 90% validity of the model. The objectives of this study were to determine relevance of a discriminate model to predict financial distress.

## TABLE OF CONTENTS

DECLARATION .....	ii
DEDICATION .....	iii
ACKNOWLEDGMENTS .....	iv
LIST OF ABBREVIATIONS.....	v
ABSTRACT.....	vi
TABLE OF CONTENTS.....	vii
<b>CHAPTER ONE: INTRODUCTION .....</b>	<b>1</b>
1.1 Background of the study .....	1
1.1.1 Overview of Commercial Banks.....	5
1.2 Statement of the Problem.....	7
1.3 Objective of the Study .....	8
1.4 Significance of the Study .....	9
<b>CHAPTER TWO: LITERATURE REVIEW.....</b>	<b>10</b>
2.1 Introduction.....	10
2.2 Theoretical Review .....	10
2.2.1 Modigliani and Miller, Capital Structure Irrelevancy.....	10
2.2.2 Financial Life Cycle (FLC).....	11
2.2.3 Financial Ratios as Measurers of Performance.....	11
2.3 The Altman’s Z-Score Model .....	12
2.4 Review of Empirical Studies .....	15
2.5.6 Application of Altman’s Model In Analysis (MDA).....	18
2.6 Conclusion from Literature Review.....	19
<b>CHAPTER THREE: RESEARCH METHODOLOGY .....</b>	<b>20</b>
3.1 Introduction.....	20
3.2 Research Design.....	20
3.3 Population .....	21
3.4 Data Collection .....	21

3.5 Data Analysis .....	21
<b>CHAPTER FOUR: DATA ANALYSIS AND FINDINGS .....</b>	<b>23</b>
4.1 Introduction.....	23
4.2 The Failure Prediction Model .....	23
4.3 Computed Data Result for Failed Commercial Banks.....	24
4.4 Variables in the Analysis .....	26
<b>CHAPTER FIVE: SUMMARY, CONCLUSIONS AND RECOMMENDATIONS</b>	<b>31</b>
5.1 Introduction.....	31
5.2 Summary of Findings and Discussions.....	31
5.3 Conclusions and Recommendations .....	33
5.4 Limitations of the Study.....	33
5.5 Suggestions for Further Studies .....	34
REFERENCES .....	35
APPENDIX I .....	39
APPENDIX II Stepwise Statistics .....	40
APPENDIX III Letter of Introduction .....	47



# CHAPTER ONE

## INTRODUCTION

### 1.1 Background of the study

Financial distress is a term in corporate finance used to indicate a condition when promises to creditors of a company are broken or honored with difficulty. Sometimes financial distress can lead to bankruptcy. In a more general and basic sense, financial distress is a reduction in financial efficiency that results from a shortage of cash (Korteweg, 2007). Financial distress is a condition where firms' obligations are not met or meet with difficulty. The disadvantage of a firm taking on higher debt ratio is that it increases the risk of financial distress which is detrimental to equity and debt holders. The extreme form of financial distress is insolvency, which could be very expensive for it involves legal costs and may force a firm to sell its assets at distress prices.

Ross et al (1999) linked financial distress to insolvency and defined it as: "Inability to pay one's debt and lack of means of paying one's debts. Such as a condition of an individual's assets and liabilities, the former needs immediately available would be insufficient to discharge the later". Altman (1983) distinguished between stock-based insolvency and flow-based insolvency all of which leads to financial distress. The former occurs when a firm has negative net-worth causing the value of its assets to be less than the value of its debts while the later occurs when operating cash flow is insufficient to meet current obligations.

Financial distress runs across the whole range; from a vague uneasiness about future profitability to complete disintegration of the firm. Ramanujam (1984) defined financial distress using a number of terms. Firstly, as 'Economic failure' signifying that the firm's revenues do not cover its total costs including its cost of capital. Secondly as 'Business failure' which refers to any business that has terminated operations with a resultant loss to creditors. Thirdly as 'Technical insolvency' whereby a firm cannot meet its obligations as they fall due. And finally as 'Legal bankruptcy' which cautions that a firm is not legally bankrupt unless it has filed for liquidation under the applicable Act of law.

Ross et al. (1999) noted that the risk of incurring the costs of financial distress has a negative effect on a firm's value which offsets the value of tax relief of increasing debt levels. Further these costs become considerable with very high gearing. Even if a firm manages to avoid liquidation its relationships with suppliers, customers, employees and creditors may be seriously damaged. Similarly suppliers providing goods and services on credit are likely to reduce the generosity of their terms, or even stop supplying altogether, if they believe that there is an increased chance of the firm not being in existence in a few months' time. Lastly customers may develop close relationships with their suppliers, and plan their own production on the assumption of a continuance of that relationship.

Wruck (1990) provided general indicators of financial distress in a firm. These may include dividend reduction for a firm which has shown a continuous decline in the amount of dividend over time, or even failed to declare dividends at all. A financially distressed firm may not support all its operations leading to closure of some branches. Operating losses make a company not to pay dividends or increase investment. A loss is a reduction in capital, hence the company moves towards bankruptcy. Lay-offs will be experienced e.g. retrenchment to save the firm from mounting deficits. The top executives of a firm are well placed to see much ahead of time the performance of their organizations. They can therefore resign and move to firms that show potential for withstanding economic hardship. This resignation can be a sign of poor performance. Sometimes, firing of CEOs is a sign of a firm in distress. Finally, plummeting stock prices are indicators of a market value for the firm. Creditors observe performances of an organization based on stock prices.

Financial distress has associated costs that can be divided into direct costs and indirect costs, (O'Neill, 1986). Direct costs change the payout to debt holders if bankruptcy occurs. These include the direct expenses that a company incurs; auditors' fees, legal fees, management fees and other payments. Indirect costs changes the distribution of firm value prior to bankruptcy. These include loss goodwill which will result in fewer sales, hence less revenue. It has a great effect on the attitude of the management. The shareholders may like the management to invest in risky, marginal projects so that debt holder's wealth is transferred. Management may also avoid investing in profitable

projects since under an insolvency or financial distress debt holders are likely to benefit more from such investments. Creditors will lose their patience when a firm faces financial problems. They force the firm into liquidation to realize their claims. A financially distressed firm also has a tendency to emphasize short-term profitability at the cost of long-term sustainability and profitability causing sub optimization. There is also a tendency of staff considering alternative employment, as a result of a loss in staff morale. If assets have to be sold quickly, their realizable values may be very low. Quick fix measures may result in temptation to sell healthy businesses as this will receive the most cash.

Whitaker (1999) came up with the financial distress process. The process begins when a firm is unable to meet scheduled payments or when cash flow projections indicate that it will soon be unable to do so. They were able to identify five central steps that the process takes as the situation develops: Firstly is the firm's inability to meet scheduled debt payments, is it a temporary cash flow problem (technical insolvency) or is it a permanent problem caused by asset values having fallen below debt obligations (insolvency in bankruptcy). The next stage is to decide whether the problem is a temporary one. If so, then an agreement with creditors that gives the firm time to recover and to satisfy everyone may be worked out. However, if basic long run asset values have truly declined, then economic losses have occurred. In this case who should bear the losses? Next is to decide whether business would be more valuable if it were maintained and continued in operation or would liquidated or sold off. Thereafter, the next stage is to establish whether the firm should file for protection under the Companies Act or try to use informal procedures. The last stage is to agree who should control the firm while it is being liquidated or rehabilitated, and should the existing management be left in charge or should a trustee be placed in charge of operations.

Gilbert et al. (1990) gave the 3 key reasons for financial distress. They argued that the principal factors influencing the probability of bankruptcy, *ceteris paribus*, could be associated with the (1) Asset mix (2) financial structure (3) corporate governance. The first cause of financial distress is the inappropriate allocation of assets. Assets are usually industry specific a firm may be driven to bankruptcy if the resources are not allocated

efficiently. The resources mix between the long and short-term assets is crucial in an efficient market. Secondly, a firm's bankruptcy might be financial. The firm may have the right assets structure but its financial structure is inappropriate hence leading to liquidity constraints. Thirdly, corporate governance may drive a firm into distress if conflicts of interest exist between the management and the owners.

Arguably, the most popular corporate failure prediction model is the Z-score formula developed in 1968 by Edward I. Altman, who was at the time an Assistant Professor of Finance at New York University. The model is used to predict the probability that a firm will go into bankruptcy. The Z-scores calculated are used to predict corporate defaults and are an easy-to-calculate control measure for financial distress status of companies. The Z-score model uses multiple corporate income and balance sheet values to measure the financial health of a firm. The model uses multivariate discriminant analysis (MDA) to construct a boundary line through a graph such that if the firm is to the left of the line, it is not likely to become insolvent whereas it is likely to go bankrupt if it fell to the right. (Altman,1968).

The study of corporate bankruptcy prediction pervades the accounting literature. This is attributable to the need to predict successfully the event of bankruptcy due to its considerable social and economic costs as well as its adverse impact on a diverse group of people. Equally important is the need to predict financial distress as the precursor of bankruptcy. A successful early prediction of signals symptomatic of bankruptcy enables managers to mitigate or reduce the bankruptcy-induced costs.

The seminal works by Beaver (1996) and Altman (1968) paved the way for the academic research in the area of corporate bankruptcy prediction. Beaver (1966) introduced a univariate approach examining the predictive ability of one ratio at a time. A "cut-off" score was calculated for each ratio and used as the criterion for the categorical and dichotomous output (i.e. failed versus non-failed companies).Altman (1968) adopted a multivariate discriminant analysis (MDA) model to predict corporate failure. His discriminant function uses five weighted ratios to calculate the z-score acting as the "cut-

off” threshold discriminating failed from non-failed companies. In addition, Ohlson (1980) introduced logistic regression in the area of bankruptcy prediction. Logistic regression and MDA have been widely used to predict bankruptcy with varying degrees of success.

Besides the Altman Z-score model, other models were also developed for use in predicting financial distress in firms. The Statistical models were first and they incorporated statistical techniques to predict corporate failure. Univariate discriminant analysis was applied to a number of financial ratios to derive a model that could predict bankruptcy.

The univariate model was improved by developing a multivariate discriminant model for prediction of possible bankruptcy in firms. Later, weaknesses noted in the statistical models led to the introduction of Risk Index models which used a simple point system to allocate points based on different important ratios as a measure of financial health. A higher total point indicated a better financial situation. These were to be followed by Gambler’s Ruin mathematical model which used the net liquidation value (NLV) of a company to indicate probable bankruptcy if it was negative. We also had the Conditional probability models which estimated the probability of a company’s failure by a non-linear maximum likelihood estimation. Modern day prediction models are the Artificial Neural Network models (ANNs). Adopted in the 1990s, these are computer based and constructed to process information, in parallel, similar to the human brain and are especially useful in recognizing and learning complex data relationships.

### **1.1.1 Overview of Commercial Banks**

Commercial banking took root in Kenya at the turn of the 20<sup>th</sup> century with the partitioning of Africa by the European imperial powers. The first bank to establish operations was National Bank of India, which started a branch in Mombasa in 1896. The banking system in Kenya currently has 43 commercial Banks and 1 mortgage finance company and 2 deposit taking microfinance Institutions. (CBK, 2010)

Kiyai (2003) observed that weaknesses in the banking system in Kenya became apparent in the late 1980s and were manifested in the relatively uncontrolled and fragmented

financial system. In the early 1990s the government (under pressure from the International Monetary Fund, World Bank and western donor agencies) embarked on reforms designed to promote a more efficient and market-oriented financial system. The reform program focused on policy, legal and institutional framework. The drastic policy change that the Kenyan economy underwent was geared towards a free economy under the banner of trade liberalization. After liberalization, the industry underwent tremendous changes. Competition resulted from micro-finance houses & cooperative societies, which opened front-office operations providing services very much similar to those of the commercial banks and NBFIs converting to commercial banks.as noted by Koros, 2001)

Kathanje (2000) noted that in the period after comprehensive liberalization, there were massive failures in the banking sector. There were 39 financial institutions that failed in Kenya during this period. These failures cost the economy about Kshs.19.6 billion in terms of loans and grants for restructuring, compensating depositors and outright losses due to depositor funds not covered by the Deposit Protection Fund compensation scheme. This was 10% of Kenya's GDP. There were also high non-monetary costs associated with resultant unemployment and the general instability in the financial system. As a result the Deposit Protection Fund was set up to instill some confidence in the sector. It further prompted the CBK to take corrective measures some of which were to strengthen its supervisory role through implementation of the worldwide Basel Accord principles. (CBK, Banking Supervision, 2004 Annual report).

In the preceding circumstances, predictive analysis would have been helpful to signal performance in the banking industry and therefore save the country from losing the much needed scarce resources occasioned by the bank failures. This study therefore seeks to develop a prediction model and apply it on the commercial banks in Kenyan, and with what accuracy, failure of the said banks before actual occurrence. Business failure is costly to the society and its prediction is beneficial. The CBK Act Cap.491 defines a bank as a body corporate carrying on banking business within the meaning of the Banking Act of Kenya. The Banking Act Cap.488 is established by the CBK Act and defines a bank as a company which carries on banking business in Kenya.

## 1.2 Statement of the Problem

Financial distress is an elusive concept. Given the important role that commercial banks play in any economy, it is crucial to understand the factors that influence their viability and survival. The core aim of any commercial bank is to generate profit and by extension, maximize its wealth. However in a distress situation, the bank's performance, hence stability is affected and this with time has real implications for the business community. Extended periods of financial distress will eventually result in liquidation especially for commercial banks in Less Developed Countries (LDCs) due to limited resources to withstand long periods of poor performance. Instances of commercial banks failures thus raise valid concerns to both local and foreign investors in any country. Thus the expectation of the study is that the prediction model developed will be an addition to the measures in place to assist the various stakeholders in the Kenyan financial industry to be able to react to distress signals in commercial banks early enough to avoid complete failure.

To what extent can commercial banks therefore rely on a discriminant predictive model to accurately indicate their financial health? Some studies have been done to establish this. Alexakis (2008) analyzed whether the Z-score, as examined by Altman and other researchers, could predict correctly company failures. He derived that the Altman Z-score model performs well in predicting failures for a period up to five years earlier and could be used by portfolio managers in stock selection and by company management for merger decisions or other corporate strategic moves. Samarakoon and Hasan (2003) also investigated the ability of Altman's Z-Score model to predict corporate distress in the emerging market of Sri Lanka.

Their results showed that the model had a remarkable degree of accuracy in predicting distress using financial ratios computed from financial statements in the year prior to distress. The overall success rate of 81% was observed using the Z-Score. However, Shaefer (1982) reported some shortcomings of the Z-Score model. He states that the model is not perfect, and needs to be calculated and interpreted with care. For starters, the Z-Score is not immune to false accounting practices.

He also argued that the Z-Score is also not of much use for new companies with little or no earnings. These companies, regardless of their financial health, will score low. Moreover, the Z-Score does not address the issue of cash flows directly, only hinting at it through the use of the net working capital-to-asset ratio. Finally, he states that Z-Scores can swing from quarter to quarter when a company records one-time write offs. These can change the score, suggesting a company really not at risk is on the brink of bankruptcy.

A research gap on financial distress facing commercial banks in Kenya is evident from the limited number of local studies on the subject. Kogi (2003) did a study to develop a discriminant model incorporating financial ratio stability that could be used to predict corporate failure. He sought to identify critical financial ratios with significant predictive ability. His findings showed that it was possible to predict corporate failure with up to 70% accuracy 3 years before the actual occurrence using his stability discriminant model.

Keige (1991) had earlier formulated a model to predict business failures among Kenyan companies which achieved a prediction accuracy of 90% two years before actual failure. Nganga (2006) sought to explore and expose possible indicators of impending failures and develop a prediction model for insurance companies in Kenya. He derived a failure prediction model for both composite and general insurance businesses. Kamau (2007) developed a failure prediction model using cash flow information and multiple discriminant analysis techniques. The model yielded an overall correct classification accuracy of 85% a year prior to failure confirming that cash flows can be used to give clear and precise information about an entity. The study specifically targeted financial distress in banking industries compared to other studies that dwell on other areas. This is to enhance a new knowledge in a diverse environment.

### **1.3 Objective of the Study**

The objective of this study is to establish the relevance of Altman (1968) model to predict financial distress in commercial banks in Kenya.



#### **1.4 Significance of the Study**

The findings of the study will be beneficial to the following groups in decision-making:

**Regulators** - The CBK is the regulator charged with monitoring and ensuring stability in the economy. The study will assist them to know how commercial banks are being managed by predicting financial distress and thus set measures based on both financial and operational fronts to avoid losses to the economy through failure.

**Investors** - The study will make the investors recognize the overall level of financial performance affecting their return on investment and hence not ignore the critical need to be able to predict financial distress when making investment decisions. Equity stockbrokers and individual investors will be able to evaluate the safety of a proposed investment.

**Creditors** - To assess the creditworthiness of firms based on financial stability as disclosed by the prediction model on any likelihood of financial distress. This will be able to provide the financial status of the particular firm and help in deciding whether they qualify for credit.

**Academicians and Scholars** - The academicians will find the study useful as it will highlight areas for further research while also contributing to new knowledge. The study will also provide an insight of how financial distress affects commercial banks and their various stakeholders in the economy. The academicians being charged with dissemination of knowledge to various stakeholders will hence find this study useful.

## **CHAPTER TWO**

### **LITERATURE REVIEW**

#### **2.1 Introduction**

In this chapter, the researchers do not endeavor to review all the literature pertinent to corporate bankruptcy, due to the literature's considerable magnitude. Instead, I focus on three areas. In the first part, I review the two other statistical techniques used in the area of corporate bankruptcy prediction. Lastly, the researcher will compare and contrast the performance of multivariate discriminant analysis with that of the statistical techniques in predicting bankruptcy.

#### **2.2 Theoretical Review**

##### **2.2.1 Modigliani and Miller, Capital Structure Irrelevancy**

Modigliani and Miller (1963) came up with theorems which form the basis for modern thinking on capital structure. The theorem stated that, under a certain market price process in the absence of taxes, bankruptcy costs, and asymmetric information, and in an efficient market, the value of a firm is unaffected by how that firm is financed. It did not matter if the firm's capital was raised by issuing stock or selling debt. MM later showed that financial distress reduces the value of the firm. They argued that the present value of the interest tax shield increases with borrowing but so does the present value of the costs of financial distress. However, the costs of financial distress are quite insignificant with moderate level of debt and therefore the value of the firm increases with debt. With more and more debt, the costs of financial distress increases and so the tax benefits shrinks. The optimum point is reached when the present value of the tax benefit becomes equal to the present value of the costs of financial distress. The value of the firm is maximum at this point.

Later studies by Stiglitz (1969) and Baron (1974) demonstrated that the MM thesis was intact even in the presence of positive probability of costless bankruptcy. However,

Baxter (1967) noted that bankruptcy costs may provide an economic rationale for the existence of a finite optimal capital structure.

### **2.2.2 Financial Life Cycle (FLC)**

A cyclical concept of performance can be used to describe the financial life cycle of a firm. This concept has been used in marketing literature to describe the product life cycle (Kotler, 1995). Rasheed (1997) used a financial life cycle model to describe financial performance over time. The shape of the life cycle curve suggests cyclical variation in financial performance over a continuum of time. The first stage of the financial life cycle is the startup phases. This is characterized by financial returns below break-even point. The second stage, growth, represents returns greater than zero. The stagnant is a situation in which a firm has stabilized and has a market niche.

Aiyabei (2000) argued that a firm experiencing an extended first stage will often end in financial distress, which eventually may result in liquidation. Application of this operational cyclical model is logical for '*turnaround*' of the firm during a period of poor performance which if executed well can be followed by increased returns.

### **2.2.3 Financial Ratios as Measurers of Performance**

Ramanujam, (1984) argued that financial performance measures were critical in establishing the level of a firm's financial health and by extension could be used to predict bankruptcy. He stated that the two most used variables in univariate measures were return on sales (ROS), or return on assets (ROA). Similarly, Beaver (1967) proposed three univariate model financial ratios that measured profitability, liquidity and solvency. However, Rasheed (1997) noted that the most statistically significant results in predicting financial distress were produced by multivariate models. This is because they combined financial ratios thus basing their analyses on the entire variable profile of the object simultaneously rather than sequentially examining individual characteristics. Combinations of ratios analyzed together removed possible ambiguities and misclassifications.

Other statistical methods of assessing the potential for failure have been used in financial literature. Some measures are combinations of different financial ratios. Ohlson (1980) established that a widely used approach in failure prediction is the analysis of liquidity ratios. The two most important of these are the current ratio and the quick ratio. The current ratio is the ratio of current assets to current liabilities. This ratio is based on the premise that a company should have enough current assets to suggest that it will be able to meet its future commitments to pay off its current liabilities. A ratio in excess of 2.0 is needed for safety, although this will obviously depend on the nature of the industry, the relationship between credit periods allowed and taken-and the level of stockholdings. The Quick ratio is the ratio of current assets excluding stock to current liabilities. Stock is excluded because it is not always possible to convert stock to cash quickly. A ratio in excess of 1.0 is a general indicator of financial safety.

Ohlson (1980) however also indicated that, contrary to expectations, the level of these ratios and trends over time for a single company does not provide a reliable means of predicting business failure. He therefore suggested that in addition, debt ratios can also be used to provide a measure of financial security. These include: *Total debts: Total assets*. This ratio shows the extent to which assets are financed by borrowings. A maximum level of 50% is considerable appropriate for safety.

*Earnings before interest and tax (EBIT): Interest*. This indicates the ability of the company to pay the interest charge out of earnings, and it can also be used to give a measure of sensitivity to interest rate fluctuations. A ratio greater than 2.0 or ideally 3.0 is considered necessary for safety.

### **2.3 The Altman's Z-Score Model**

E. Altman (1968) spearheaded the use of multivariate discriminant analysis (i.e. MDA) in predicting corporate failure. MDA combines information from multivariate independent variables (e.g. ratios) into a single score that is used to classify an observation into either of two a-priori and mutually exclusive groups (Hair, 1992). In this respect, MDA enjoys an advantage over univariate analysis, because it considers an entire variable profile of a firm as well as the interaction among these variables.

Possibly the most famous failure prediction model is Altman's Z-Score Model. Based on multiple discriminate analysis (MDA), the Z-Score model (developed in 1968) was based on a sample composed of 66 manufacturing companies with 33 firms in each of two matched-pair groups. The bankruptcy group consisted of companies that filed a bankruptcy petition under Chapter X of the United States bankruptcy act from 1946 through 1965. The model predicted a company's financial health based on a discriminant function of the form:

$$Z = 0.012X1 + 0.014X2 + 0.033X3 + 0.006X4 + 0.999X5$$

Where:  $Z$  = score

$X1$  = working capital/total assets

$X2$  = retained earnings/total assets

$X3$  = earnings before interest and taxes/total assets

$X4$  = market value of equity/book value of total liabilities

$X5$  = sales/total assets

Based on the sample, all firms having a Z-Score greater than 2.99 fell into the non-bankruptcy sector, while those firms having a Z-Score below 1.81 were bankrupt. Scores of between 1.81 and 2.99 lied in the grey area. The significance of each of the ratios is as follows: -

*Working capital /Total assets (WC/TA)*: is a ratio that is a good test for corporate distress. A firm with negative working capital is likely to experience problems meeting its short-term obligations because there are simply not enough current assets to cover them. By contrast, a firm with significantly positive working capital rarely has trouble paying its bills.

*Retained earnings /Total assets (RE/TA)*: measures the amount of reinvested earnings or losses, which reflects the extent of the company's leverage. Companies with low RE/TA are financing capital expenditure through borrowings rather than through retained

earnings. Companies with high RE/TA suggest a history of profitability and the ability to stand up to a bad year of losses.

*Earnings before interest and tax/Total assets (EBIT/TA)*: is a version of return on assets (ROA), an effective way of assessing a firm's ability to squeeze profits before factors like interest and tax are deducted.

*Market value of equity /Total liabilities (ME/TL)*: is a ratio that shows if a firm were to become insolvent, how much the company's market value would decline before liabilities exceed assets on the financial statements. This ration adds a market value dimension to the model that isn't based on pure fundamentals. In other words, a durable market capitalization can be interpreted as the markets confidence in the company's solid financial position, thus bringing in the dimension of market efficiency.

*Sales / Total assets (S/TA)*: tells investor how well management handles competition and how efficiently a firm uses assets to generate sales. Failure to grow market share translates into a low or falling S/TA.

The discriminant score, z-score, is an one-dimensional measure conveying a company's bankruptcy potential. E. Altman (1968) concluded that the greater a company's bankruptcy potential the lower the z-score is. In a classification or prediction context, if a company's z-score is below the a-priori chosen cut-off point, then the company is classified as failing otherwise as non-failing. Multivariate discriminant analysis (MDA) scores from a number of delimiting factors, because it relies on the following restrictive assumptions (Hair, 1992): (i) the independent variables (e.g. ratios) are multivariate normally distributed, (ii) the dataset consists of two a-priori chosen mutually exclusive groups, (iii) the two groups have equal population variances and (iv) the researcher just need to select the optimal cut-off point a-priori.

## 2.4 Review of Empirical Studies

Calandro Junior, (2007) provided a commentary on the utility of Altman's Z-score as a strategic assessment and performance management tool. This possibility had been suggested in earlier studies. His finding was that while the Z-score is both popular and widely used in the fields of credit risk analysis, distressed investing, M&A target analysis, and turnaround management, it has received relatively little attention as a strategic assessment and performance management tool. This finding in conjunction with the impressive results achieved by GTI Corporation, suggested that applying the Z-score in strategy and performance management could also be warranted, especially after more research is undertaken.

Toffler and Agarwal (2007) provided the operating characteristics of the well-known Taffler (1983) UK-based Z-score model for the first time and evaluated its performance over the 25-year period since it was originally developed. The model was shown to have clear predictive ability over this extended time period and dominated more prediction approaches. Their study also illustrated the economic value to a bank of using such methodologies for default risk assessment purposes. Prima facie, such results also demonstrated the predictive ability of the published accounting numbers and associated financial ratios used in the z-score model calculation.

Grice and Ingram (2001) examined three research questions using recent sample data: (1) Was Altman's original model as useful for predicting bankruptcy in recent periods as it was for the periods in which it was developed and tested by Altman? (2) Was the model as useful for predicting bankruptcy of non-manufacturing firms as it was for predicting bankruptcy of manufacturing firms? (3) Was the model as useful for predicting financial stress conditions other than bankruptcy as it was for predicting bankruptcy? Their results were consistent with negative answers to questions one and two and a positive answer to question three.

Dambolena and Khoury (1980) sought to improve on the Altman model by introducing ratio stability in the discriminant model. They held that it was the stability of every ratio that was relevant as opposed to earnings. Therefore, they used a ration stability measure

and stepwise discriminant analysis. A sample of 46 firms from the U.S. was paired into failed and non-failed categories. They extracted data for 8 years prior to failure for the banks that failed between the 1969 and 1975 period. From this data, they calculated 19 ratios as well as 3 different measures of stability i.e. standard deviation, standard error of estimation and coefficient of variation. The ratios were classified into 4 major groups; profitability, activity, turnover and indebtedness. The predictive accuracy of the model without stability measures was tested and compared with the accuracy of one with stability measures. It was noted that the model with stability measures was superior in predictive accuracy.

Fletcher and Goss (1993) studied statistical methods and artificial intelligence techniques that have been widely used to predict financial distress. Their study indicated that artificial neural networks outperform many statistical methods even though artificial neural networks have the drawback of failing to interpret the classification results. Some financial distress prediction studies attempted to compare empirically the forecast accuracy of the Z-score model variables.

Moyer (1977) analyzed the variables one at a time and indicated that accounting rate of return measures were most useful in classifying bankruptcy; they were followed by the financial leverage and fixed payment coverage measures. The single-variable analysis indicated that, on average, bankrupt firms had lower rates of return, lower liquid-asset composition, lower liquidity position, and lower fixed payment coverage than do non-bankrupt firms. However, the degree of financial leverage was greater for bankrupt firms.

Sinkey (1979) developed a model based on these variables: operating expenses to operating income and investments to assets. The model worked well in classifying non-problem banks as such. Pettway and Sinkey (1980) followed up that research with an analysis of market and accounting-based screening models, on the assumption that market prices might detect aspects of financial distress earlier than accounting-based information.



Brownbridge (1998) examined the causes of financial distress in local banks in Africa. His study covered Kenya, Uganda, Zambia and Nigeria. He argued that financial distress and bank failure was as a result of non-performing loans attributed to moral hazards leading to imprudent lending strategies, low levels of capitalization, political interference and weak regulation. He advocated for the strengthening of prudential supervision for local banks and their credit policies and proposed incentives to bank owners to pursue prudent management.

Waweru and Kalani (2009) investigated the main cause of the financial crises that griped commercial banks in Kenya in the 1990s which culminated in the failure of several major banks and established it as non-performing loan books. They attributed this to lack of aggressive debt collection policies by the financial institutions.

Aiyabei (2000) looked at the prediction and analysis of corporate financial performance in Kenya as a developing country in the light of the then increasing trend of failure of Kenyan businesses. He specifically looked at KCC and KENATCO which were put under receivership as a result of financial distress caused by what he termed as internal and external environmental factors. He concluded that there was a need to explore business financial performance evaluation during the life cycle of a firm in a developing nation such as Kenya. He also recommended the use of Altman's Z-score model to predict financial distress in Kenyan firms and suggested the action firms should take when they are in various zones of the Z score as indicated by Altman.

Kathanje (2000) sought to evaluate financial performance of the Kenyan banking sector using financial ratio analysis. Based on the ratios computed, he formulated a performance predictive model for financial institutions which helped to explain the effects of financial ratios to the overall financial performance of an institution.

Kiragu (1993) carried out a study on the prediction of corporate failure using price adjusted accounting data. He used a sample consisting of 10 failed firms and 10 non failed firms. Financial ratios were calculated from price level adjusted financial statistics. Discriminant model developed showed that 9 ratios had high corporate failure predictive ability. These ratios were times interest coverage, fixed charge coverage, quick ratio,

current ratio, equity to total assets, working capital to total debt, return on investments to total assets, change in monetary liabilities, total debt to total assets. The most critical ratios were found to be liquidity and debt service ratios. The results were consistent with the finance theory relating to the firm's risk. The firm has to maintain sufficient liquidity in order to avoid insolvency problems. It also needs to generate sufficient earnings to meet its fixed finance charges. The results however differed from earlier studies done by Altman (1968) and Kimura (1980) who had concluded that liquidity ratios were not of any significance in bankruptcy prediction. Both had indicated that efficiency and profitability ratios were the most important.

Keige (1991) did a study on business failure prediction using discriminate analysis. He concluded that ratios can be used to predict company failure. However, the types of ratios that will best discriminate between failing companies and successful ones tend to differ from place to place. In Kenya current ratio, fixed charge coverage, return on earning to total assets, and return on net worth can be used successfully in predicting for a period up to 2 years before it occurs. Keige concludes that stakeholders should pay attention to liquidity, leverage and activity ratios.

The current study seeks to evaluate Altman revised model and determine whether it is necessary to come up with a more up to date model of predicting financial distress in Kenya. The studies preceding the current one have all concentrated on ratios independently and not trying to relate with the rest of the studies that have been carried out earlier. This study will change that approach and take revised Altman model to guide it in a bid to establish its applicability in prediction of financial distress in Kenya.

#### **2.5.6 Application of Altman's Model In Analysis (MDA)**

Carson (1994) studied the strength of 3 types of bankruptcy detection models: multiple discriminant analyses, logistic regression and recursive partitioning. He concluded that MDA models were superior. Kiege (1991) applied MDA in line with Altman (1968) model on quoted companies in Kenya and observed that ratios that will best discriminate between failing and successful companies appeared to differ from industry to industry.

He further observed that financial ratios like current ratio, fixed charge coverage, retained earnings to total assets, return on total assets, return on net worth, average collection period and sales to total assets can be used successfully in predicting failure for a period up to 2 years at 95% correct classification.

## **2.6 Conclusion from Literature Review**

It is evident from the literature review that investors need to keep an eye on their investments, and should consider checking their companies Z-Score on a regular basis and over time. A deteriorating Z-Score can signal trouble ahead and provide a simpler conclusion than the mass of ratios. Therefore, the Z-Score can be used not only as a gauge of relative financial health but also as a predictor of financial distress. Arguably, it is best to use the model as a quick check of financial health, but if the score indicates a problem, conduct a more detailed analysis.

Most studies done both locally as well as in developed economies agree that the Altman Z-Score model is the most thoroughly tested and broadly accepted distress prediction model. As such it is arguably the most important tool used in turnaround management for diagnosing and evaluating overall financial corporate health, as well as the viability of turnaround or restructuring efforts. As a reliable test of corporate financial health, it has been found to be widely used by courts of law, the banking industry, credit risk management and turnaround industries in the USA as a benchmark for corporate health.

Most of the publicly available information regarding prediction models is based on research published by academic scholars. Commercial banks, public accounting firms and other institutional entities appear to be the primary beneficiaries of this research, since they can use the information to minimize their exposure to potential client failures. My study will therefore add to this knowledge data base for application to the commercial banking sector in Kenya.

## **CHAPTER THREE**

### **RESEARCH METHODOLOGY**

#### **3.1 Introduction**

The chapter discusses the research methodology that was followed in this study. It examines and justifies the research design to be applied in the study. It also states the population of interest for the study and the sample to be used. The data collection methods to be used are provided. The data analysis technique to be applied and the justification for its use are also given. The computer software for analyzing the data has been provided as well as what will be used for presenting the findings. Finally, the model derived will also be validated.

#### **3.2 Research Design**

This study sought to apply Altman's model in predicting financial distress in commercial banks in Kenya. The research design applied in this research will be descriptive study. A descriptive study or formal study has been described by Cooper & Schindler (2001) as a study that is typically structured with clearly stated investigative objective. This design was applied by Chong (1998) in his study on predicting financial distress in Malaysian firms.

A descriptive research design allows the researcher to make a speculation, on the basis of the literature and any other earlier evidence as to what they expect the findings of the research to be. The data collection and analysis can then be structured in order to support or refute the research propositions. In this regard, we go into this research expected similar findings to what other researchers on this area have found. Therefore, this research expected to conform to one of the schools of thoughts.

The advantages of a descriptive study include a thorough description of the characteristics or variables associated with the study. This implies the what, when, who, where and how of the topic.

This research was expected to be pure or basic research, which means that its primary role was to expand the body of existing knowledge. This is because some research has been done in the area and this study adds to the early findings.

### **3.3 Population**

The population of study consisted of all the 43 banks in Kenya (multinational and locals) under review as per Kenya Bankers Association source (census survey). Commercial banks were chosen because they are well organized and filed their return to Central Bank regularly. In determining the size of a firm, several measures have been used. They include net assets, turnover and number of employees in the firm, capital employed, volume of sales turnover, level and types of sales turnover and level and type of technology used.

### **3.4 Data Collection**

The study relied on secondary data for large, medium and small banks (a sample composed of 43 banks). The secondary data was extracted from financial statements of the commercial banks and considered sufficient for the study. The secondary data for banks were obtained from commercial banks financial reports and prudential returns filed with the CBK bank supervision department. This data extracted from financial statements for the last 2 years. Specifically items in the income statement and balance sheet of the each bank in the sample were collected

### **3.5 Data Analysis**

We applied Altman (1968) model for failed and non failed Bank. Altman's (1968) analysis used to primarily classify and/ or make prediction in problems where the dependent variable falls between either of the two possibilities e.g. bankrupt or non bankrupt. The testing model will discriminated 20 failed banks versus 23 non failed ones.

From the data each company and each year the ratios was computed. Data analysis will use the following ratios (Working Capital/total assets (liquidity), retained Earnings/total assets (earned surplus, leverage), earnings before interest and taxes/total assets (earning power), Market value equity/book value of total liabilities (solvency), sales/total assets (sales generating capability). These ratios were selected on the basis of having been used

elsewhere in business failure prediction studies, their reasonableness and general acceptability in the development of a discriminant function. These types of ratios have shown considerable merit in financial analysis and in measurement of financial health of companies.

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

The Z score formula below was applied in order to identify zones of discrimination with ratios computed from the set of the sample.

The Z-score formula:  $Z' = 0.717T_1 + 0.847T_2 + 3.107T_3 + 0.420T_4 + 0.998T_5$

$T_1 = (\text{Current Assets} - \text{Current Liabilities}) / \text{Total Assets}$

$T_2 = \text{Retained Earnings} / \text{Total Assets}$

$T_3 = \text{Earnings before Interest and Taxes} / \text{Total Assets}$

$T_4 = \text{Book Value of Equity} / \text{Total Liabilities}$

$T_5 = \text{Sales} / \text{Total Assets}$

**Z' Score Bankruptcy Model:**

$Z' = 0.717T_1 + 0.847T_2 + 3.107T_3 + 0.420T_4 + 0.998T_5$

**Zones of Discrimination:**

$Z' > 2.9$  -“Safe” Zone

$1.23 < Z' < 2.9$  -“Grey” Zone

$Z' < 1.23$  -“Distress” Zone

## **CHAPTER FOUR**

### **DATA ANALYSIS AND FINDINGS**

#### **4.1 Introduction**

The chapter presents the data analysis and interpretation as per the study objective of establishing the ability to predict financial distress in commercial predicting financial distress in commercial banks in Kenya in Kenya using the multivariate discriminant analysis technique. Likewise, the prediction result presentation on the two characteristics variable of the failed and non-failed indicators were curtailed and computed below. In this chapter, data is presented using non-text approaches such as tables. The data was analyzed quantitatively using the Statistical package for Social Sciences (SPSS). The analysis was done as per selected data that were used. Data was categorized in terms of predictor variables.

#### **4.2 The Failure Prediction Model**

Five common business ratios weighted by coefficients were used to calculate the Z-score. The coefficients were estimated by identifying a set of firms which had been declared bankrupt and matched by sample of firms which had survived, with matching by industry and approximate size. Five measures were objectively weighted and summed up to arrive at an overall score that formed the basis for classification of firms into one of the a priori groupings (distressed and non-distressed).

The Z-score formula:  $Z' = 0.717A + 0.847B + 3.107C + 0.420D + 0.998E$

The following zones of discrimination:  $Z' > 2.9$  -“Safe” Zone,  $1.23 < Z' < 2.9$  -“Grey” Zone and  $Z' < 1.23$  -“Distress” Zone. All the companies which had a Z score below 1.23 were classified as companies in a distress zone, companies which had a Z score of between 1.23 and 2.9 were classified as companies in a grey zone while those companies which had a Z score above 2.9 were classified as companies in a safe zone. In a distress zone there is a high probability of bankruptcy for a firm, in a grey zone there is uncertainty whether the firm be bankrupt or not, while in a safe zone there is a low probability of firm becoming bankrupt.

### 4.3 Computed Data Result for Failed Commercial Banks

**Table 4. 1: Failed Commercial banks**

	Amount in millions				
2005-2009					
Working capital	578.998	564.801	466.203	367.453	366.456
Total assets	2667.287	2661.970	2549.064	2456.356	2454.234
A (working capital/total assets)	0.2170	0.2122	0.1829	0.1496	0.1493
Retained earnings	129.425	128.450	116.265	112.245	111.673
B (retained earnings/ total assets)	0.0485	0.0482	0.04561	0.0457	0.0455
Earnings before interest and taxes	11.256	11.785	31.319	26.789	25.678
C (earnings before interest and taxes/ total assets)	0.004	0.0044	0.0123	0.0109	0.0105
Book value of equity	428.453	417.543	401.507	398.367	394.325
Total liabilities	8189.098	8186.689	7770.427	6789.35	6676.53
D (book value of equity/ total liabilities)	0.0523	0.051	0.05167	0.0587	0.0591
Sales	2098.760	2094.650	1853.145	1798.234	1697.365
E (sales / total assets)	0.7869	0.7869	0.727	0.7321	0.6916
Z score	1.0164	1.0134	0.955	0.9325	0.8932

In order to develop the failure prediction model, data from financial statements of the both failed and non-failed banks from 1990 to 2009 was extracted. The data collected comprised of; current assets, current liabilities, total assets, retained earnings, earnings before tax, total debt, total income, total liabilities, shareholders equity, and working capital for 3 years before actual failure. However, it is worth noting that even though some of the lines of business concentration were varied, all contribute to the overall top lines and bottom lines of their income statements as is in the case of general banking operations. Shareholders accrue benefits from the banks by way of payment of dividends. Such payments are made from the general reserves from accumulated profits and have also to be in compliance with the limits stipulated in the Banks Act (Banks Act Cap. 416).



In this study and in view of the features here above described, the banks general reserves was treated as part of the long term liabilities and included under total debt in computation of the debt ratio. Similarly the outstanding NPL provisions and premium reserves were also categorized as long term liabilities. However, either way the effects on the debt ratio would have been transferred to the current ratio. The other notable feature is that the total debt appearing in the respective balance sheets was basically from the respective bank's long term borrowing.

The section also posted the result for the discriminant function for variables entered in step one, two and three years prior to Failure using the ratios alone. Then similar discriminant functions were developed using standard deviations of the ratios as independent variables. In both cases the Wilks' Method with Discriminant Procedure of the Statistical Package for Social Sciences (SPSS) was used. The results for each year are discussed below. (See Appendix 1)

The discriminant function using the ratios was:

$$Z = 0.293X_1 - 0.011X_2 + 0.651X_3 - 8.502$$

Introducing the standard deviation, the following function was obtained.

$$Z = 0.293X_1 - 0.011X_2.$$

#### Variables Entered/Removed

	Entered	Wilks' Lambda							
		Statistic	df1	df2	df3	Exact F			
Step						Statistic	df1	df2	Sig.
1	Total liabilities over Total debt	.888	1	1	82.000	10.342	1	82.000	.002
2	working capital over Total Assets	.819	2	1	82.000	8.976	2	81.000	.000
3	EBT over Total Assets	.704	3	1	82.000	11.203	3	80.000	.000

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

a Maximum number of steps is 14.

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 Wilks' lambda using the ratios alone was 0.704 while using the standard deviation; the Wilks' lambda was 0.888. Although Wilks lambda increases by 0.819, the difference between with and without standard deviations however do not seem significant. This is to be expected since one year prior to failure most models classify quite accurately.

However the Eigen value Show different results. Year I using rates alone has Eigen value of 14.328 while using the standard deviation, the Eigen value was 0.42. This means the relative importance of the function in year I using the standard deviation diminishes significantly. This decline was also supported by canonical correlation. Which decreased from 0.094 to 1.453 using ratios and deviations respectively?

#### 4.4 Variables in the Analysis

Step		Tolerance	F to Remove	Wilk's Lambda
1	Total liabilities over Total debt	1.000	10.342	
2	Total liabilities over Total debt	.881	15.258	.973
	working capital over Total Assets	.881	6.868	.888
3	Total liabilities over Total debt	.880	13.628	.824
	working capital over Total Assets	.728	14.485	.832
	EBT over Total Assets	.814	12.999	.819

Year 3 The discriminant function using the ratio was;

$$Z = 0.293X_1 - .011X_2 + 0.651X_3 - 8.502.$$

Introducing the standard deviation the function was;

$$Z = 0.130X_1 + 4.028X_5 + 0.216X_{13} + 10.079X_{19} - 4.083$$

There was much improvement in Wilks' lambda from 0.423 to 0.086, again the discriminant function using standard deviations contains two more variables than those using ratios alone. There was also a marked improvement in Eigen value from 1.364 to 10.669. The relative importance of the function using the standard deviation as compared

to using ratio increased as evidenced by the increase in canonical correlation from 0.76 to 0.56. In both year 1 and year 3.

Both models show conflicting percent correct classification. Overall Wilks' lambda was entered. No variables were qualified for the analysis and therefore no discriminant function was developed using the standard deviation, the Wilks' lambda increased from 0.086 to 0.169. This means that the discriminating power not already accounted for by the model increased by 96.512%. Besides, only three of the 19 ratios are meaningful in discriminating between groups when standard deviations were used although with 100 percent correct classification's The Eigen value fell from 10,669 is 4.917. This implies that the relative importance of the function from Year 3 to Year 5 fell by 53.91%. The canonical correlation was not better either. It fell from 0.956 in year 3 to 0.9 12 in Year 5.

This implies that the discriminating power already in the model decreased by 4.60% although the model produced a classification accuracy of 1 00%. Thus, the model for Year 3 using standard deviation emerged as the "best" discriminant function.

The function was:

$$Z = 0.293X_1 - .011X_2 + 0.651X_3 - 8.502$$

Where Z = Discriminant score

$X_1$  = Net Profit/ Total Income

$X_5$  = Net Profit/Total Assets

$X_{13}$  = Current Debt/Inventory

$X_{19}$  = Total Debt / Total Assets

These critical ratios are discussed below:

*Net profit/Sales*: This was a measure of the proportion of sales revenue in the net profit of firm. It assesses the probability of the firm. Generally, the more net profit a given level of sales earns the better the performance of the firm.

*Net Profit/ Total Assets.* This ratio also measures the profitability of a firm. In particular it assesses how the firm is utilizing its fixed assets in realizing profits. Assets represent items of value whose benefits are expected to accrue to the firm iii a number of years. Generally, the more net profit a given level of assets earns the better the performance of the firm.

*Current Liabilities /Inventory:* This ratio measures liquidity of the firm. Liquidity is the ability of the firm to meet its obligation as and when they fall due and in full. This encompasses short term and current portion of long-term liabilities. Although inventory is an asset, its realizable value is uncertain and thus may impair inflows of value. Selling on credit does not improve the firm’s position due to. Collectibles of receivables.

*Total Debt/Total Assets:* This ratio measures the level of indebtedness of the firm. All that is owned by the firm (things of value) is a function of liabilities and owners equity. The interest is on outside ownership because these are ‘hard contracts” and failure to me t these obligations entitles creditors to liquidation. This raises a firm’s risk and thus results in high present value of financial distress.

**Standardized Canonical Discriminant Function Coefficients**

	Function
	1
EBT over Total Assets	-.762
workin capital over Total Assets	.844
Total liabilities over Total debt	.748

Coefficients provided tell us how much each predictor adds value to the discriminant function. The magnitude of these coefficients indicates how strong the discriminating variables affect the score. Working capital to total assets has greater impact of the three.

### Canonical Discriminant Function Coefficients

	Function
	1
EBT over Total Assets	-12.142
working capital over Total Assets	4.558
Total liabilities over Total debt	5.711
(Constant)	-5.460

The 'Canonical Discriminant Function Coefficients' indicate the unstandardized scores concerning the independent variables. It is the list of coefficients of the unstandardized discriminant equation. The canonical relation is a function that discriminates well.

### Structure Matrix

	Function
	1
Total liabilities over Total debt	.548
EBT over Total Assets	-.489
Retained earning	-.425
current Ratio	.328
working capital over Total Assets	.258
Total income over Total debt	.203
Equity over Total assets	-.010

Pooled within-groups correlations between discriminating variables and standardized canonical discriminant functions Variables ordered by absolute size of correlation within function.

In a two-group, one function problem, the statistically significant variables are all important to function 1. The sign of the coefficient in the structure matrix are arbitrary. The sign indicates the direction of the relationship to discriminant function scores, and does not indicate a direct or inverse relationship to the dependent variable as it does in multiple regression.

a This variable not used in the analysis.

### Classification Function Coefficients

	bank failed or non-failed status	
	Failed	Non failed
EBT over Total Assets	-15.105	.446
working capital over Total Assets	22.786	16.948
Total liabilities over Total debt	63.391	56.076
(Constant)	-31.625	-24.632

Fisher's linear discriminant functions: The output includes the means on the discriminate functions for each of the variables and a classification table. Values in the classification table reflect the correct classification of the two groups based on their scores on the discriminant dimensions.

## **CHAPTER FIVE**

### **SUMMARY, CONCLUSIONS AND RECOMMENDATIONS**

#### **5.1 Introduction**

This chapter provides a summary, conclusions and recommendations that were deduced from the study findings. This was adequate for a normal hypothetical assumption. Below are the conclusions, findings and recommendations on the study.

#### **5.2 Summary of Findings and Discussions**

The objectives of this study were to test relevance of discriminant model incorporating ratio stability that can be used to predict financial distress in commercial banks in Kenya and to identify critical financial ratios with significant predictive ability. The following ratios were identified as significant. Net Profit/Sales, Net profit/total Assets, Current Debt/Inventory and Total Debt/Total Assets. The findings provide evidence that the stability of financial ratios has an impact on the ability of the firm to continue as a going concern. Profitability ratios offer a reasonable measure of management effectiveness in firms' value creation, leverage / indebtedness ratios provide historical reasons for firms' failure while liquidity ratios constitute a measure of firms' solvency.

An important observation is that none of the Activity and Turnover ratio was found to be critical in predicting financial distress in commercial banks in Kenya failure prediction. The model attained 70% and 100% correct classification in year I and in year 3 respectively. The findings are consistent with studies by Kiragu (1991), Kiege (1991) and Dambolena and Khoury (1980) who concluded that profitability, leverage in predicting failure.

The findings however differ with those of Altman's (1968) who concluded that efficiency and profitability ratios were most crucial and that liquidity ratios were not significant. Managers of these resources ought to pay attention to both investment and financing

decisions. Proper investment decision-making will ensure that the firm implements only those projects that add value to the company. A comprehensive investment evaluation should always be undertaken.

Projects commit resources and these funds are not available to the firm for use elsewhere. Investment involves risk. In financing decisions, managers need to ensure that the firm sources funds at the optimal cost of capital and flexible debt covenants increased leverage may add value due to tax benefits but the present value of financial distress may exceed the benefits associated with debt.

There is need to monitor the performance of banks by all stakeholders as banks failure has serious social, economic and political implications. It affects the livelihood of people, reduces credibility of the industry, creates bad-will to the legislators and other stakeholders. The application of credit control and monitoring mechanisms by regulators using standardized Z-Scores for the specific industries should be encouraged. This information could be made readily available on timely basis. This may instill discipline on the incumbent management to ensure the banks survive and remain competitive.

Stijn et al (2001) noted that a working insolvency regime is an essential part of market economy. The use of standardized financial statements across the industries should be encouraged as this may in future allow cross industry comparisons. In the banks industry this is already on course. This will facilitate ease of extraction of financial data relevant in arriving at the ratios.

Other management decisions are dysfunctional to the overall functioning of the company. For a value-maximizing manager. High liquidity may be very expensive to a company having low turnover, as there are opportunity costs and risks associated with high liquidity. Free cash flows may provide incentive to managers to make decisions that lower the value of the firm due to lack of discipline instilled by external funding. If the market for predicting financial distress in commercial banks in Kenya control is inefficient, the inefficient managers may destroy value in a company that will have more value dead than alive.



### **5.3 Conclusions and Recommendations**

Edward Altman's financial distress prediction model was found to be accurate prediction on 8 out of the 10 failed firms, 80% validity for the model. On sampled non-failed firms, majority of them proved the Edward Altman's financial distress prediction model was correct a 90% validity of the model.

This study presented a model on predicting financial distress in commercial banks in Kenya based on the stability of financial ratios. Other measures of ratio stability such as the coefficient of variation and the standard error of estimate of the financial ratios could be applied to develop similar models.

There is also the need to carry out a study that takes into account the nature of the distribution of finance ratios. A model could be developed taking into account the fact that ratios may not be normally distributed but positively skewed. Variables in the real world may not usually be linear. Thus the linearity assumption inherent in this model could be relaxed and attempts made to develop a non-linear model such as logit and probit models.

The wrong prediction may have been due to some other factors such as the reliability of data, smothering of data by managers especially for those firms that failed eventually.

### **5.4 Limitations of the Study**

Several limitations to this study can be noted. The findings are limited as the sample size used here is small. The variable could probably change if a large sample is used. When analyzing financial statements in any depth it is necessary to compute a good number of ratios, but relatively few are really significant and not all of these ratios are independent in the sense that they could not be logically derived from other ratios without reference to the original figures.

It was not possible to calculate some ratios from the available information. For example  $X_4$ (Cost of sales/Inventory) could not be computed from the sample because of lack of

data on cost of sales from the financial statements. The matching of failed and non-failed firm could not be undertaken on stratified basis.

Information on private owned companies is not publicly available thus more time taken to source for required data. The study has focused on applicability of Altman's model in predicting financial distress in commercial banks in Kenya .Qualitative aspects such as the company's strategy, age of the firm and quality of management need to be considered in the interpretation of the result.

This study cannot escape the defects and drawbacks that are inherent in every human endeavor. This included financial constraints and challenges.

### **5.5 Suggestions for Further Studies**

The research study limited itself to six ratios and there could be need to explore other ratios. Ratios based on revenue statements could also be applied like combined ratio, retention ratios (Calandro Junior, et al 2003).

It may also be worth considering actuarial liabilities in further studies so as to isolate the element of shareholders equity in the life funds. Studies on prediction models based on separate lines of banks, that is short term and long term banks may also be appropriate. Similar studies have been done elsewhere (Browne et al, 1995 and 1999).

Studies on corporate governance have been done elsewhere, whereby indices and weights are applied to specific parameters of corporate governance (Esmeralda et al, 2005), In view of the critical role of corporate governance, what specific studies on the effects of corporate governance in banking industry could be done?

Under what circumstances might company management prefer to promptly predict financial distress or bankruptcy to evade from collapse or insolvency?

Areas that need to be explored are interventions model to enable managers' restore confidence and productivity during bankruptcy or insolvency in banking industries.

## REFERENCES

- Altman, E.I. (1968), "*Financial Ratios, Discriminate Analysis and the Prediction of Corporate Bankruptcy*", Journal of Finance, September.
- Altman E.I., (1983), "*Corporate Financial Distress: A Complete Guide to Predicting, Avoiding and Dealing with Bankruptcy*", Toronto: Wiley & Sons.
- Alexakis Panayotis (2008), "*Altman Z-score model and prediction of business failures*" International Journal of Monetary Economics and Finance Volume 1, Number 4
- Aiyabei Jonah, (2000), "*Financial Distress: Theory, Measurement & Consequence*", Journal of Humanities and Social Sciences, September.
- Baron P. David (1974), "*Default Risk, Homemade Leverage and the Modigliani-Miller Theorem*", The American Economic Review, Vol 64, pp 176-182.
- Balcaen Sofie and Hubert Ooghe (2004), "*35 Years of Study on Buusiness Failure: An Overview of the Classical Statistical Methodology and their Related Problems*", Ghent University, Belgium.
- Beaver,W, (1967),"*Financial Ratios as Predictors of Failure*" Journal of Accounting Research.Brownbridge Martin, (1998), "*The Causes of Financial Distress in Local Banks in Africa and Implications for Prudential Policy*", UNCTAG/OSG/ Discussion Paper No.132
- Calandro Jr. Joseph, (2007), "*Considering the utility of Altman's Z-score as a strategic assessment and performance management tool*", Strategy & Leadership, Vol. 35 Issue: 5.
- Carson M. James (1995), "*Financial Distress in the Life Insurance Industry: An Empirical Examination*", Illinois University. 4<sup>th</sup> AFIR Colloquium.
- Chong Chin Wei (1998), "*Predicting financial distress in Malaysian firms*", MBA, MMU.
- Cooper and Schindler (2001), "*Business Research Methods*", 7th Ed. Irwin/ McGraw-Hill, New York
- Dambolena I. G. and Khoury S. J. (1980), "*Ratio Stability and Corporate Failure*", Journal of Finance. Vol XXXV No.4, September. Pg.1017-1027.
- Feller William (1968), "*An Introduction to Probability Theory and Its Application*" John Wiley & Sons Inc.

- Fletcher, D., & Goss, E. (1993), “*Application forecasting with neural networks an application using bankruptcy data*”, *Information and Management*, Vol 24, pp. 159–167.
- Grice John Stephen and Ingram Robert W., (2001), “*Tests of the generalizability of Altman's bankruptcy prediction model*” *Journal of Business Research* Volume 54, Issue 1.
- Gilbert, L. R., Menon, K. and Schwartz, K. B. (1990). “*Predicting Bankruptcy for Firms in Financial Distress*”, *Journal of Business Finance*, pp. 161-171.
- Kamau Metho (2007), “*Cashflow ratios as a predictor of Corporate failure*”, Unpublished MBA research work. UON.
- Kathange M.N. (2000), “*An evaluation of financial performance of the Kenyan banking sector*”, Unpublished research work. UON.
- Keige P.N. (1991), “*Business failure prediction using discriminate analysis*”, Unpublished MBA research work. UON.
- Kiyai K. Thomas (2003), “*Bad Debts Restructuring Techniques & Non-Performing Loans of Commercial Banks in Kenya*”. Unpublished MBA research work, UON.
- Kogi S.K. (2003), “*An analysis of the discriminant corporate failure prediction model based on stability of financial ratios*”. Unpublished MBA research work, UON.
- Koros D. Julius (2001), “*An Evaluation of The Financial Performance of Non-Banking Financial Institutions That Converted to Commercial Banks in Kenya*”. Unpublished MBA research work.
- Korteweg, Arthur G, (2007), “*The Costs of Financial Distress Across Industries*” (September). *Stanford Graduate School of Business Journal*.
- Kotler, P. (1995), “*Marketing Management*”, Eaglewood Cliffs, NJ: Prentice-Hall.
- Modigliani, F.; Miller, M. (1963). “*Corporate income taxes and the cost of capital*”. *American Economic Review* 53 (3): 433–443.
- Moyer, R. Charles., (1977). “*Forecasting Financial Failure: A Re-Examination, Financial Management*”, Spring, pp.11-17.
- Nganga I. K. (2006) “*Failure prediction of Insurance companies in Kenya*”, Unpublished MBA research work UON.
- O’Neill, H. (1986), “*An Analysis of the Turnaround Strategy in Commercial Banking*” in

- Journal of Management Studies, March: 165-188.
- Ohlson, James A., (1980). "*Financial Ratios and the Probabilistic Prediction of Bankruptcy*", Journal of Accounting Research, Spring, pp.109-131.
- Pettway, Richard H., and Joseph F. Sinkey, Jr., (1980). "*Establishing On-Site Bank Priorities: An Early-Warning System Using Accounting and Market Information*", Journal of Finance, March.
- Rasheed (1987), "*Financial Distress in Entrepreneurial Firms*" Seminar paper, Catholic University of Eastern Africa, Department of Commerce, November.
- Ramanujam, V., (1984), "*Environment Context, Organizational Context, Strategy and Corporate turnaround*", PhD Dissertation, University of Pittsburgh.
- Ross A. Stephen, Westerfield W. and Jaffe Jeffrey (1999) "*Corporate Finance*", McGraw Hill International Editions, 5<sup>th</sup> Edition.
- Samarakoon, Lalith P. and Hasan, Tanweer, (2003), "*Altman's Z-Score Models of Predicting Corporate Distress: Evidence from the Emerging Sri Lankan Stock Market*". Journal of the Academy of Finance, vol. 1, pp. 119-125.
- Sinkey, Joseph F., Jr. (1979). "*Problem and Failed Institutions in the Commercial Banking Industry*", Edited by Edward I. Altman and Walter Ingo, Greenwich, Conn.: JAI Press
- Schaefer, Thomas F., (1982). "*The Information Content of Current cost Income Relative To Dividends and Historical Cost Income*", Journal of Accounting Research, Autumn.
- Stiglitz Joseph E., (1967). "*A Re-Examination of the Modigliani Miller Theorem*," Cowles Foundation Discussion Papers 242, Cowles Foundation, Yale University.
- Taffler J. Richard, Vineet Agarwal, (2007), "*Twenty-five years of the Taffler z-score model: does it really have predictive ability?*" Accounting & Business Research Magazine.
- Tamari M. (1966), "*Financial Ratios as a means of forecasting Bankruptcy*", Management International Review.
- Waweru M. Nelson and Kalani M. Victor (2009), "*Commercial banking crises in Kenya: Causes and Remedies*", Africa Journal of Accounting, Economics, Finance And Banking Research, Vol 4.
- Wilcox, Jarrod W., (1971). "*A Simple Theory of Financial Ratios as Predictors of Failure*", Journal of Accounting Research, Autumn, pp. 389-395.

Whitaker Richard B., (1999), "*The stages of financial distress*" Journal of Economics and Finance, Volume 23, Number 2, pg 123 – 132.

Wruck, K. (1990), "*Financial Distress: Reorganization and Organization Efficiency*" in Journal of Financial Economics 27, pg. 425.

## APPENDIX I

### Computed data result for non-Failed Commercial banks

	Amount in millions				
2005-2009					
Working capital	1443.14	1524.27	1542.26	1549.26	1565.26
Total assets	4649.1	4767.27	4688.37	4567.38	4625.28
A (working capital/total assets)	0.31041	0.31974	0.32895	0.3392	0.33842
Retained earnings	214.625	224.267	226.377	234.365	223.263
B (retained earnings/ total assets)	0.04616	0.04704	0.04828	0.05131	0.04827
Earnings before interest and taxes	51.163	51.265	52.276	55.343	54.256
C (earnings before interest and taxes/ total assets)	0.02548	0.02554	0.02606	0.0276	0.02707
Book value of equity	4174.63	4176.36	4178.35	4167.38	4167.37
Total liabilities	4174.48	4175.15	4176.27	4263.36	4126.25
D (book value of equity/ total liabilities)	1.00003	1.00029	1.0005	0.97749	1.00996
Sales	2316.19	2414.26	2416.26	2419.28	2322.26
E (sales / total assets)	0.4982	0.50642	0.51537	0.52969	0.50208
Z score	1.25307	1.26893	1.28712	1.3063	1.28789

## APPENDIX II

### Stepwise Statistics

#### Variables Entered/Removed

	Entered	Wilks' Lambda							
		Statistic	df1	df2	df3	Exact F			
Step						Statistic	df1	df2	Sig.
1	Total liabilities over Total debt	.888	1	1	82.000	10.342	1	82.000	.002
2	working capital over Total Assets	.819	2	1	82.000	8.976	2	81.000	.000
3	EBT over Total Assets	.704	3	1	82.000	11.203	3	80.000	.000

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

- a) Maximum number of steps is 14.
- 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.



### Variables in the Analysis

Step		Tolerance	F to Remove	Wilk's Lambda
1	Total liabilities over Total debt	1.000	10.342	
2	Total liabilities over Total debt	.881	15.258	.973
	working capital over Total Assets	.881	6.868	.888
3	Total liabilities over Total debt	.880	13.628	.824
	working capital over Total Assets	.728	14.485	.832
	EBT over Total Assets	.814	12.999	.819

### Variables Not in the Analysis

Step		Tolerance	Min. Tolerance	F to Enter	Wilks' Lambda
0	current Ratio	1.000	1.000	4.675	.946
	Retained earning	1.000	1.000	2.832	.967
	EBT over Total Assets	1.000	1.000	8.235	.909
	Total income over Total debt	1.000	1.000	.056	.999
	working capital over Total Assets	1.000	1.000	2.294	.973
	Total liabilities over Total debt	1.000	1.000	10.342	.888
	Equity over Total assets	1.000	1.000	.230	.997
1	current Ratio	.968	.968	6.799	.819
	Retained earning	1.000	1.000	2.580	.861
	EBT over Total Assets	.986	.986	5.486	.832
	Total income over Total debt	.994	.994	.201	.886
	working capital over Total Assets	.881	.881	6.868	.819
	Equity over Total assets	.744	.744	1.557	.871
2	current Ratio	.632	.575	1.578	.803
	Retained earning	.999	.880	2.567	.793
	EBT over Total Assets	.814	.728	12.999	.704
	Total income over Total debt	.682	.604	4.890	.771
	Equity over Total assets	.730	.646	2.380	.795
3	current Ratio	.584	.440	.064	.704
	Retained earning	.583	.475	.767	.697
	Total income over Total debt	.658	.559	2.106	.686
	Equity over Total assets	.509	.509	.237	.702

### Wilks' Lambda

	Number of Variables	Lambda	df1	df2	df3	Exact F			
Step						Statistic	df1	df2	Sig.
1	1	.888	1	1	82	10.342	1	82.000	.002
2	2	.819	2	1	82	8.976	2	81.000	.000
3	3	.704	3	1	82	11.203	3	80.000	.000

### Summary of Canonical Discriminant Functions

#### Eigenvalues

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	.420	100.0	100.0	.544

a First 1 canonical discriminant functions were used in the analysis. The function is significant with correlation of 0.54 level which implies relative importance of the function.

#### Wilks' Lambda

Test of function(s)	Wilks' Lambda	Chi-square	df	Sig.
1	.704	28.234	3	.000

We cannot discriminate between the groups using the predictor as its significance is 0.00

### Tests of Equality of Group Means

	Wilks' Lambda	F	df1	df2	Sig.
current Ratio	.946	4.675	1	82	.034
Retained earning	.967	2.832	1	82	.096
EBT over Total Assets	.909	8.235	1	82	.005
Total income over Total debt	.999	.056	1	82	.814
working capital over Total Assets	.973	2.294	1	82	.134
Total liabilities over Total debt	.888	10.342	1	82	.002
Equity over Total assets	.997	.230	1	82	.633

Importance of variables is indicated by the relative size of the absolute value of the coefficient, more important variables having larger coefficients. Thus, we see that Total Liability/total Asset, EBT/total Asset, and current ratio are the three most important predictors.

### THE COMPUTED DATA USED IN THE ANALYSIS

status	x1	x2	x3	x4	x5	x6
1	5.82963	152	47	0.016085	0.018504	0.869268
1	4.358491	84	28	0.016837	0.019608	0.858689
1	4	26	16	0.015253	0.015984	0.954242
1	2.695652	-18	-30	-0.01764	-0.01839	0.958848
1	2.733945	32	18	0.010889	0.011688	0.931639
1	0.770992	19	25	0.016556	0.017507	0.945695
1	5.9375	7	-7	-0.03431	-0.03955	0.867647
1	7.214286	-5	18	0.098361	0.124138	0.79235
1	6.222222	10	10	0.089286	0.102041	0.875
1	0.347619	0	-20	-0.03724	-0.03497	1.065177
1	0.150198	0	-111	-0.20404	-0.17344	1.176471
1	0.168224	0	-102	-0.24286	-0.21162	1.147619
1	2.767857	10	-15	-0.00826	-0.00973	0.849119
1	4.858824	35	35	0.023793	0.025362	0.938137
1	2.907801	18	110	0.108803	0.115304	0.94362
1	1.387889	33	38	0.015866	0.017048	0.930689
1	6.676923	29	20	0.01233	0.013184	0.935265
1	3.627907	18	17	0.016782	0.018478	0.908193
1	4.104762	31	-10	-0.00496	-0.00561	0.883871
1	3.352941	38	11	0.007124	0.008166	0.872409
1	2.715447	29	-33	-0.02303	-0.02454	0.93859
1	24.77406	137	129	0.009868	0.010472	0.942396
1	6.264095	195	118	0.015305	0.016622	0.920752
1	4.192935	127	107	0.022536	0.025452	0.885425
1	7.322581	25	8	0.009324	0.029389	0.848485
1	4.5	90	22	0.028497	0.033846	0.841969
1	5.636364	83	15	0.021583	0.024876	0.867626
1	1.684455	15	20	0.005816	0.006232	0.93312
1	1.214022	70	30	0.012837	0.014012	0.916132
1	2.248619	16	28	0.014652	0.016355	0.895866
1	0.505882	-84	-77	-0.05366	-0.05488	0.9777
1	2.351351	-7	15	0.010225	0.011038	0.92638
1	0.940171	-22	-26	-0.02527	-0.02664	0.948494
1	4.864583	-605	-230	-0.10895	-0.15873	0.686405
1	3.252577	-430	-251	-0.1118	-0.17827	0.627171
1	15.18571	-414	-731	-0.20049	-0.20539	0.976138
1	0.730159	-37	-52	-0.02596	-0.02751	0.943585
1	0.951299	-28	-24	-0.01738	-0.01871	0.929037

1	0.599099	28	-70	-0.06542	-0.07277	0.899065
2	1.477922	1	306	0.293481	0.115254	0.949911
2	1.911111	198	162	0.103185	0.123853	0.833121
2	1.885057	136	97	0.0776	0.092469	0.8392
2	1.986667	170	114	0.058915	0.068551	0.859432
2	1.443662	188	115	0.061563	0.072877	0.844754
2	1.46729	207	152	0.07411	0.087256	0.849342
2	2.56	8	8	0.018433	0.025237	0.730415
2	2.1875	3	3	0.006198	0.007772	0.797521
2	1.5	-45	-24	-0.15484	-0.192	0.806452
2	2.522727	12	65	0.030762	0.034265	0.897776
2	3.939655	10	73	0.03806	0.042172	0.902503
2	2.047619	8	52	0.034392	0.039695	0.866402
2	3.36	37	41	0.019204	0.050995	0.376581
2	5.215909	-42	29	0.014139	0.037275	0.379327
2	7.431373	31	15	0.02381	0.075377	0.315873
2	1.018809	833	169	0.04701	0.069979	0.671766
2	1.040179	779	196	0.058577	0.088328	0.66318
2	1.107143	625	140	0.04717	0.073107	0.645216
2	2.535484	15	53	0.026904	0.028726	0.936548
2	3.535714	9	38	0.023385	0.025083	0.932308
2	6.48	0	27	0.022823	0.024479	0.932375
2	2.19398	171	279	0.053469	0.064929	0.823496
2	2.227437	235	234	0.055503	0.067222	0.825664
2	1.059441	282	214	0.059627	0.070003	0.851769
2	1.704545	0	103	0.048086	0.052126	0.922502
2	3.829545	2	130	0.073654	0.082938	0.908215
2	3.495726	2	85	0.062089	0.06746	0.92038
2	4.753333	53	92	0.018764	0.0203	0.924332
2	4.072727	80	75	0.017556	0.018788	0.934457
2	2.818792	74	118	0.033676	0.036086	0.933219
2	1.70297	28	26	0.011982	0.013138	0.911982
2	3.223301	15	24	0.012158	0.013022	0.933637
2	2.013793	0	13	0.006904	0.007506	0.919809
2	1.090535	263	126	0.044968	0.050868	0.884011
2	1.245232	174	65	0.026125	0.028459	0.918006
2	1.551613	122	43	0.02035	0.021641	0.940369
2	1.699602	104	61	0.012669	0.013339	0.94974
2	5.572816	80	40	0.012634	0.013769	0.917562
2	3.853261	61	30	0.006231	0.012255	0.508411

## APPENDIX III

### LETTER OF INTRODUCTION

16<sup>th</sup> September 2011.

Dear Sir/madam,

RE: **MBA RESEARCH PROJECT**

I am a post-graduate student in the School of Business at the University of Nairobi. I am currently undertaking a research project on “**Applicability of Altman (1968) model in predicting financial distress of commercial banks in Kenya.**”

Your firm has been selected to form part of this study. I kindly request your assistance in providing year 2005-2009 financial statements. The study is based on commercial banks in Nairobi and is being carried out for a management project paper as a requirement in partial fulfillment of the degree of Master in Business Administration, University of Nairobi.

All the information you disclose will be treated in strict confidence and in no instance will your name be mentioned in the report.  
Your co-operation will be highly appreciated.

Thank you

Yours faithfully,

---

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