PREDICTIVE ABILITY OF INFORMATION CONTAINED IN FINANCIAL STATEMENTS OF CO-OPERATIVE SOCIETIES – A CASE OF CO-OPERATIVE BANK OF KENYA LIMITED

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DECLARATION

This project is my original work and has not been presented for a degree in any other University

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This project has been submitted for examination with my approval as the University Supervisor

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DEDICATION

To my husband, Mwanzia, my dear parents, Mr. and Mrs. Macharia, brothers, Paul and Peter and sisters, Perpetual, Rose and Eunice, for all the support and encouragement that they gave me throughout the entire course, to the completion of my paper.

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ABSTRACT

The study seeks to establish whether information contained in financial statements is useful in discriminating between performing and non performing co-operative societies' loans. Non performing loans, a prevalent occurrence to financial institutions, cause concern. Central Bank of Kenya recently disclosed that the ration of non-performing loans to total loans stood at a high of 23.4percent as at June 2004.

Credit evaluation data, quality information and choice of a reliable credit evaluation model are key factors in enhancing credit evaluation and monitoring processes. An earlier study found out that only 6.4percent of the commercial banks in Kenya use quantitative credit risk assessment methods.

Financial statements contain information about solvency, profitability and financial strength of a firm, useful in the prediction of future performance. Dicriminant analysis is a way of classifying observations into one of several a priori groupings. It is used to make predictions where the dependent variable appears in qualitative form, performing or non performing. It is used to find the linear combination of observations that maximize the variance between groups relative to the variances within the group. The data used in this study is derived from financial statements of co-operative societies in Kenya.

The findings of this study indicate that we can rely on discriminant model and the ratios that are an input to that model to separate performing co-operative societies from non-performing ones.

1.0 INTRODUCTION

1.1 Background

Caprio and Klingebiel (1996) examined a wide variety of cases and link macro-economic and microeconomic factors in the debate about how bank insolvency arises and spreads. They concluded that most episodes of insolvency are caused by a mixture of ".. Bad luck, bad policies, both macroeconomic, microeconomic and bad lending." Bad lending is mainly due to poor credit evaluation and monitoring skills. Quality lending is equally a function of information available. Financial statements are a major source of information, Foster (1986). They contain information about solvency, profitability, and financial strength of a firm. Investors find that set of information relevant in making their investment decisions. In his study, Mucheke (2001) pointed out that through the mitigation of a strong internal credit process, most of the problems faced in lending can be avoided. Credit evaluation data and the application of a reliable credit evaluation model are two key factors in enhancing credit evaluation and monitoring processes.

Poor credit risk management is another contributor to poor lending. Greuning and Bratanovic (1999) identify the aspects of credit risk management function as constituting credit portfolio management, lending function and operations, credit portfolio quality, non performing loan portfolio, credit risk management policies, policies to limit or reduce credit risk, assets classification and loan loss provisioning policy. There have been instances where owners and managers have tried to achieve short-run profit goals by taking excessive risks within the bank, often in the form of high risk lending.

Inadequate training is a major contributor to poor credit risk management. In a recent publication on common causes of bank failures in post communist countries, it was noted that the banking system inherited from the Soviet era, had bankers who had no experience in credit risk assessment skills, thus, "..many of the loans made were poorly selected."

The existence of a poor regulatory framework has also played a role in bad lending. Obiero (2002) in his study, reviewed the Kenyan regulatory framework during the period 1984- 2001 within which period, he noted that there were no clear provisions aimed at the regulation of incidences of non performing loans, with Central Bank of Kenya (CBK) simply disclosing the level of non performing loans. It was only until 1999, that CBK started formulating laws on credit reference and credit rating agencies that encouraged banks to exchange information on loan defaulters. The existence of clear lending policy guidelines would have greatly alleviated bad lending decisions.

Government or political interference is another cause of bad lending. In most financial institutions, especially where the government of the day has interest, credit managers are under pressure to disburse loans without effecting any credit vetting measures. Most individuals or organizations that have benefited from such "easy" loans have consequently defaulted on repayment.

Other significant contributors to bad lending are internally generated from prevailing weak banking controls. A good example is incidences of collusion between credit managers and customers. Loans, in this case are given without any vetting measures being undertaken. These may eventually deteriorate into bad loans as little monitoring of the same is done. Insider lending is another significant factor. In this case, loans are issued to staff and shareholders or directors of the bank, with little regard to their recoverability. Credit managers, may also lend to enterprises in which they have ownership ties with little or no vetting measures. Such loans are hardly monitored and easily deteriorate to non performing loans.

In Co-operative bank, Co-operative societies are the core customers. In terms of lending, they comprise at least 60percent of the total loan portfolio. The ownership structure at the bank, where most co-operatives are shareholders is a dominant factor that could lead to bad lending decisions. Financial support in this sector, channeled through the bank for on

lending to mainly co-operatives, may result in bad lending if effective credit management policies and procedures are not put in place.

Co-operative bank, to avert incidences of bad lending especially in this sector, has set up a team of relationship managers, trained and dedicated to specifically handle matters relating to the co-operatives. In addition to this, a qualified credit risk team has been put in place to liaise with credit managers in the co-operatives sectors in ensuring loans disbursed are effectively evaluated and effective monitoring processes are put in place.

Economists and regulators generally accept that banks are special and that bank-runs or failures are costly to the economy. Banking stability is therefore afforded the utmost importance, Kam Hon Chu (1996). Banks are crucial to a country's economy. They serve as the center point of the exchange of money throughout the economy. They gather savings from small and large depositors disburse loans, run the payments system, and coordinate financial transactions. In developing countries, they usually are the core of the financial market and in industrial countries with complex financial markets they still have a role as primary providers of financial services, Garcia (1995). Bad lending policies, if unchecked, can lead to the eventual collapse of a financial institution.

In the case of Co-operative Bank, insolvency would have a tremendous adverse effect on the owners, depositors, staff and the nation as a whole. With over 20 branches spread countrywide, its customer base is wide and varied. According to factual disclosures on the bank, as per the published accounts, 2002, the following helps visualize the magnitude of its impact:

- On ownership, the bank "...is 100percent privately owned by over 57,000 Kenyan shareholders countrywide who include Co-operatives and Individual members of Co-operatives."
- The directors are drawn from the Co-operative movement through delegates who represent all the provinces of Kenya.

- On impact analysis,".. the bank impacts on the livelihood of over 5million members of the co-operative movement directly and 20 million Kenyans indirectly, (thus) ranking it (the bank) as the single biggest business partner to co-operatives in Africa."

The overall impact is not only national but global. Shareholders would lose on their hard earned investment while depositors would suffer loss of funds. The staffing levels are also quite high, 947, in 2002(885 in 2001), and resultant insolvency, as a result of bad lending policies, would result in significant unemployment levels. Overall this would have an adverse effect on the country's economy.

Through the Ministry of Co-operatives, the government has continuously strived to offer support to the co-operative sector. The support and assistance is mainly financial and technical. Recently, the government gave its reprieve on non performing loans, mainly in the sugar industry. During the recent budget, to help tap the potential role of the co-operative movement, the Minister proposed to restructure the taxation of all co-operative societies by removing the special treatment accorded to the sector. Here, dividends and interest income would be taxed like other companies but all payments to members for both primary and corporate societies would continue to be allowable for tax purposes. This proposed amendment's objective was to help ensure co-operative societies stick to their core business where they have a tax advantage.

Loans to co-operative societies account, as earlier mentioned, are approximately 60percent of total lending in Co-operative bank. Out of this lending, a significant proportion is non performing. Generally, loan performance, similarly to other sectors is adversely affected by poor prevailing economic conditions. Other determinants of the loan performance of co-operative societies include the following:

- Poor weather condition experienced in the recent past years. This resulted with poor harvests, thus adversely affecting loan repayments especially on agricultural based co-operatives.

- Poor world commodity prices especially on coffee, which only started to improve in 2000, greatly affected the ability of agriculturally based co-operatives to service their debts.
- Constraints in the Co-operative Societies Act, by which all co-operatives are, governed, also impact on their ability to service their debt. Per the bank's annual accounts in 2000, it was noted that ongoing amendments to force employers to remit funds to the Savings and Credit Co-operatives Societies,(SACCOS) would improve the latter's capacity to service their debt.

Considering that the bulk of the loans in the bank are to the co-operative sector, application of effective credit evaluation, granting and monitoring processes, to help reduce incidences of non performing loans, are essential for the survival of the bank.

Globally, the main cause of serious banking problems continues to be directly related to lax credit standards, (Basel 1999).In Nigeria, the president of Chartered Institute of Bankers of Nigeria (CIBN), speaking at the second Compulsory Continuing Professional Development conference (CCPD), Prince Kola, said that "... the poor credit management of the financial sector led to the liquidation of thirty-four banks in Nigeria between 1994 and 2000". In China, in their recent working paper, John Bonin and Yiping Huan (2001) noted that Chinese banks suffer from serious financial fragility manifested by high proportions of non-performing loans. In Japan, Kay Herr and Goe Miyazaki (1999) noted that despite a large portion of non performing loans Japanese banks have been delaying their recognition until recently. Unlike the U.S banks, which quickly wrote off their non performing loans in the early 1980's, Japanese banks only started doing so in 1995. Sinkey (1992), to this effect, pointed out that the effective management of credit is a critical component, essential to the long term success of the banking industry.

In its reaction to the need for lending policy guidelines, Central bank of Kenya, per the Prudential guidelines, clearly states the following:

- The management of every institution is primarily responsible for maintaining public confidence in the institution it represents. Accordingly, the Board of Directors and Executive Officers of the Institution should provide reasonable assurance to the public, the depositors and creditors, the shareholders and the supervisory authorities that all lending policies of a financial institution conform to acceptable and established norms of banking.
- Loans granted should have been approved and ministered with the highest degree of prudence required by public trust. Further, the management of financial institutions is requested to ensure that timely and adequate actions are taken on problem loans to prevent accumulation of portfolio losses.
- The Board of directors is also required to prescribe in writing, a credit policy specifying the criteria and procedures in the evaluation, processing, approval, documentation and release of credits. Such policy should include the procedures for loan administration and recovery, the recording of transactions and maintenance of appropriate credit files. The levels of discretion given to approving Executive Officers or Committees must be defined clearly in such credit policy or in a separate resolution of the Board of Directors.
- A system of reviewing the entire asset portfolio and the adequate provisioning for losses at periodic monthly or quarterly intervals should be made part of the credit policy.
- Additionally, the system of reviewing each extension or renewal of credit and of identifying and adversely classifying troubled credits as weaknesses should be evident and incorporated as part of the institution's credit policy.

Despite the above general guidelines, non performing loans continue to be a phenomenal issue in the Kenyan financial market. According to recent statistics on non performing loans in Kenya, non- performing loans to total loans remained poor in the year May 2003, declining

marginally to 29.4percent from 29.8percent in May 2002. Kabiru, (2002) in his study, concluded that many of the prevailing credit problems would have been avoided or mitigated by strong internal credit processes.

This problem of non performing loans proved to be of national concern, when the Minister of Finance, in his Budget speech mandated the Central Bank of Kenya to explore ways of resolving the problem and to clean up non performing loans from bank balance sheets. The Minister further suggested use of a tribunal with judicial powers to deal with the problem. Mucheke (2001) in his study, found that one of the key methods of resolving the problem of non performing loans in Kenya was for banks to develop sufficient internal capacities in order to ensure existence of sound credit policies and adherence to such policies. This could only be achieved through the acquisition of relevant credit analysis skills to help ensure "near – flawless" credit appraisal systems. In selecting credit appraisal systems, the model has to take into account input variables to be used. Generally accounting variables are key components in most appraisal systems in use in the banking industry. This study, thus seeks to review the usefulness of the information contained in financial statements to loan managers, especially at Co-operative bank, in their credit decisions.

1.2 Statement of the Problem

Credit Managers at the Co-operative Bank, in addition to other tools, also greatly on information contained in the respective Financial Statements of co-operative societies when making their credit decisions and in monitoring of any outstanding loans. However, no research has been carried out to determine how useful the information contained in financial statements is to the lending managers at Co-operative Bank.

Financial statements contain summarized information of the firm's financial affairs, which is organized systematically. Financial information is relied on to predict, compare and evaluate the firm's earning ability that is critical to the servicing of debt. Firms with poor earnings will find it difficult to service their debts. Investors are known to rely on earnings' variability to determine the riskiness of a potential borrower, Pandey (1988). Generally, the basis for any financial planning and analysis is the financial information contained in the financial statements.

Traditional analysis of financial statements has tended to concentrate on univariate analysis. Here, ratios are examined one at a time with the objective of drawing tentative conclusions. This is achieved through the comparison of a particular ratio with some comparative yardstick. By studying a number of ratios this way, a picture is built up of the position and likely future prospects of the company. The ratios are not combined together in any formal manner, but professional judgment is used to determine how much weight should be given to each of them. This is the predominant approach used by the credit managers, generally, in the banking industry. The assumption is that this approach to credit risk analysis, helps in discriminating potential loan defaulters from non defaulters.

Despite the reliance on financial statements, the bank continues to feel the effects of non performing loans. As per the published accounts for the financial year ended 2002, out of a total loan portfolio of Khs. 28 billion, an amount of Kshs. 11.6 billion (2001- Kshs.9.0 billion) related to loans and advances on which interest was not being accrued as these were classified as non- performing. This phenomenon is common amongst most of the commercial

banks in Kenya. Mucheke (2001) noted that non performing loans stood at 39 percent of total loans of Kenyan Commercial Banks, as at 2001.

In the 1970s, there was a move towards the use of multivariate analysis, which is consideration of the impact of several ratios at the same time by using such statistical techniques as multiple regression analysis and discriminant analysis. Altman (1968) used financial ratios and the technique of discriminant analysis to develop a model to predict corporate bankruptcy. Discriminant analysis is a way of classifying an observation into one of several a priori groupings, or make predictions where the dependent variable appears in qualitative form.

This model computes a score which discriminates bankrupt firms from non bankrupt firms while univariate models, as applied in most banks in Kenya, evaluate each ratio at a time to assess potential failure. Altman's Z Score model combined ratios covering aspects of liquidity, reinvested earnings, profitability, gearing and asset turnover. There is no economic reason why these ratios emerged, it was just that, statistically, they gave the best results. On testing findings, this model correctly classified companies to the failed or non failed group accurately in 96percent of the cases. However, correct classification declined considerably with data taken more that one year prior to failure. In his study, (Keige1991),noted that the models' reliability for up to at least two years was of concern as this was too short a time for third parties, especially long term lenders to extricate themselves from failing institutions without incurring considerable losses.

Mucheke(2001), in concluding his study, as earlier noted, zoned in on the acquisition of relevant credit analysis skills to help ensure " near – flawless" credit appraisal systems, as one of the key methods of resolving the problem of non performing loans in Kenya. Almost all of the statistical credit scoring models that are in use today are variations on a similar theme. They involve the combination of a set of quantifiable financial indicators of firm performance, with, perhaps, a small number of additional variables that attempt to capture some qualitative elements of the credit process.

Previous studies in America, Piefer (1970), and Mayer (1970) have shown that most banks' deterioration to problem status or collapse was not an overnight change but a gradual development. Such findings are the basis of developing financial based predictors of potential failure candidates. This study, therefore seeks to establish whether, loan managers in Cooperative Bank, Kenya, can use information contained in the financial statements to effectively discriminate between co-operative societies that are likely to default and those likely not to default on their loans.

1.3 Objectives of the Study

a) To determine coefficients for the discriminant model using financial statements data.

b) To test the validity of the discriminant model.

1.4 Importance of the Study

Lenders: The study shall assist them effectively use the information contained in financial statements in their lending decisions and in the monitoring of loans. It shall help them effectively use financial statements of co-operative societies in discriminating between performing and non-performing loans.

Regulatory Authorities: The study shall assist them in monitoring the solvency and stability of individual societies through effective use of financial statements. This is through the analysis of key financial ratios identified in this study and the coefficients of the MDA model determined in the study.

Auditors: The study shall assist in determining going concern matters of the respective society. This shall similarly be done through use of the society's financial statements where continued monitoring of the identified key financial ratios shall help predict the society's financial soundness.

Researchers and Scholars: The study can be used in their pursuit for knowledge and further research.

2.0 Literature Review

Effective management of credit risk is a critical component of a comprehensive approach to risk management and essential to the long term success of a banking organization, Sinkey (1992). According to the new Basel Capital Accord (Basel II), the main cause of serious banking problems continues to be directly related to lax credit standards.

2.1 General Risk Management.

Risk management at banks has in the recent years come under increasing scrutiny. By its very nature, banking is an attempt to manage multiple and seemingly opposing needs. They stand ready to provide liquidity on demand to depositors through the deposit accounts and at the same time, to extend credit as well as liquidity through lines of credit, Kashyap, Rajan, and Stein, (1999). It is difficult to imagine another sector of the economy where as many risks are managed jointly as in banking. In a Modigliani- Miller (1958) world, firms generally should not waste resources managing risks because shareholders can do so by efficiently holding a well diversified portfolio. Banks (intermediaries) would not exist in such a world, however.

2.2 Credit Risk Management.

Credit risk is the probability of loss of interest and principal on a financial firm's debt Thygerson(1991). Credit Risk arises from the risk of borrower defaults, downgrading, or failures to make payments on a contractual obligation. Saunders (2002) classified credit risk into two main classifications:

Firm specific credit risk: This is the risk of default of a borrowing firm associated with the specific type of project risk taken by that firm.

Systemic credit risk: This is the risk of default associated with the general economic wide or macro-conditions affecting all borrowers.

Credit risk management involves creating policies and procedures for underwriting loans in the organization units, analyzing the financial position of the guarantors and issuers of securities held in the firm, creating policies and procedures for servicing assets, monitoring the credit experience of the institution's asset portfolio and participating in loan provisioning. The main goal of credit risk management is to maximize a bank's risk adjusted rate of return by maintaining credit risk exposure within acceptable parameters. Banks need to manage credit risk inherent in the entire portfolio as well as the risk in individual credits or transactions. When banks experience financial difficulties, the underlying cause usually can be traced to excessive credit risk manifested in heavy loan losses, Kabiru (2002).

Credit Risk management in Cooperative Bank, has taken effect through the setting up of a Credit Risk Management Unit. This team continuously reviews and implements controls and relevant procedures aimed at enhancing lending decisions and loan monitoring, ensuring the bank's credit risk exposure is maintained within acceptable parameters.

2.3 Credit Risk Assessment Models

Several models to assess default risk on loans have been used by economists and bankers. These models vary from relatively qualitative to the highly quantitative. The models are not mutually exclusive, thus a credit manager may use more than one to reach a credit pricing decision (Gardner, Mills and Cooperman 2000).

Qualitative Models.

Historically, banks used to rely on the expertise of credit advisors who looked at a combination of accounting and qualitative variables to come up with an assessment of the client's firm credit risk. In his study, (Kabiru 2002) noted two key factors that influenced credit decisions, that is, borrower specific factors and market specific factors.

Borrower specific factors

These included:

- Attractiveness of customer due to long banking relationship. This of course worked to the disadvantage of new borrowers.
- Leverage- the ratio of debt to equity was an indicator of probability of default. The higher the leverage, the higher the probability of default.
- Volatility of earnings- Here, highly volatile income streams increased the probability that the borrower cannot meet fixed interest and principal charge. For this reason, new firms with high earning variance over time were less attractive than those with long and more stable earning histories.
- Collateral- the degree of collateral or assets forming security of the loan was said to be a key feature.

Market Specific Factor

Business cycle- the economic situation in the business cycle is of paramount importance to banks in assessing default probability. Here corporate borrowers, especially in the consumer durable goods sector of the economy were considered prone to default risk.

Qualitative credit risk assessment models are prone to bias as detailed above. It is not surprising that in his study, Kabiru highlighted the fact that the use of quantitative risk assessment models would greatly assist in the elimination of subjective lending decisions making processes practiced by credit managers.

Quantitative Models.

$$R^* = \frac{1+R}{1-D} - 1$$

Where:

D- Probability of Default

(1-D)- Probability of Non default.

R*- Loan contract rate.

R - Risk free rate

In the above case, assuming that the risk of default is D, then the risk of non default is (1-D). A profitable loan contract rate R* must compensate the lender for the time value of money as represented by the risk free rate of interest, R, and the risk of default.

A profitable loan, for banks, contract rate increases with the perception of the borrower's probability of default, where:

If (D=0), then R*=R

In contrast, when a borrower is certain to default, (D=1), then the loan contract rate is undefined, that is the lender cannot be compensated for the risk.

In the case of a borrower, the difference between the profitable contract rate (R*) and the risk free rate R, is the default rate premium required by the lender. Therefore mathematically:

Default risk premium= R*-R = (1+R*) D

In summary, Kabiru (2002) noted that, theoretically, the typical credit analysis performed by a bank focuses on determining a borrower's probability of loan repayment (1-D), where D is the probability of default. Credit scoring is a statistical approach to assessing credit risk by assigning point values to various criteria thought to be associated with credit risk. To apply credit scoring models, the credit manager has to identify objective economic and financial measures of risk for any particular class of borrower.

In the Kenyan Financial market, Kabiru (2002), in his study (Credit risk assessment practice and the level of Non performing loans of Kenyan Banks) concluded in part as follows:

a) 93.6percent of banks in Kenya use qualitative credit assessment methods only.
b) 6.4percent use quantitative methods of credit risk.
c) All, 100percent, use qualitative credit risk assessment methods.

d) Quantitative credit assessment method applied could influence the level of non performing loans. Quantitative methods are advisable as they lead to lower non performing loans.

2.4 Financial Statements.

Financial statements contain summarized information of the firm's financial affairs, organized systematically. These statements not only report on past performance but they are also used as an aid on the prediction of future performance. The concept of prediction is heavily dependent on an extrapolation of the past. The basic objective of financial statements, as stated earlier is to assist in decision-making. Additional objectives include:

a) Provision of financial information about economic resources and obligations of a business enterprise.

b) Provision of reliable information about changes in net resources of a firm that result from the profit directed activities

c) Provision of financial information that assists in estimating the earning potential of a firm

d) Provision of additional information about changes in economic resources and obligations

e) Disclosure to the extent possible, other information related to the financial statement that is relevant to statement users.

There are two basic components of financial statements, being the Balance sheet and the profit and loss statements.

Balance Sheet Statement: This indicates the financial condition of a business at a particular time, and contains summarized information of the firm's financial affairs. Functionally, this statement provides a concise summary of the firm's resources (assets) and obligations (liabilities and owners' equity), helps determine a firm's liquidity and helps measure the level of a firm's solvency.

Profit and Loss Statement: It represents a flow of economic data, matching revenues and expenses to determine the firm's net profit or loss. This statement gives a concise summary of the firm's revenues and expenses during a period of time and helps measure a firm's profitability level.

Users of financial statements can get better insight about the strengths and weaknesses of a firm if they properly analyze the information reported in the statements. In the banking sector, one of the contributors to sound credit management is understanding of financial analysis. Financial analysis is the process of identifying the financial strengths and weaknesses of a firm by properly establishing relationships between the items of the balance sheet and the profit and loss statements, mainly through the use of ratio analysis.

Ratio Analysis.

One of the powerful tools of financial analysis is ratio analysis. The relationship between two accounting figures, expressed mathematically, is known as a financial ratio. A ratio helps indicate quantitative relationship which can in turn be used to make a qualitative judgment. In financial analysis, ratios are used as a yardstick to measure financial position and performance of a firm. The use of ratios is based on the realization that failing firms are significantly different from non failing firms, (Keige, 1991).

Selection of Candidate Variables.

Several ratios can be calculated from the financial data contained in the financial statements. These ratios can be further grouped into various categories according to the financial activity to be evaluated. Chen and Shimerda (1981), in their literature, cited over 100 ratios, of which almost 50 percent were found useful in at least one empirical study. Ezzamuel et al (1987) and Clarke (1990), attempted to reduce the wide variety of financial ratios into several major groups, for example liquidity, profitability etc. The indication here was that a researcher need only select one ratio from each of the groups to obtain an

indication of the company's overall performance. There is however no guide as to which ratio should be selected within each group.

Libby (1975) carried out a study to determine whether accounting ratios provided useful information to loan officers trying to predict business failure. Using a set of five variables, commercial bank loan officers were asked to analyze the ratios and then predict either failure or non failure. In her conclusion, she noted that there was a relatively uniform interpretation of the accounting data across the banks with most predictions being correct. In her test, Libby used profitability ratios, activity ratios, liquidity ratios, asset balance ratios and cash position ratios.

Tamari(1966),in his study on bankruptcy prediction on a group of companies based in Israel, used net profit margin ratios, quick ratio and debt ratios. All these ratios were noted to have a marked drop during the 5 year period prior to bankruptcy, studied.

In a local study Keige (1991) noted that ratios that best discriminate between failing and non failing companies appear to differ from one place to another. In his findings, current ratio, fixed charge coverage ratios, retained earnings to equity, return on total assets, return on net worth, average collection period and sales to total assets, in Kenya, appeared to be useful in failure prediction for a period of up to 2 years.

Hamer (1983) tested to see if classification success was sensitive to a variable selection. She examined four variable sets; those selected by Altman (1968), Deakin (1972), Blum (1974) and Ohlson (1980). She found there was very little direct consistency in the variables selected for inclusion in the set, however, each contained variables that measure profitability, liquidity and leverage. Therefore, my selection of the variables in this study is based under the four broad categories, that is, profitability, efficiency, gearing ratios and liquidity ratios.

2.5 Credit Scoring Models

Credit scoring is an underwriting tool used to evaluate the credit worthiness of prospective borrowers. These models have predictive power, giving lenders the ability to expeditiously assess the likelihood of borrower default. There is agreement, amongst scholars, that to retain their predictive power, models must be maintained and adjusted to reflect changes in loan performance.

Credit scoring models use data on observed characteristics either to calculate the probability of default or to sort borrowers into different default risk classes. Hayden (2003) in her research highlighted three pricinciple model categories;

- Statistical or Quantitative
- Theoretical models (Option pricing Approach)
- Judgmental or Qualitative

2.5.1 Quantitative Credit Scoring Methods

The detection of companies operating under financial difficulties is a subject which has been particularly amenable to analysis with financial ratios. However, starting in the 1980's, some practitioners and certainly academicians had been moving towards the possible elimination of ratio analysis as an analytical technique in assessing firm performance. Ratios were said to be inadequate as they simply reflected symptoms and not causes.

Tamari (1966)

Tamari (1966) in his study of 16 industrial companies in Israel which had been declared bankrupt and 12 companies on the verge of bankruptcy, during a 5year period, 1956-1960, found out that financial ratios of these companies were lower than for the industry as a whole for the five year prior to bankruptcy; that indeed these ratios had fallen during the period. The ratios used included debt ratios, net profit margin and quick ratio.

Beaver (1967, 1968)

Classic works in the area of ratio analysis and bankruptcy classification were performed by Beaver (1967, 1968). His univariate analysis of a number of bankruptcy predictors set the stage for multivariate attempts. In his study, he carried out a comparison ratio on 79 failed firms and 79 non-failed firms. Beaver found that a number of indicators could discriminate between matched samples of failed and non failed firms for as long as five years prior to failure. In his study, he found that non liquid assets ratios were better predictors of failure in both the short and long term.

These studies imply a definite potential of ratios as predictors of bankruptcy. In general ratios measuring profitability, liquidity, leverage and solvency seemed to prevail as the most significant indicators. The order of their importance is not clear since almost every study cited a different ratio as being the most effective indicator of impending problems. This method was univariate in nature and emphasis was placed on individual signals of impending problems.

Zmijewski (1983)

This was further affirmed by Zmijewski (1983) when he carried out an overview of univariate evidence, by classifying 75 out of the 100 financial ratios and other variables examined in distress prediction studies, published over the last 20 years (then).

In his findings, he noted that;

- Rate of Return- bankrupt firms were less profitable
- Financial Leverage- bankrupt firms were more highly leveraged
- Fixed payment coverage- bankrupt firms had lower coverage of their fixed payments by their earnings or cash flow.
- Stock-return Volatility- bankrupt firms had lower mean stock returns and higher stock return variability.

Conclusively, consistent with other research studies, Zmijewski reported that the liquidity and activity /turnover categories of variables exhibited limited differences between bankrupt and Non bankrupt firms.

Multivariate models are motivated, in part, by the attempts to resolve such conflicting predictions. The model attempts to combine the information in several financial variables into a single multivariate model.

Edward Altman (1968) Z-Score

One of the first researchers who tried to formalize the dependence between accounting variables and credit quality was Edward Altman (1968) who developed the famous Z Score model. His model showed that for a rather small sample of observations, financially distressed firms can be separated from the non-failed firms in the year before the declaration of bankruptcy. He used financial ratios and the technique of discriminant analysis to develop the model. Discriminant analysis is a way of classifying an observation into one of several a priori groupings, or make predictions where the dependent variable appears in qualitative form.

Edward Altman's Z-Score

Mathematically, it takes the following form:

$Z= 0.012X_1+0.014X_2+ 0.033X_3+0.006X_4+0.010X_5$

The ratios used were:

X_1-Working Capital / Total Assets

X_2-Retained Earnings / Total Assets

X_3-Earnings Before Interest and Taxes/ Total Assets

X_4-Market Value of Equity / Book Value of Total Liabilities

X_5-Sales / Total Assets

Gardner (2000) criticized the use of dicriminant analysis model to make credit risk evaluations based on the following:

a) It usually discriminates only between two extreme cases of borrower's behavior, Default and Non default.
b) There is no obvious economic reason to expect the weights in the discriminant function or more generally the weights in any credit scoring model to be constant over any but very short periods.
c) This model ignores qualitative factors that may play a crucial role in the default or non default decisions.

Dambolena and Khoury (1980), sought to improve Altman's model by introducing ratio stability in the discriminant model. They held that it was the stability of every ratio that was relevant and not just the earnings. They used a ratio stability measure and stepwise discriminant analysis. A sample of 46 firms from the US paired into failed and non-failed were used. The data was extracted from 12 financial statement items for 8 years prior to failure for firms that failed during the 1969-1975 period. From their data, they accumulated 19 ratios as well as 4 different measures of stability, namely standard deviation of each ratio for 3 and 4 year periods; standard error of estimate around a 4 year linear trend and coefficient of variation over 4 years. The ratios were then grouped into 4 major groups that is, profitability, activity, turnover and indebtedness measures. Predictive accuracy of a model without stability 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.

R.J Taffer and H. Tisshaw (1977) Z Scales

The Z Scores were developed for quoted manufacturing companies and another for non quoted manufacturing enterprises with a turnover of above half a million British Pounds. The model for quoted companies is as follows:

$Z= C_0+C_1R_1+C_2R_2+ C_3R_3+C_4R_4$

C_0 to C_4 are coefficients and R_1 to R_4 are the following ratios:

R_1 = Profit before taxation/ Current Liabilities

R_2= Current Assets/Total Liabilities

R_3= Current Assets/ Total Assets

R_4= No credit Interval = Immediate Assets- Current Liabilities/ Operating costs excluding depreciation

The four ratios combine together various aspects of profitability and solvency to produce Z Score. It is important to note that this model was developed upon application of Altman (1968) Z Score model to UK based data.

2.5.2 Others Credit Scoring Models.

Classification and Regression Trees (CART)

The technique can be used to develop a binary classification tree to assign observation to a priori groups. It is useful in that it is easy to understand and can be used under general conditions. Frydman, Altman and Kao(1985), have applied CART to the problem of classifying commercial banks' loans and predicting financial distress (corporate bankruptcy).

ZETA Credit Risk Model

This is a risk evaluation model developed by Zeta Services Inc. The Zeta Score tells the user how much a company resembles firms that have poor credit risks. that is , firms that have recently filed for bankruptcy petitions. This model does not forecast failure or non-failure. This is simply because it was not designed to do so. It instead, compares a company's operating and financial characteristics to those of over 50 firms which have already failed. It is important to note that the test sample was composed of 53 industrial corporations which filed for bankruptcy or were taken over by their banks. The sample does not include banks, financial companies, real estate companies or railroad companies.

Judgmental

This is subjective based and data obtained is mainly derived from credit rating agencies.

Theoretical.

The Expected Default Frequency (EDF) Model

This model is based on market variables, based on the option pricing approach, originally proposed by Merton (1974). It basically uses market variables to calculate credit risk of traded firms and is said to be a better predictor model than accounting- based models. (Nyberg, Sellers and Zhang (2001))

The starting point of the model is the proposition that when the market value of a firm drops below a certain level, the firm will default on its obligations. The value of the firm projected to a given future date, has a probability distribution characterized by its expected value and standard deviation(volatility) The area under the distribution that is below the book liabilities of the firm is the Probability of default (PD) called the (EDF).

The model:

a) Determines the EDF for a company. The Market value and volatility of the firm are estimated from the market value of its stock, the volatility of its stock and the book value of its liabilities.

b) The firm's default point is calculated relative to the firm's liabilities coming due over time. A measure is constructed that represents the number of standard deviations from the expected firm value to the default point (the distance to default)

c) Lastly, a mapping is determined between a firm's distance to default and the default rate probability based on the historical default experience of companies with similar distance – to default values.(E. Altman's Literature, 2002)

Catastrophe Model (Thomas Ho & Anthony Saunders, 1980)

This is mainly used where that path towards failure is not smooth and continuous, but rather explosive, sudden or catastrophic. The theory maintains that changes in a system's parameters can cause catastrophic behavior in a dependent variable or state.

The following are the properties of this model:

a) Divergence: small continuous changes in a parameter or initial conditions can lead to a large dichotomous change.

b) Asymmetry: This implies that as parameters increase or decrease, there will be a dichotomous jump in the dependent variable.

c) Stability: Catastrophe is robust to marginal changes in the underlying relationship, that is, some relationships may change marginally but catastrophe will occur.

For the purposes of this study, considering that the choice of model- type and the selection of input variables have to be adapted to each other, judgmental and theoretical models have not been selected. Judgmental is subjective whereas based on the nature of our sample, where market based data is not applicable, the EDF model, is not applicable. Altman (1968) model use of discriminant analysis is considered most applicable, for purposes of this study. Discriminant analyses are appealing on their use of a small number of financial statement ratios and the aggregation of these ratios into an easy to apply multivariate model.

2.6 Discriminant Analysis.

Discriminant Analysis is a statistical tool that can help us decide which prospective accounts to accept or reject on the basis of certain relevant variables. It was used to find the linear combination of observations that maximize the variance between groups relative to the variances within the groups. It involves attributing weights to each variable such that the distributions of the scores for each group have the least overlap, or so that groups are forced to be as statistically distinct as possible.

Mathematically, it takes the following form:

$y= b_0+b_1x_1 + \ldots\ldots b_n X_n$

Where:

y is the firm's discriminant score.

b_0 is a constant

b_n is the discriminant coefficient

x_n is the independent variable.

Discriminant analysis can be extended to include a number of independent variables. Additional variables should be added as long as the benefits of greater predictability exceed the costs of collecting or processing information.

The use of a multivariate approach is best depicted by Altman (1968) when he took a sample of 33 failed and non failed American manufacturing companies. He then examined many ratios in an attempt to determine which ratios best discriminated between companies in the two groups. In the absence of any well developed theoretical model which could best explain why companies fail, he used a statistical technique known as 'multiple discriminant analysis, MDA'. By this model, he found 5 ratios which could be combined to produce what is called a Z-Score. These best captured differences between the failed and non failed firms. MDA is a statistical technique used to classify an observation into one of several a priori groupings dependent upon the observation's individual characteristics. It is multivariate in its nature of analysis. It is used primarily to classify or make predictions in problems where the dependent variable appears in qualitative form, for example, bankrupt to non bankrupt. MDA simply attempts to derive a linear combination of these characteristics that "best" discriminates between the groups. The technique has the advantage of considering an entire profile of characteristics common to the relevant firms, as well as interaction of these properties, coefficients. If a particular object, for example a corporation, has characteristics (financial ratios) which can be quantified for all of the companies in the analysis, the MDA

determines a set of determinant coefficients. When these coefficients are applied to the actual ratios, a basis for classification into one of the mutually exclusive groupings exists. Additionally, the approach, compared to traditional ratio analysis has the potential to reformulate the problem correctly. Specifically, combinations of ratios can be analyzed together in order to remove possible ambiguities and misclassifications observed in earlier traditional ratio studies.

Edward Altman's Z-Score

Upon application of MDA, mathematically, the discriminant function took the following form:

$Z= V_1X_1+V_2X_2.....V_nX_n$

Where

Z is the score on discrimination function, in this study either performing loan or non performing loan.

V_1 is the discriminant weight or coefficient.

X_1 is the independent predictor variable

This discriminant analysis transforms the independent variables into a single discriminant score. In application, Altman found that Z-Scores of less than 1.81 indicated a high probability of bankruptcy, while Z-Scores higher than 3.00 indicated a low probability of bankruptcy.

3.0 RESEARCH METHODOLOGY

3.1 Population

The population interests in this study will be Co-operative Societies who have Loan accounts with Co-operative Bank, Kenya.

3.2 Sample Size

The sample size will be 64 Co-operative societies' accounts, 32 of which are performing and 32 of which are non performing.

3.3 Data Collection

Data collection shall be done by use of secondary data from financial statements of co-operatives, between the years 1994 and 2002.

3.4 Data Analysis

The objective is to determine a set of ratios that maximize the difference between a performing and non performing society. Initial samples of ratios used are detailed in Appendix 1. Data collected will be analyzed using the multi-discriminant analysis model as structured below:

$Z = V_1X_1 + V_2X_2 \ldots\ldots V_nX_n$

Where:

Z is the score on discrimination function, in this study either performing loan or non performing loan.

V_1 to V_n - the discriminant weights or coefficients.

X_1 to X_n- the independent predictor variables

3.4.1 Validity Test

A classification matrix shall be used to test the validity of the MDA model. This shall take the following form;

Actual Group Membership	Predicted Group Membership	
	Group 0	Group 1
Group 0	C_0	I_0
Group 1	I_1	C_1

Where:

C Refers to number of correct classifications

I Refers to the number of Incorrect classifications.

In this study, for example, group 1 will be the number of performing loans whereas group 0 will consist of non performing loans. If the model were a perfect predictor, then $I_0 = I_1$.

4.0 RESULTS AND INTERPRETATIONS

4.1 Introduction

The main objective of this study is to establish predictor variable(s) that best classify the co-operative societies into two groups, namely performing (1) and non-performing (0). A total of sixty four co-operatives were studied.

4.2 Ratios used in this Study

A total of twelve ratios are used in this study. They included current asset ratio (CA/CL), return on assets ratio (ROA), return on equity ratio (ROE), debt to equity ratio (D/Equity), liabilities to total assets ratio (Lia/TA), advances to deposits ratio (Adv/Dep), expenses to income ratio (Exp/Inc), income to fixed assets ratio (Inc/FA), fixed assets to total assets ratio (FA/TA), current assets to total assets (CA/TA), cash to total assets (Cash/TA), and working capital to total assets(WA/TA).

The descriptive statistics are summarized in table one (1) below

Table 1.
Descriptive Statistics of All Financial Ratios

Variable	N	N*	Mean	Median	TrMean	StDev	SE Mean	Min	Max	Q1	Q3
CA/CL	42	3	3.082	1.185	2.754	3.443	0.531	0.426	12.198	0.925	4.517
ROA	42	3	-0.002	0.002	-0.002	0.058	0.009	-0.220	0.221	-0.011	0.011
ROE	42	3	-0.292	0.005	0.008	2.088	0.322	-13.400	1.047	-0.022	0.039
D/E	39	6	2.290	0.610	1.650	6.870	1.100	-12.160	33.340	0.110	3.450
LIA/TA	42	3	0.639	0.640	0.610	0.484	0.075	0.046	1.972	0.132	0.921
ADV/DEP	35	10	1.680	0.671	0.982	3.280	0.554	0.069	14.509	0.296	1.041
EXP/IN	40	5	0.408	0.948	0.870	2.584	0.409	-14.185	2.031	0.805	1.140
IN/FA	41	4	0.545	0.315	0.471	0.691	0.108	-0.180	3.241	0.148	0.534
FA/TA	42	3	0.258	0.193	0.243	0.199	0.031	0.018	0.822	0.122	0.366
CA/TA	42	3	0.742	0.807	0.757	0.199	0.031	0.178	0.983	0.634	0.878
CASH/TA	42	3	0.070	0.043	0.062	0.157	0.024	-0.233	0.618	-0.007	0.089
WC/TA	42	3	0.188	0.086	0.198	0.412	0.064	-0.796	0.873	-0.067	0.533

The debt equity ratio, current asset ratio, advances to deposit ratio, expenses to income ratio and return to equity have the highest dispersion as measured by standard deviation (see table 1 above). This is explained by wide differences between the minimum and maximum value of these ratios. Theoretically these ratios should have the highest discriminating power. Table above is relied on to determine whether the average of a ratio belonging to a particular class (performing (1) and non performing (0)) is above or below pooled average (overall average).

4.3 Univariate Modeling of Distressed Prediction

This involves the evaluation of a single variable or ratio at a time, to assess potential failure. This type of model is only applicable where the distribution of a variable for non-performing co-operatives differs systematically from the distribution of the variable for performing ones and that the systematic differences can be exploited for prediction purposes, Foster (1986).

Table 2.

Descriptive Statistics: CA/CL Ratio, ROA, ... by CLASS

Variable	CLASS	N	N*	Mean	Median	TrMean	StDev	SE Mean	Min	Max	Q1	Q3
CA/CL	0	22	0	1.528	1.003	1.343	1.517	0.323	0.426	6.319	0.735	1.552
	1	20	2	4.791	2.858	4.607	4.143	0.926	0.708	12.198	1.093	7.904
ROA	0	22	0	-0.014	-0.005	-0.016	0.076	0.016	-0.220	0.221	-0.048	0.006
	1	20	2	0.010	0.005	0.009	0.021	0.005	-0.027	0.074	0.000	0.016
ROE	0	22	0	-0.591	0.006	-0.033	2.882	0.614	-13.400	1.047	-0.071	0.039
	1	20	2	0.038	0.005	0.025	0.110	0.025	-0.132	0.439	0.000	0.052
D/E Ratio	0	20	2	2.180	1.830	2.100	5.720	1.280	-12.160	18.020	0.190	4.260
	1	19	3	2.400	0.140	1.190	8.070	1.850	-7.970	33.340	0.090	1.140
Lia/TA	0	22	0	0.809	0.846	0.808	0.405	0.086	0.101	1.526	0.455	1.052
	1	20	2	0.451	0.185	0.389	0.503	0.113	0.046	1.972	0.093	0.830
Adv/Dep	0	18	4	2.610	0.640	2.030	4.420	1.040	0.100	14.510	0.300	2.370
	1	17	5	0.693	0.895	0.706	0.373	0.090	0.069	1.126	0.363	1.017
Exp/In	0	21	1	0.008	1.010	0.649	3.552	0.775	-14.185	2.031	0.840	1.286
	1	19	3	0.850	0.926	0.855	0.224	0.051	0.411	1.190	0.729	0.982
In/FA	0	22	0	0.335	0.259	0.283	0.428	0.091	-0.180	1.890	0.113	0.447
	1	19	3	0.789	0.485	0.687	0.855	0.196	0.069	3.241	0.179	1.202
FA/TA	0	22	0	0.287	0.240	0.277	0.191	0.041	0.048	0.721	0.146	0.418
	1	20	2	0.227	0.154	0.206	0.208	0.047	0.018	0.822	0.085	0.312
CA/TA	0	22	0	0.713	0.761	0.723	0.191	0.041	0.279	0.952	0.582	0.854
	1	20	2	0.773	0.846	0.794	0.208	0.047	0.178	0.983	0.689	0.915
Cash/TA	0	22	0	0.028	0.011	0.024	0.142	0.030	-0.233	0.382	-0.024	0.083
	1	20	2	0.115	0.063	0.095	0.164	0.037	-0.026	0.618	0.023	0.120
WC/TA	0	22	0	0.000	0.004	0.009	0.350	0.075	-0.796	0.611	-0.177	0.147
	1	20	2	0.395	0.432	0.409	0.380	0.085	-0.333	0.873	0.037	0.783

4.3.1 Liquidity Ratio

For current asset ratio, the pooled average is 3.082 as shown on table 1, whereas the average for performing co-operatives is 4.791 while that for non-performing co-operatives is 1.528, see table 2, below. The current asset ratio for non-performing loans is below the recommended text ratio of 2.

The current asset to total asset ratio of performing cooperatives is higher than that of non-performing co-operatives. While the pooled average is 0.742, the average for performing loans is 0.773 whereas that of the non performing loans is 0.713.

As expected the cash position of non-performing co-operatives, measured by the ratio of cash to total assets, is relatively weaker, 0.028 compared to 0.115 and the overall average of 0.070. The strong cash position of the performing cooperatives dominates the sample.

The same applies to working capital to total assets whereby, in comparison to the overall average of 0.188, performing co-operatives averaged at 0.395 whereas the non performing co-operatives averaged at 0.000. The observation is that by looking at liquidity position we should be able to easily differentiate non-performing co-operatives firms from performing ones.

4.3.2 Profitability Ratio

The pooled average return on assets ratio (ROA) is -0.002, while the average return on assets ratio (ROA) for performing cooperatives is 0.010, compared to -0.014 on non-performing co-operatives. This also confirms that managers in non performing co-operatives not only fail to make good use of assets available but also that members of poorly performing cooperatives cannot expect much in terms of profits. The pooled average return on equity ratio (ROE) is -0.2992, whereby that for performing cooperatives is 0.038 compared to -0.591 on non-performing co-operatives.

The rate at which assets are used to generate income is measured by income to fixed assets ratio (In/FA). Here, the pooled average return is 0.545, whereby performing loans had an average of 0.789 in comparison to 0.335 of the non- performing loans. Again from this ratio, the conclusion is that performing co-operatives make better use of the fixed assets at their disposal than poorly performing ones.

4.3.3 Financial Position

The pooled average debt to equity ratio (D/Equity Ratio) is 2.290, whereby, the debt to equity ratio for performing cooperatives is 2.400 in comparison to 2.180 for non-performing cooperatives. It appears that only profitable firms are able to attract additional lending. Managers of poor performing firms are not be able to fund their operations from borrowings. This ratio could therefore be a useful variable in discriminating between performing and non performing cooperatives, in a univariate discriminant model.

The pooled average liabilities to total assets ratio (Lia/TA) is 0.639, whereby the average ratio for performing cooperatives is 0.451, compared to non-performing cooperative at 0.809. In this case, with a high average ratio, the ownership of assets in non-performing co-operatives is transferred to lenders of the business who include both financiers and creditors.

The pooled advance to deposits ratio (Adv/Dep) is 1.680, whereby, the average ratio for performing cooperatives is 0.693 in comparison to 2.610 of non-performing co-operative societies. In this case, the tying up of funds in advances with minimal deposits would translate to strained cash flows due to bad lending and reluctance or inability of members to inject funds in terms of deposits due to the reigning poor performance of loans.

4.4 T- test for difference in the Means of Ratios

The 2-Sample t-test is used to perform a hypothesis test and compute a confidence interval of the difference between performing and non-performing cooperatives. This is because two population standard deviations are unknown. For a 2-tailed two-sample t – test:

h_0: $m_1 - m_0 = 0$ i.e. there is no difference in means; or

h_1: $m_1 - m_0 \neq 0$ i.e. there is difference in means

Where m_1 and m_0 are the means of performing and non-performing cooperatives respectively. The results for the differences in means of the ratios are summarized in table 3 below. At 95% confidence interval the differences are only significant for current asset ratio (CA/CR), liability to total asset ratio (Lia/TA), income to fixed asset ratio (In/FA) ratio, and working capital to total asset ratio (WC/TA). However at 90% confidence interval the difference in the mean of two additional ratios, namely advances to deposits and current asset to total assets ratio become significant. The ratios whose means differ significantly are used separately to generate coefficients for the discriminant function.

Table 3.

T-Test Of Difference between Non Performing and Performing Ratio

Variable	Estimate For Difference	Confidence Interval	95% Confidence Interval	t-Value	p-Value	Comment
CA/CL	-3.263	95	(-5.293, -1.234)	-3.33	0.003	There is a difference
ROA	-0.025	95	(-0.0594, 0.0104)	-1.45	0.160	There is no difference
ROE	-0.629	95	(-1.908, 0.650)	-1.02	0.318	There is no difference
D/E	-0.220	95	(-4.80, 4.36)	-0.10	0.923	There is no difference
Lia/TA	0.358	95	(0.70, 0.645)	2.52	0.016	There is difference
Adv/Dep	1.920	95	(-0.28, 4.12)	1.84	0.084	There is no difference
Exp/In	-0.842	95	(-2.462, 0.779)	-1.08	0.292	There is no difference
In/FA	-0.454	95	(-0.900, 0.009)	-2.10	0.046	There is difference
FA/TA	0.059	95	(-0.0657, 0.1845)	0.96	0.343	There is no difference
CA/TA	-0.059	95	(-0.1845, 0.0657)	-0.96	0.343	There is no difference
Cash/TA	-0.087	95	(-0.1829, 0.0097)	-1.82	0.077	There is no difference
WC/TA	-0.395	95	(-0.624, 0.166)	-3.49	0.001	There is difference

4.5 Multivariate Modeling of Distressed Prediction (Discriminant Analysis)

The Multivariate Discriminant Analysis model was used to separate groups using multivariate measures. After subtracting group means, CA/TA was highly correlated with other predictors and thus, since the calculations for discriminant analysis could not be done, this variable was dropped. Table 4 below, is the summary of classification table in which the discriminant analysis correctly identified 25 of 32 cooperatives, though the probability of correctly classifying a performing loans was lower (12/16 or 75%) than the probability of correctly classifying a non-performing loan (13/16 or 81.3%).

Table 4

Summary of Classification

Put into Group	True Group 0	True Group 1
0 (Non Performing)	13	4
1 (Performing)	3	12
Total N	16	16
N Correct	13	12
Proportion	0.813	0.75

N = 32 N Correct = 25 Proportion Correct = 0.781

Table 4a

Linear Discriminant Function for Group

	0	1
Constant	-47.68	-45.4
CA/CL Ra	0.597	0.968
ROA	-41.24	-36.5
ROE	2.475	6.485
D/E Ratio	0.009	0.116
Lia/TA	86.06	79.85
Adv/Dep	-2.458	-2.4
Exp/In	-0.672	-0.41
In/FA	5.855	6.456
FA/TA	97.22	96.2
Cash/TA	1.31	10.67
WC/TA	77.98	73.23

The ratios whose means are statistically different (see t – test for Difference in 4.4 above), e.g. current asset ratio, liability to total assets, fixed assets to total assets ratio and working capital to total assets ratio exhibit large coefficients in the discriminant equation for the groups. These are the additional ratios used to maximize the differences between the values of the dependent variable. They were selected due to the fact that their means differed significantly from the group mean. They are uncorrelated to the others, thus the high respective coefficients.

To identify co-operatives not in the sample, one should compute the linear discriminant function associated with non-performing and performing co-operatives (table 4a above) and identify the new co-operatives as being of a particular origin depending upon which discriminant function value is higher.

A Tabular summary of misclassified observations appendix 2, shows the squared distances from each misclassified point to group centroids and the posterior probabilities. The squared distance value is that value from observation to the group centroids, or mean vector. The probability value is the posterior probability, or the probability of a group given the data.

Observations are assigned to the group with the highest posterior probability.

The Z-scores using the coefficients are summarized in appendix 3.

5.0 SUMMARY AND CONCLUSION

5.1 Introduction

The findings of this study, as summarized in table 4 above, conclusively indicate that we can rely on the financial ratios employed in this study to separate performing co-operative societies from non-performing ones. This, therefore, confirms that the information contained in the financial statements is useful to the lending managers who should review the identified ratios and the coefficient of MDA model in page 34. The Co-operative bank and other financial institutions who lend to co-operative societies can use this model to support their lending decisions

5.2 Limitations of the Study

Ratios used to develop the model are only a few in comparison to the numerous ratios available. They therefore cannot be concluded as sole ratios that can help predict the performance of the societies. Chen and Shimerda (1981), in their literature, cited over 100 ratios, of which almost 50 percent were found useful in at least one empirical study. In her study, Libby (1975) used profitability ratios, activity ratios, liquidity ratios, asset balance ratios and cash position ratios whereas Tamari (1966), in his study used net profit margin ratios, quick ratio and debt ratios. In a local study Keige (1991) noted that ratios that best discriminate between failing and non failing companies appear to differ from one place to another. In his findings, current ratio, fixed charge coverage ratios, retained earnings to equity, return on total assets, return on net worth, average collection period and sales to total assets, in Kenya, appeared to be useful in failure prediction for a period of up to 2 years.

Therefore, it is possible that there could be other ratios that can help predict the financial ability of cooperatives apart from those cited above. Additionally, several financial statements could not be used because of lack of detailed information.

5.3 Suggestions for further research

A similar study may be carried out in future taking into account sectorial nature of the cooperative society. This can help determine, key characteristics in the various sectors that can help signal imminent failure.

Considering that this study has used samples of co-operative societies that are known to have become non performing as of a particular period in time and consequently examined the financial characteristics that would have helped predict their current status, a similar study may be carried out to predict the timing of bankruptcy for co-operative societies experiencing financial difficulty (a forward looking exercise). This shall further seek to determine failure prediction period of the developed model. The study can shed a lot of light on the timing of application of remedial action to help avert a loan from going bad.

Additionally the review can also be applied to a wider clientele in various business sectors to help widen knowledge available to loan managers with a varied loan portfolio.

APPENDICES

Appendix 1

List of Ratios Used

1. Current Asset Ratio
2. Current Assets /Total Assets Ratio
3. Working Capital to Total Assets Ratio
4. Debt to Equity Ratio
5. Return on Total Assets Ratio
6. Return on Equity Ratio
7. Advances to Deposits Ratio
8. Cash to Total Assets Ratio
9. Fixed Assets to Total Assets Ratio
10. Total liabilities to Total Assets Ratio
11. Income to Fixed Assets Ratio
12. Expenses to Income Ratio

SUMMARY OF MISCLASSIFIED OBSERVATIONS

Case	Appendix Zscore	Observation RawGroup		TRUE Group	Pred Group	Observation		TRUE Group	Pred Group	Group	Squared Distance	Probability
1	42.47819841	1	1	1	1	1	1	1	1	0	8.516	0.065
2	39.80104217	0	2 **	0	1					1	3.186	0.935
3	41.96507851	0	3	0	0	2 **		0	1	0	7.046	0.239
4	50.54726324	1	4	1	1					1	4.726	0.761
5	37.99401277	1	5	1	1	3		0	0	0	1.798	0.741
6	55.40348964	1	6	1	1					1	3.895	0.259
7	48.34330729	0				4		1	1	0	19.312	0.004
8	40.35094056	1	8 **	1	0					1	8.325	0.996
9	45.52243322	1	9	1	1	5		1	1	0	5.442	0.355
10	46.14080667	1	10	1	1					1	4.247	0.645
11	50.95404217	0	11	0	0	6		1	1	0	20.92	0.036
12	47.62030692	0	12	0	0					1	14.36	0.964
13	39.39645998	1	13 **	1	0	8 **		1	0	0	12.86	0.61
14	50.18040877	0	14	0	0					1	13.76	0.39
15	46.10924182	0	15 **	0	1	9		1	1	0	19.87	0.016
16	47.37892837	0	16	0	0					1	11.69	0.984
17	42.54745559	0	17	0	0	10		1	1	0	28.94	0.05
18		1								1	23.06	0.95
19	46.09578245	0				11		0	0	0	25.58	0.985
20	26.37958643	0								1	33.97	0.015
21	47.19719945	0	21	0	0	12		0	0	0	19.57	0.988
22	48.65061633	1	22	1	1					1	28.46	0.012
23	39.47770158	0	23	0	0	13 **		1	0	0	4.917	0.705
24	51.92552467	1	24	1	1					1	6.663	0.295
25	41.8166595	0	25	0	0	14		0	0	0	25.58	0.983
26	43.0681131	0	26	0	0					1	33.75	0.017
27	39.63812709	0			15 **			0	1	0	7.886	0.22
28	38.07891391	0	28 **	0	1					1	5.359	0.78
29						16		0	0	0	26.94	0.973
30	50.4703903	1								1	34.09	0.027
31	46.02098925	1	31	1	1	17		0	0	0	1 621	0.87
32	48.48008141	1	32	1	1					1	5.426	0.13
33	41.56888338	1				21		0	0	0	2.472	0.693
34	150.8955819	1								1	4.099	0.307
35	14.98543551	0				22		1	1	0	12.234	0.03
36		1								1	5.264	0.97
37	45.7103758	1	37	1	1	23		0	0	0	2.567	0.888
38	85.86145212	0								1	6.698	0.112
39	40.80906417	1	39 **	1	0	24		1	1	0	17.501	0.008
40	44.98418605	1	40	1	1					1	7.916	0.992
41	95.10889609	0	41	0	0	25		0	0	0	16.82	0.914
42	40.38253678	1								1	21.54	0.086
43	51.63547614	0	43	0	0	26		0	0	0	2.086	0.737
44	39.58794035	1	44 **	1	0					1	4.145	0.263
45	39.953373	0	45	0	0	28 **		0	1	0	5.886	0.31
										1	4.281	0.69
						31		1	1	0	7.871	0.249
										1	5.661	0.751
						32		1	1	0	20.15	0.056
										1	14.49	0.944
						37		1	1	0	12.035	0.043
										1	5.844	0.957
					39 **			1	0	0	2.857	0.552
										1	3.271	0.448
						40		1	1	0	10.355	0.267
										1	8.338	0.733
						41		0	0	0	26.36	0.99
										1	35.47	0.01
						43		0	0	0	11.87	0.893
										1	16.11	0.107
					44 **			1	0	0	1.942	0.743
										1	4.064	0.257
						45		0	0	0	5.77	0.979
										1	13.432	0.021

Appendix 3

Z SCORE FOR TEST SAMPLE

Case	Class	Zscore
1	1	37.99401277
2	1	39.39645998
3	1	39.58794035
4	1	40.35094056
5	1	40.38253678
6	1	40.80906417
7	1	41.56888338
8	1	42.47819841
9	1	44.98418605
10	1	45.52243322
11	1	45.7103758
12	1	46.02098925
13	1	46.14080667
14	1	48.48008141
15	1	48.65061633
16	1	50.4703903
17	1	50.54726324
18	1	51.92552467
19	1	55.40348964
20	1	150.8955819
21	1	
22	1	
23	0	14.98543551
24	0	26.37958643
25	0	38.07891391
26	0	39.47770158
27	0	39.63812709
28	0	39.80104217
29	0	39.953373
30	0	41.8166595
31	0	41.96507851
32	0	42.54745559
33	0	43.0681131
34	0	46.09578245
35	0	46.10924182
36	0	47.19719945
37	0	47.37892837
38	0	47.62030692
39	0	48.34330729
40	0	50.18040877
41	0	50.95404217
42	0	51.63547614
43	0	85.86145212
44	0	95.10889609
45		

Average of Performers	50.36598874
Average of non Performers	46.55438764

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