"AN ANALYSIS OF THE RELATIONSHIP BETWEEN LIQUIDITY AND MACRO-ECONOMIC INDICATORS: AN INTER-INDUSTRY COMPARISON"

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DECLARATION

This management project is my original work and not been presented for a degree in any other university.

SIGNED:------*waciira*------------------------------- DATE:------12/11/99------------

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

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ABSTRACT

Liquidity is cited as a major predictor or determinant of business failure. Financial ratio measures of liquidity have been shown to be suitable predictors of subsequent insolvency of firms. This study attempts to investigate an additional linkage, that is the relationship between the liquidity of firms and the state of a country's economy .The existence of such a linkage may supplement the existing body of knowledge as well as explain additional aspects of financial distress such as its cyclical nature.

A linear model has been used to explain the relationship between computed measures of liquidity and three economic indicators. Four major categories of firms have been used, these categories are currently adopted at the Nairobi Stock Exchange and include the Agricultural, Commercial, Financial and Industrial sectors. Correlation co-efficients were used to measure the strength of the relationships. For each industry category five separate measures of liquidity were computed, which covered both short term and long term aspects of liquidity as well as the static (Balance sheet) and dynamic (Cash flow oriented) aspects of liquidity. A review of literature highlighted problems with the distributions of financial ratios, this problem was tackled by use of natural logarithm transformations on two of the five ratios used in this study. The application of transformations on the ratio data successfully restored normality on some of the ratio categories , although it was unsuccessful in a few instances. The degree of normality was established using the Lilliefors test at a significance level of 95%.

Results from the analysis conducted indicate that there exists moderate to strong relationships between liquidity and economic conditions. The results also indicate that substantial differences in the relationship described above exist as a result of the nature of operations undertaken by firms, which are reflected in their industry classification. The results of the analysis also suggest that sectors such as the commercial , industrial and agricultural sectors have responses that are generally similar to each other , but that the financial sector appears to differ from the other sectors significantly.

LIST OF ABBREVIATIONS

The following abbreviations have been used to represent the ratios used in this study;

CA/CL: Current Assets To Current Liabilities

WC/TA :   Working Capital To Total Assets

TD/TA :   Total Debt To Total Assets

CF/CL :   Cashflow From Operations To Current Liabilities

CF/TL :   Cashflow From Operations To Total Liabilities

(ln)TD/TA: Natural Logarithm Of Total Debt To Total Assets

(ln)CA/CL :   Natural Logarithm Of Current Asset Ratio

DEFINITION OF TERMS

LIQUIDITY.

Liquidity may be defined as the ability to realize value in money, the most liquid of assets. It has two dimensions (1) the time necessary to convert an asset into money; and (2) the degree of certainty associated with the conversion ratio or price realized for the asset. (Van horne, 1980). Essentially liquidity measures the ability of a firm to meet its financial obligations as they fall due and thereby remain solvent. Liquidity is often broken down into short-term and long-term liquidity. Short-term liquidity specifically measures the ability of the firm to meet obligations arising from normal operations of the business. Long-term liquidity measures the ability to meet obligations arising from the financing and investing activities of the business. Short-term liquidity problems may arise from long-term liquidity difficulties. For example long-term debt arrangements are often accompanied by periodic interest payments.

OUTLIERS.

An observation so different in magnitude from the rest of the observations that the analyst chooses to treat it as a special case (Churchill, 1991). Outliers may or may not result from errors in data collection. Treatment of outliers may vary depending on the perceived cause of the outlier and on the purposes of the researcher. Removal of outliers has been suggested as being beneficial in the case of financial ratio analysis (Frecka and hopwood, 1983). Outliers may be eliminated by visual inspection. The proportion of outliers in a category of ratios has been estimated at around four percent (Watson, 1990).

BANKRUPTCY

This is a legal state that is declared by a court of law upon determination that a person is unable to discharge his obligations as they fall due. Bankruptcy research has chiefly been concerned with the ability to predict the occurrence of bankruptcy before the event occurs. One may observe that bankruptcy researchers embrace a broader definition of bankruptcy that encompasses the conventional bankruptcy as well as insolvency and in some cases debt rescheduling. Variations of bankruptcy definition will vary according to the researcher as well as the precise wording and provisions of bankruptcy statutes in the country where the researcher is resident or where the research is being conducted. Researches based in the United States of America will tend to embrace broader definitions of bankruptcy on account of the numerous clauses in the bankruptcy statutes in that country. Much of the bankruptcy research reviewed in this study was conducted in the United States.

1.00: INTRODUCTION

1.01: BACKGROUND OF THE STUDY.

Liquidity refers to the ability of a firm to meet its short-term and long-term financial obligations as they fall due. Liquidity is an important concept in the world of business. Research has established that Liquidity is an important determinant of financial distress (Merwin, 1942; Beaver, 1966), consequently it is used by a variety of persons to evaluate the riskiness of firms.

The concept of liquidity has contemporary significance in Kenya today. Amongst many institutions , some quoted banks such as the National Bank of Kenya have indicated a significant increase in non-performing loans for the 1998 financial year. This essentially signifies the inability of a borrowing party to honor a financial obligation within the stipulated time period. As such it is possible to view the bad debts crisis primarily as a liquidity problem even though, particularly in Kenya, other significant factors such as the use of political patronage to obtain credit by overruling normal credit procedures cannot be ignored. It is also apparent that liquidity in one sector can be transmitted to another sector, for example the bad debts being recognized by financial institutions in this republic have probably arisen from defaulters in other sectors such as the industrial sectors of our economy and this has affected the liquidity of these financial institutions to an extent whereby the government has had to devise rescue packages to keep some of these institutions afloat[1] .In addition to this, non financial concerns such as manufacturers may also have claims against each other arising in the normal course of

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[1] The National Bank of Kenya (NBK) was the target of such a rescue package in early 1999.

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operations , such as credit purchases and so on , because of this the liquidity of a sector is of concern , not only to lending institutions , but also to the business world in general.

Anecdotal evidence suggests that liquidity problems experienced by firms are closely influenced by economic cycles such that more firms experience liquidity problems during economic downturns than during upswings. This aspect has not been addressed by bankruptcy researchers such as Beaver (1966) which is the seminal paper in the field . This aspect also seems to have been ignored by Keige(1991) who conducted a similar research in Kenya. Both researchers above were able , however, inspite of this weakness , to build successful models capable of predicting bankruptcy as far as two years in advance . It is possible however to build better models if researchers allow for movements in the economic cycle which follows a generally predictable pattern over time.

A firm usually becomes insolvent because it is unable to either generate sufficient cash internally or to obtain needed cash from external sources to sustain operating, investing and financing activities. Liquidity analysis therefore generally focuses on the relationship between the demand for, and the supply of cash or near cash items. For this reason financial ratios have been widely used to estimate the liquidity of firms. It is important to note that both the demand for , and supply of near cash items is to a great degree influenced by prevailing economic circumstances , for example interest rates will be high when the economy is in recession and this will tend to place a heavier burden on firms with outstanding obligations which will , holding other factors constant lead to a worsening of the liquidity positions of such firms. Thus we can see that in an economy where firms compete with each other , the economy exerts a similar impact on all firms , however since some firms are healthier (financially) than others , they are able to withstand the rigors of economic downturns whereas less healthy firms fail.

One way of evaluating an enterprise is by the use of benchmarks. Recently however this technique has fallen out of favour because it lacks empirical justification, for example it is difficult to explain the justification of the commonly used benchmark of two to one for the current ratio. Alternative methods of ratio evaluation involve comparison of a firm's actual ratio against a standard for example, the planned ratio for the period, the corresponding ratio during the preceding period for the same firm the corresponding ratio of a similar firm in the same industry and the average ratio for other firms in the same industry.

Most of the researches concerned with the application of ratios to, for example bankruptcy prediction are based on observing trends or movements in these ratios over time. It is believed that movements in a ratio over time are caused by conditions internal to the firm. Analysis of the current asset ratio over long periods of time in the US, however suggests that this ratio may be affected also by macro-economic factors such as interest rates (Gibson, 1992).

Researches into the variability of financial ratios with respect to time has been undertaken by Stickney (1996) who has attributed the decline of current ratios observed by Gibson to the increase in interest rates over the period. Virtanen and Ylli-olli (1989) have observed in Finnish financial data that the business cycle affects the cross sectional financial ratio distributions. Whittington , Saporta and Singh (1997) have studied the effect of hyper-inflation on accounting ratios for 37 quoted companies in Turkey. They concluded that hyper-inflation tends to distort balance sheet data in such a manner that any ratios computed on the basis of such data are likely to be erroneous. Frecka and Lee (1983) have concluded that movements in financial ratios over time are adjustments to predetermined targets, which they suspect are the industry averages. They suggest that

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this adjustment process may partly be due to active efforts of management and partly the result of passive industry-wide effects operating on the firm.

Possibly the most promising line of ratio research is the investigation of corporate failure. Research in this area can be traced as far back as Winakor and Smith (1935) who concluded that the ratio of working capital to total assets was the most accurate and steady indicator of failure with its decline beginning as early as ten years before the occurrence of financial difficulties. This study, however suffered the shortcoming of lack of a contrasting control group and as a result their results are generally not regarded as being conclusive. The earliest credible research however was conducted by Merwin (1942). He concluded that three ratios were very sensitive predictors of discontinuance , with a predictive ability of as many as five years before the occurrence of bankruptcy .These ratios were working capital to total assets, net worth to debt and the Current ratio.

Merwin's study is regarded as being the first really sophisticated analysis of ratio predictive power. His conclusions are still considered to be credible. However the seminal paper in this area (Beaver, 1966) derived conclusions similar to Merwin's, but Beaver is considered more credible because of superior statistical analysis and due to the fact that Beaver also analysed ratios extracted from the funds flow statement such as net income plus depreciation, depletion and amortization to total liabilities.

1.02: STATEMENT OF THE RESEARCH PROBLEM.

Studies by Merwin (1942), Beaver (1966) and Tamari (1966) have shown that liquidity ratios are strong predictors of financial distress in studies based in the US and elsewhere. In Kenya similar work has been done by Keige (1991) who also established the viability of liquidity ratios (amongst other ratios) in predicting financial distress as early as two years in advance. Other uses of liquidity ratios include analysis of credit decisions and appraisal of corporations for investment purposes. The credibility of various models that use liquidity ratios to reach conclusions about the characteristics of an enterprise may be undermined by findings that seem to suggest that some liquidity ratios such as the current ratio respond, not only to a firm's performance but also to the general economic circumstances. Indeed the apparently cyclical nature of the bad debt problem in Kenya in recent years may hint at the role of the economy in the liquidity of firms. Conclusions such as those of Gibson (1992) suggest that the declining trend in the current ratios may be as a result of some macro-economic influence and not necessarily that firm's were facing liquidity problems. Indeed Stickney (1996) and Whittington, Saporta and Singh (1997) have suggested that interest rates and inflation respectively may also explain trends in financial ratios. A drawback of Stickney and Whittington et. al (1997) is the univariate nature of their study . Multivariate models are generally more comprehensive where it is suspected that a variable may be influenced by more than one factor. Liquidity is a key aid in the decision processes of a variety of interest groups. The apparent variability of liquidity of companies with time has real implications for the business community especially the banking sector and is therefore deserving of further research. This study attempts to investigate the relationship between the liquidity of quoted firms and Macro-economic indicators. Prior research has already suggested interest rates and inflation rates as possible influences on financial ratios (Gibson, 1992; Whittington, Saporta and Singh, 1997) To gain a clearer picture of the impact of macro-

economic factors on the liquidity of firms it is proposed that an additional factor be included in this analysis. This is;

- The NSE 20 Share index which is an indicator of general economic activity.

This study attempts to answer the following questions:

1. **Does a relationship exist between the liquidity of quoted firms and the following macro-economic variables:**

- Interest rates (R)

- Inflation.(I)

- The NSE index (X)

2. **What is the magnitude or strength of the relationship, if one exists?**

3. **What is the effect of industry categorisations on the relationship described in (1) above?**

The above questions were investigated by use of the regression model suggested below.

$$(LIQ^*) = \beta_{(0)} + \beta_{(1)} I + \beta_{(2)} X + \beta_{(3)} R + \Sigma_i$$

Where;

LIQ* is the current asset ratio adjusted by removing outliers so as to restore normality.

I is the month on month annual average rate of inflation,

X is the NSE 20 share index (annual average),

R is the interest rate on 91-day treasury bills , this is a common yardstick of interest rates in general.

Σ_i is a measure of the error term contained in the model this measures the goodness of model fit or the explanatory power of the model.

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The following hypothesis shall also be tested.

Ho: $\beta_1 = \beta_2 = \beta_3 = \beta_4 = 0$

The NSE index, exchange rate, interest rates and inflation do not affect the current ratio

H_A: $\beta_1 \neq \beta_2 \neq \beta_3 \neq \beta_4 \neq 0$

At least one of the variables affects the current ratio.

The hypotheses outlined above shall be tested using a two-tailed t-test at a significance level of 95%.

1.03: OBJECTIVES OF THE STUDY

This study attempted to find out the following;

1. To establish whether or not a relationship exists between the liquidity of quoted firms and the macro economic factors identified above. This objective was be accomplished by use of a multiple linear model. The model was also tested for statistical significance at a level of significance of 95%.

2. To establish the magnitude and direction of the relationships between the liquidity of quoted firms and the macro-economic factors. This was accomplished by use of correlation analysis.

3. To establish the possible existence of different relationships that may exist from industry groupings. This objective was accomplished by use of descriptive statistics.

1.04: IMPORTANCE OF THE STUDY

This study is of use to the following parties.

1. **Financial analysts**: It has already been established that liquidity is a key predictor of bankruptcy. It would be beneficial to these parties therefore to distinguish between movements in liquidity that are likely to be as a result of internal firm conditions and those that are as a result of external economic conditions

2. **Academia:** Contemporary approaches to ratio analysis have tended to distance themselves from the more traditional approaches such as benchmarking which have been shown to be empirically unsound (Gibson, 1992). In place of the more traditional approaches, researchers such as Stickney (1996) have suggested that more meaningful conclusions can be drawn from ratio analysis by considering ratios over a number of periods and also evaluating the ratios with due regard to the industry and macro-economic environment. This research incorporates the suggestions of the contemporary school and should therefore be of interest to researchers interested in this particular line of research.

3. **Credit Managers**: Credit managers are key users of financial ratio data and especially liquidity ratios. The decisions they make are likely to be based on the level of a liquidity ratio variable at a given point in time. By placing liquidity in the context of wider economic factors, a more informed decision can be made.

4. **Policy makers:** Government authorities who are in a position to influence some of the variables tackled in this study through either monetary or fiscal policy. These

parties would gain a deeper appreciation of the impact of their decisions on the liquidity of the **business** community.

1.05: ORGANISATION OF THE STUDY.

This report is organised into the following chapters;

1. **Introduction;** This includes the background of the study, the statement of the research problem, the objectives of the study and the importance of the study.

2. **The literature review;** This is a review of previous researches in this area. The main areas that are discussed in this part are on the applications of current ratios especially in the area of bankruptcy prediction and also the impact of external factors on the movements of this ratio. This chapter also discusses the distributions of financial ratios.

3. **The research design;** Issues dealt with here include the population of the study, data collection and the data analysis method.

4. **Research findings and interpretation of the findings.**

5. **Conclusions of the study, limitations of the study, recommendations and suggestions for further research.**

Bibliography and Appendices will follow after chapter five.

2.00: LITERATURE REVIEW

2.01: INTRODUCTION.

Ratio analysis is the manipulation of financial data to obtain an insight into the financial structure, profitability and ultimately the inherent strength and viability of a firm. The origins of financial ratio analysis (FRA) can be traced back to the last stages of America's drive to industrial maturity (Horrigan, 1968). Sometime in the last few years of the 1890's there arose a practice of comparing a company's current assets to its current liabilities. Researches by Foulke (1961) suggest that 1891 was the earliest possible year that the current ratio could have emerged.

The traditionally stated purpose of using financial data in the ratio form is making results comparable across firms and over time by controlling for size (Salmi, Virtanen and Ylli-oli, 1990). Ratios have also been found to be useful predictors of corporate failure (Deakin, 1968).

2.02: APPROACHES TO THE CLASSIFICATION OF FINANCIAL RATIOS

The question of classifying financial ratios so as to reduce redundancy between numerous potential financial ratios has been a subject of much research. There are broadly four major approaches to the classification of financial ratios.

2.03: THE PRAGMATIC APPROACH OR AUTHORITARIAN APPROACH TO THE CLASSIFICATION OF FINANCIAL RATIOS.

According to this approach classifications of financial ratios are established on the basis of personal views of eminent financial analysts. This approach appears in most standard

financial texts such as Brealey and Myers (1991), Meigs and Meigs (1990) and Foster (1986). This school of thought resolves financial ratios into the following categories:

- **Liquidity ratios: These** are used to measure the ability of an organization to meet its financial obligations on time. Two common sub-categorizations comprise of those ratios that measure the overall liquidity of the firm and those that assess the liquidity of specific assets, these ratios are known as activity ratios.

- **Leverage ratios:** These attempt to measure the extent to which an organization is reliant on debt finance. Examples of these ratios include interest cover, gross cash flow to total debt ratio, and proportional debt ratio.

- **Activity ratios:** These are also known as efficiency ratios. These ratios attempt to measure the efficiency of management in control of particular current assets. Examples of these ratios include accounts receivable days and accounts payable days.

- **Profitability ratios:** This is a category of ratios used to determine the efficiency of operations or efficiency in utilization of assets. Amongst the ratios in this category are the profit margin, return on shareholders equity and return on net assets.

The pragmatic approach as will be observed later is often at variance with empirical approaches to ratio classification.

2.04: THE DEDUCTIVE APPROACH TO THE CLASSIFICATION OF ACCOUNTING RATIOS.

In this approach, the classification of accounting ratios is based on technical considerations between the different ratios. This approach was originated by the DuPont

Corporation of the United States of America. This approach classifies ratios into three categories.

- Profit ratios.

- Sales ratios.

- Total assets ratios.

Recent studies in this area include studies by Courtis (1978), Laitinen (1983) and Bayldon, Woods and Zafiris (1984). The use of the deductive approach however has more or less stalled and this approach has more or less been absorbed into other studies.

2.05: THE INDUCTIVE APPROACH TO THE CLASSIFICATION OF ACCOUNTING RATIOS:

The inductive approach lays emphasis on data and statistical methods and attempts to classify ratios on the basis of empirical analysis rather than on intuitional approaches outlined above. Seminal work in this area has been conducted by Pinches, Mingon and Caruthers (1973). Using factor analysis they identified seven classes of ratios:

- Return on investment.

- Capital intensiveness.

- Inventory intensiveness.

- Financial leverage.

- Receivables intensiveness.

- Short-term liquidity ; and ,

- Cash position.

According to this study, the categories listed above explain between 78-92% of the total variance of 51 financial ratios. Also the correlations of the factor loadings and the differential R-factor analysis indicate that the ratio patterns are reasonably stable over time. The findings of this study were confirmed later by Pinches, Eubank, Mingo and Caruthers (1975).

Another study using factor analysis was by Johnson (1979). Based on an analysis of 306 primary manufacturing concerns and 61 retail firms Johnson identified nine classifications for both of the two industries.

Chen and Shimerda (1981) identified 10 financial ratio classifications, which bear similarity to the categorizations of Pinches, Mingo and Caruthers (1973). Cowen and Hoffer (1982) studied the inter-temporal stability of financial ratio classification patterns in a single homogenous industry. This study found that classifications of ratios are not stable over time. Cowen and Hoffer also found that firms could be grouped according to their financial ratio profile, however these groupings were not stable over time. In a sample of Finnish firms Martikainen, and Ankelo (1991) found that the instability of financial ratio groups was more pronounced for firms about to fail than for healthy firms. This conclusion is similar to that of Altman (1968) and Beaver (1966).

Ylli-olli and Virtanen (1990) introduced the usage of transformation analysis to study the stability of financial ratio patterns. After aggregating financial ratios for 1947-75 and 1974-84 in the US and Finland respectively they found that value weighted aggregation produces ratio patterns that are stable both over time and across countries. Martikainen (1993) classified financial ratios and tested their stability with transformational analysis in a study whose objective was to identify the key factors which determine stock returns.

Despite their empirical approach, the inductive studies have been unable to agree on a consistent classification of financial ratio factors beyond between three to five factors. This has stimulated the search for a different approach to the classification of ratios.

2.06: THE CONFIRMATORY APPROACH TO THE CLASSIFICATION OF FINANCIAL RATIOS

This approach can be traced back to the DuPont triangle in 1919.Recent interest in this area has been renewed by the researches of Courtis (1978). The confirmatory approach is concerned with hypothesizing and a priori classification and then trying to confirm the classification with empirical evidence. Courtis (1978) presents a pyramid scheme of financial ratios based on a mix of experience, deduction and visual approximation of data. Laurent (1979) performed a standard principle component factorization for a set of 45 financial ratios for a single year. He compared his findings with Courtis (1978) and found a good degree of correspondence. Luoma and Runhela (1991) present five a priori "dimensions " for the financial ratios. These are:

- Profitability.
- Financial leverage.
- Liquidity.
- Working capital ; and ,
- Revenue liquidity.

Luoma and Runhela found that profitability and revenue liquidity stand out as distinct clusters in their analysis. The other three dimensions turn out to be inter-related to varying degrees.

2.08: FINANCIAL RATIOS AS PREDICTORS OF BUSINESS DISTRESS

In the early 1930's studies were done on the efficiency of ratios as predictors of financial difficulties in businesses. Winakor and Smith (1935) conducted the pioneering study in this area. In their analysis of firms which had experienced difficulties in the period between 1923 and 1931 they concluded that that the ratio of working capital to total assets was the most accurate and steady indicator of financial difficulty and began to show a decline as early as ten years before the occurrence of financial difficulty.

Similar studies were carried out by Fitzpatrick (1932). He concluded that most financial ratios could predict financial distress to some degree but that the most predictive were net profit to net worth; net worth to debt and net worth to fixed assets. These studies signified the first attempts to utilise scientific method for determining the utility of ratios.

The culminating study in this era was conducted by Merwin in 1942 by comparing industry mean ratios of continuing and discontinuing firms against normal ratios, he concluded that three ratios were very sensitive predictors of discontinuance sometimes being capable of predicting as early as four to five years in advance. The ratios identified by Merwin were;

- Working capital to total assets,
- Net worth to debt ; and ,
- The current ratio.

Merwin's study is regarded as the first sophisticated analysis of ratio predictive power. His findings are generally regarded as being credible.

The landmark study in this area however was conducted by Beaver (1966). He studied 29 financial statement ratios for five years preceding bankruptcy for a sample of bankrupt and non-bankrupt firms. He found that six ratios had the best discriminating power, these were;

- Net income (plus depreciation, depletion and amortization)[2] to total liabilities.

- Net income to total assets.

- Total debt to total assets.

- Working capital to total assets.

- Current assets to current liabilities.

- Cash, marketable securities, accounts receivables to operating expenses excluding depreciation, depletion, and amortization.

Beaver's study is considered superior to Merwin's despite overlapping conclusions chiefly because Beaver's statistical techniques were more powerful and also because Beaver incorporated ratios derived from the funds flow statement.

Research comparable to Beaver has been carried out in this country by Keige 1991) who was able to develop a discriminant function that was able to predict failure ith upto 90% accuracy up to two years before the event. Keige identified three key tegories of ratios that were crucial to bankruptcy prediction in the Kenyan context. ese are;

Liquidity ratios.

Leverage ratios.

Activity ratios.

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[1] more or less equivalent to the cashflow

Recent extensions of failure prediction have attempted to incorporate the impact of economic factors on financial distress. Gupta and Huefner (1972) used cluster analysis to relate ratios to established economic characteristics. Argenti (1976) stated that financial ratios were reflections of financial defects in a firm and that firms with such weaknesses were vulnerable to adverse economic circumstances , as he put it;

" A high gearing and an economic downturn are the classic nutcrackers of failure "

(Argenti , p 136)

Related research has been conducted in this country by Asienwa (1992) who demonstrated the relationship between investment ratios and share prices of quoted firms in Kenya.

2.09: BANKRUPTCY AND THE ECONOMY

Researchers in the area of economics have carried out research similar to that of bankruptcy prediction. The chief concern of economists, however has generally been broader, as well as examining the relation between financial ratios and other measures of a firm's performance, economic analysis has also tried to place this prediction process within the broader context of industry and general economic conditions. Canova (1994) has carried out a historical analysis of financial crises in the US. He reviews various hypothesis that have been put forward to explain the chain of events that leads to a crisis in the financial sector. He observes that banking panics occurred almost simultaneously with financial crisis and stock market crashes. He also traces the roots of such panics to liquidity difficulties experienced by the business sector.

Canova also attempts to link financial distress to general economic conditions and states that such crises are more likely to occur in seasons when the money market was tight or at the peak of the business cycle when profits were in decline. Canova attempts to derive a model that can predict crisis on the basis of macro economic factors, however he observes that this model has generally poor predictive ability. Frederikslust (1978) has developed a model for the prediction of corporate failure that attempts to predict corporate distress on the basis of both a variety of ratios and also industry and economic variables. Frederikslust's paper differs from previous researches (Beaver et.al.) in that in addition to building a predictive model based on financial ratios, he also attempts to incorporate the impact of industry variables and general economic variables on financial distress.

An interesting study which illustrates the possible relationship of macroeconomic factors on decision making was done in 1967 by Crawford who suggests that as the money supply increases households increase their holdings of liquid assets such as cash balances and savings accounts. When monetary authorities actively pump reserves into the banking system, banks create large amounts of new demand deposits by making loans and buying securities. The public tends to respond to the build up in cash balances by buying securities or adding to savings accounts as well as by bidding aggressively for goods and services. This study, although it was based on households shows that rational decision makers respond to macro-environmental factors by making adjustments to their liquidity profile. This suggests that firms may respond in similar ways and also that a part of the change in the liquidity ratios of firms may be as a result of voluntary adjustments by management.

Research into the distributional characteristics of financial ratios seems to have raised concerns about the validity of the use of parametric statistical methods in the analysis of financial ratios. Studies by Altman (1968), Beaver (1966) Deakin (1972) and Keige (1991) have employed parametric statistical tools whose validity is reliant on the normality of the distribution of the variables used in the model.

Empirical research has shown that most financial ratios are not normally distributed. The landmark case in this area is Deakin (1976). In an Analysis of eleven major financial ratios, Deakin showed that only total debt to total assets ratio was not significantly different from normal. Deakin also showed that applying a square root transformation to the ratios described above tended to reduce the deviations from normality but still only net income to total assets and total debt to total assets could be considered normal after the transformation. Deakin also experimented with the lognormal transformation and found that this transformation could restore normality to the current ratio in twelve out of the nineteen years that were analysed in the study. Deakin concluded that assumptions of normality were not tenable in the case of most financial ratios with the exception of total debt to total assets and a few other cases where appropriate transformations could restore a measure of normality. Deakin's conclusions have been supported by Aduda (1993) who analysed the distributions of eight ratios of 41 quoted companies between 1981 and 1991.

The precise causes of non-normality have been explained by Barnes (1987) who studied the ability of ratios to control for size. He stated that size could only be

controlled for , in a ratio of the form Y/X if Y and X are strictly proportional that is Y/X=b , or Y=bX .In such a case the resultant ratio would be normally distributed . On this basis he suggested two sources of non-normality;

1. The presence of an intercept such that the resulting model was of the form;

$$Y = a + bX$$

2. The existence of an error term such that the resulting model was of the form ;

$$Y = a + bX + e$$

Barnes found that the existence of the error term and the intercept made the resultant distribution skewed. Barnes suggested that regression analysis could be used to eliminate the intercept and thus restore normality.

This aspect of non-normality has spurred research effort into ways in which normality could be restored to financial ratio data thus allowing the use of parametric tests. Frecka and Hopwood (1983) re-analysed the ratios described by Deakin (1976) and concluded that by removing outliers first then applying transformations, normality could be restored. They found out that if the ratios follow the gamma distribution, the square root or logarithmic transformation made the distribution approximately normal. The gamma distribution is characteristic of ratios having a technical lower limit of zero.

Foster (1986) presents a list of alternatives for restoring normality in financial ratio data, These include;

- Deleting true outliers.

- Adjusting the underlying financial data.

- Winsoring: equating the outliers to less extreme values; and,

- Trimming by dropping the tails.

Martikainen (1991) has demonstrated that normality can be restored by other approaches besides those concerned with outliers. In a sample of 35 Finnish firms, four ratios covering fifteen years, about half of the non-normal distributions became normal if economy wide effects were first controlled for using the accounting index model. Martikainen (1992) used a time series approach and observed that controlling for the economic factor improved normality. An alternative approach to normalisation is suggested by Buijink and Jegers (1986), as quoted by (Virtanen and Ylli-olli , 1989) who show that by first grouping ratios into industry categories before undertaking analysis could result in less extreme deviations from normality. Karel and Prakash (1987) observe that deviations from normality are less pronounced in multi-variate methods (such as discriminant analysis) than in univariate methods. It has also been demonstrated (Virtanen and Ylli-olli , 1989) that business cycles do affect financial ratio distributions .The effect of economic cycles on financial ratios has also been observed by Stickney (1996).

3.00: RESEARCH METHODOLOGY

3.01: POPULATION OF THE STUDY

The population of interest in this study consisted of quoted firms at the Nairobi Stock Exchange. To improve the validity of the results , the items in this population were grouped according to the industry classifications currently in use at the NSE . Adopting such a classification enabled inter-industry comparisons to be made. Such an approach is also a means of minimising deviations from normality (Buijink and Jegers ,1986) as quoted by (Virtanen and Ylli-olli , 1989).

The industry classifications currently in use are the following;

- Agricultural sector.

- Commercial and services.

- Finance and investment ; and ,

- Industrial and allied.

3.02: DATA COLLECTION

This study was facilitated by the use of secondary data . Financial ratio data were computed from published reports of the quoted companies . This information is available at the NSE library and can also be obtained in company libraries.

Data pertaining to economic indicators was obtained from Central bank of Kenya reports and also from the Central Bureau of Statistics. Data for this study was collected for the period between 1992 and 1997.

3.03: DATA ANALYSIS.

- The data collected was analysed using multiple regression and correlation analysis.

- The problem of non-normality was dealt with by using the approach outlined by Frecka and Hopwood (1983). This method entails removal of outliers from the data and then subsequently applying a natural logarithm transformation. (See Appendices)

- The significance of each of the independent variables was tested at a confidence level of 95%.

The liquidity of firms was captured using the following ratios;

Short-term liquidity measures

1. **The current asset ratio,**

2. **Cash flow from operations to current liabilities ratio.**

3. Working capital to total assets.

Long-term liquidity measures

1. Long-term debt ratio,

2. Cash flow from operations to total liabilities ratio.

3. Total debt to total assets.

3.04: SELECTION OF INDEPENDENT VARIABLES (ECONOMIC FACTORS)

The variables used in this study have been selected on the following basis:

1. Interest rates and inflation have been selected on the basis of prior research, which has identified them as having an effect on liquidity of firms (Gibson, 1992; Whittington, Saporta and Singh, 1997). Gibson suggests that the relationship between interest rates and liquidity is an inverse one. This conclusion is based on an observation of manufacturing concerns in the US in the period after 1960.

2. No research has specifically addressed the impact on liquidity of the NSE index and the exchange rate. These variables are included on the basis of personal judgement, however Lempert (1967) has observed that the NSE index is a leading indicator in the sense that it precedes economic events by as much as four months. For this reason it was included since it would be useful to those who might wish to predict future levels of liquidity. The exchange rate was considered for inclusion because it was felt that this is likely to impact on the liquidity of certain sectors such as the Agricultural and manufacturing sectors which rely either on imports of raw materials or on exports of Agricultural commodities ,however this factor was not included in the model because of its high degree of correlation with interest rates (see Appendices)

3.05: SELECTION OF LIQUIDITY RATIOS.

The ratios to be used in this study have been classified into short-term and long-term liquidity measures. The criteria used to select the ratios are as follows;

1. The ratios used in this study have all been validated through previous research. Validation in this case means that the ratio in question has been shown to be a valid predictor of financial distress. One might recall that by definition, liquidity refers to the ability to meet financial obligations as they fall due and thereby avoid the problem of insolvency, which is what bankruptcy research is all about.

2. This research has attempted to avoid ratio measures that are industry specific. Thus for example the quick ratio has been avoided because , although it has been shown to be superior to the current ratio in some instances, the inventory adjustment is only applicable to manufacturing and merchandising concerns and this would leave out firms in the services sector.

3. An attempt has been made to achieve a balance between static and dynamic measures of liquidity. Static ratios refer to balance sheet derived ratios which are static because they are computed from data collected at a specific point in time as opposed to dynamic ratios which are computed from the funds flow statement which covers an interval of time. Both static and dynamic measures have been shown to be valid. It is hoped that by using at least three ratios computed on different basis this study will be less vulnerable to the weaknesses of individual ratios such as "window dressing"

4.00: CHAPTER FOUR: DATA ANALYSIS

4.01: PROFILE OF THE STOCK EXCHANGE

Secondary data was used in this study. This data was obtained from balance sheets and cashflow statements of quoted companies between the period 1992 and 1997.The ratios computed for purposes of this study were obtained from the balance sheets and cashflow statements of the respective companies. Summarised abstracts from these statements can be found for some of the companies , in the NSE handbook for 1997 and previous years. A list of the companies used in this analysis as well as the ratios obtained for these companies can be found in the Appendices. Approximately fifty four companies were listed at the Nairobi stock Exchange as at December 1998. The Nairobi Stock Exchange was constituted in 19fifty four as an association of stockbrokers. It was amongst the first stock exchanges to be established in Africa. In terms of market capitalisation , it was ranked third after the Johannesburg stock exchange and the Morocco stock exchange. When the NSE was formalised in 19fifty four, it was constituted as a voluntary association of brokers, registered under the societies Act and an affiliate of the London stock exchange. The first major shock at the NSE came in 1963 when there was a mass outflow of capital as a significant proportion of white settlers sold off their stocks and left the country. The depression of 1972-73, which was sparked by the oil crisis of 1972, was another important factor, which affected the NSE. A 35% gains tax introduced in 1975 had the effect of further depressing the market. Subsequent government economic policies; the introduction of exchange controls, nationalisation policies and restrictions on import-export trade, all tended to discourage a freer market.

The break-up of the east African community in 1977 led to the nationalisation of companies that had assets in all three countries, again this had a visible impact on the NSE. The economic reform process began in earnest in the late 1980's with privatisation programs targeting several state enterprises. The Kenya Commercial Bank , the first state enterprise floated to the public realised a subscription rate of 327%. In January 1991 the NSE changed its status from a society to a corporate entity limited by guarantee. In addition the old "call-over " trading system was abandoned in favour of the floor based "open outcry" system. The liberalisation measures adopted by the government in the 1990's have substantially relieved the burden previously shouldered by the business sector, however not all aspects of liberalisation have had a positive impact, for example the repeal of the exchange controls Act in 1995 has shifted the foreign exchange risk burden from the central bank to the business world. The impact of the repeal of the exchange controls Act has been especially heavy on the Agricultural sector which sources a considerable proportion of its inputs from imports and exports a substantial proportion of its output. It is clear then that in the Agricultural sector as well as in the other sectors of Kenyan industry that a chief determinant of the performance of such firms is the condition of the broader macro-economic environment both in absolute terms and relative to the world economy. Companies listed at the stock exchange fall into four main categorizations these are;

1. The Agricultural sector: this sector is comprised of firms engaged in the cultivation and exportation of tea and coffee, the sisal sector is also represented by Rea Vipingo. Due to the nature of operations in this sector, performance is affected chiefly by exchange rates and interest rates.

2. The commercial and services sector: this sector contains an amalgam of different companies engaged in a variety of activities such as media, trading and retailing as well as the motor vehicle industry.

3. The industrial and allied sector: This sector comprises of several large manufacturing companies involved in activities such as mining, petroleum refining and retailing and manufacture of final commodities.

4. The finance and investment sector: Following a directive by the central bank of Kenya to convert all non-bank financial institutions into banks this sector now consists almost entirely of banks and insurance institutions. Prior to this directive this sector included a category of financial institutions referred to as non-bank financial institutions (NBFI's). This category comprised of institutions such as National Industrial Credit Bank (NIC).

Since its inception in 19fifty four the number of listed firms has fluctuated as new firms are listed and listed firms are de-listed. The table below shows the proportion of companies included in this study on a sectoral basis. Companies not included in this study have either been recently de-listed (for example Kenya Finance Bank and African tours and hotels) or have listed so recently that insufficient data exists (for example Rea vipingo) or otherwise for lack of consistent data.

Table 1: Selection of Sample Companies

	Number of companies selected from this category	Total number of companies in this Category	Proportion included in the study
Agricultural sector	5	10	50%
Commercial sector	10	15	75%
Financial sector	8	12	67%
Industrial sector	15	17	88%

Total	38	fifty four	70%

Source: Research data

The charts following provide a description of the sectors described above on the basis of several criteria such as turnover at the stock exchange and equity capitalization

The graph below shows the relative sizes of the four sectors on the basis of turnover at the stock exchange.

Figure 1: Sectoral Turnover of Listed Companies

Figure 1: Sectoral Turnover of Listed Companies.
Source: NSE: facts and figures 1997
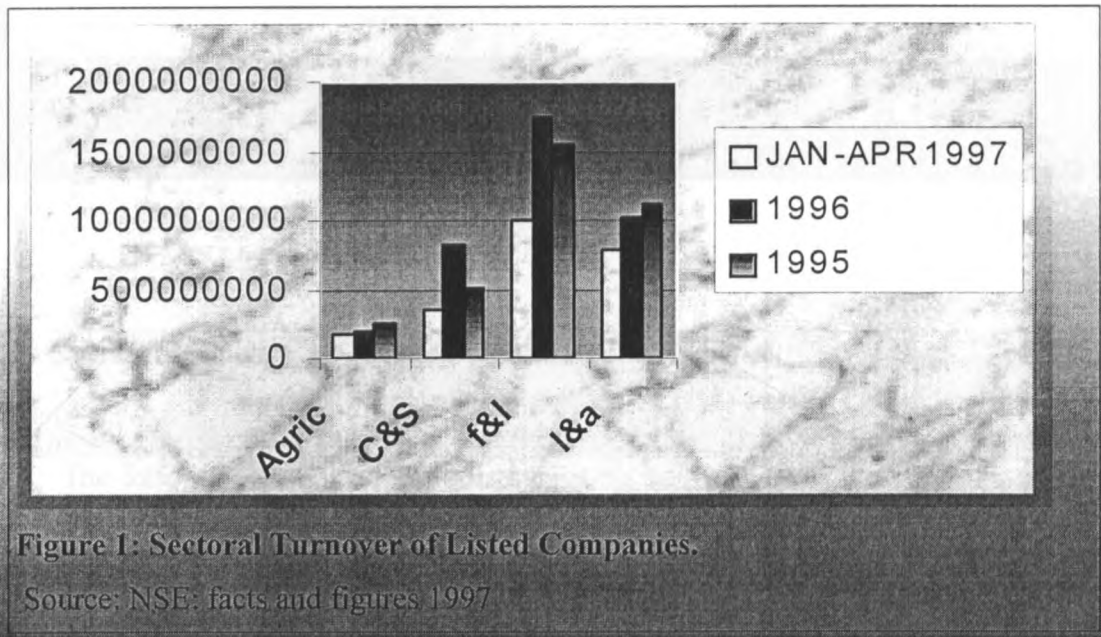
The above table shows that the largest sector in terms of turnover is the financial sector followed closely by the industrial and allied sector coming a close second and the Agricultural sector being the smallest.

Figure 2:total assets per sector
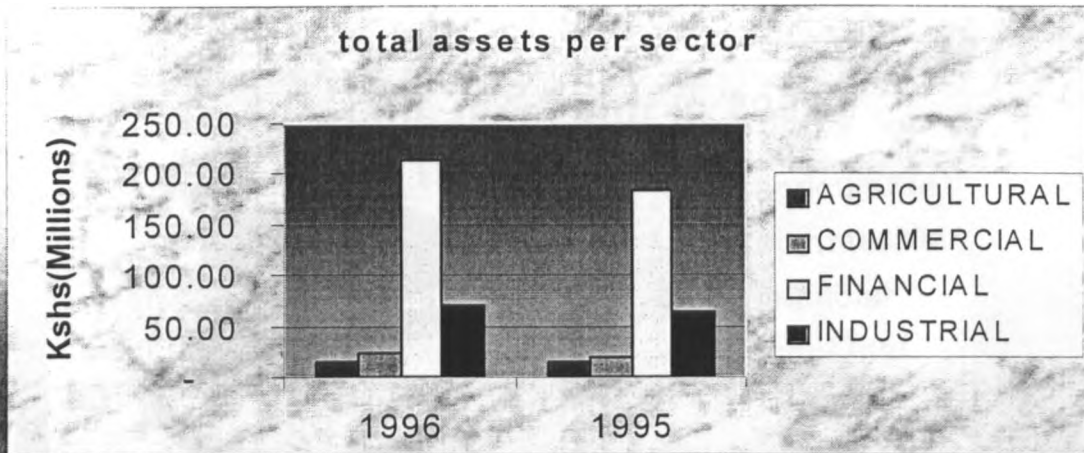
Figure 2: Total Assets per Sector
Source: NSE: Facts and figures 1997.

4.02: STATE OF BORROWINGS IN QUOTED COMPANIES

The following graphs depict borrowings on the basis of bank overdrafts and any other loans. A review of the annual reports of quoted companies reveals that many categorise bank overdrafts as a permanent source of funds. In 1996 the level of borrowings in quoted companies at the NSE stood at kshs 18.8 billion which represented an increase of 2% over the previous year.

The financial sector made the least use of borrowings during this period. The Agricultural sector witnessed decreased demand for borrowing, which stood at kshs 1.5 billion, a decline over the previous year where borrowings of kshs 2.0 billion were realised. The industrial sector made the most use of borrowings both in 1995 and 1996 taking up nearly 68% of total borrowings in 1996. The average growth in borrowings

between 1995 and 1996 was 21.5% with the commercial and services sector registering the highest growth rate of borrowings of 90%.

Borrowings by sector in 1996

- agricultural 8%
- commercial 19%
- financial 6%
- industrial 67%

Source: NSE: facts and figures 1997

borrowings by sector in 1995

- agricultural 12%
- commercial 17%
- financial 4%
- industrial 67%

Source: NSE: facts and figures 1997
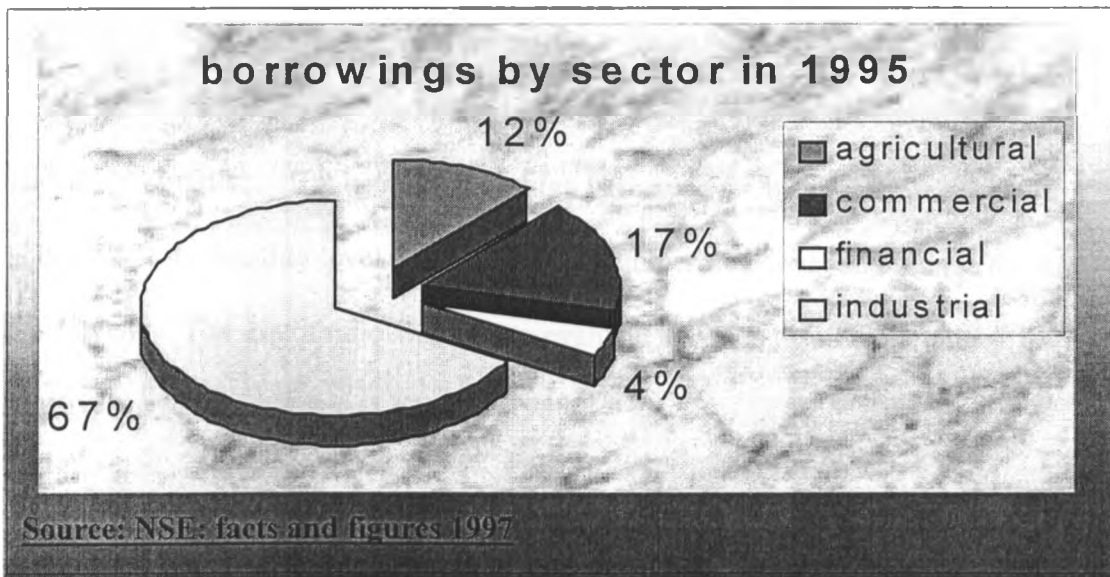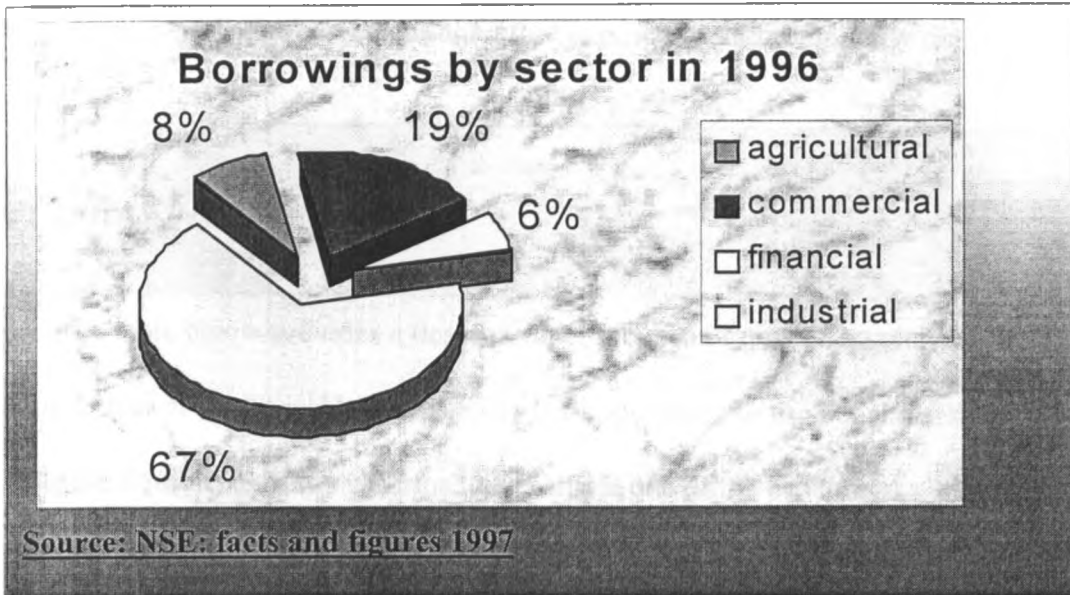
From the above charts it does appear that the industrial and allied sector makes the most use of borrowing. However this sector comes a distant second to the finance and investment sector in terms of its asset base (see graph 2) this might indicate that this sector is fairly heavily leveraged and therefore exposed to higher liquidity risk.

4.03: DATA FINDINGS

The table below provides a description of the mean ratios on a sectoral basis for the four sectors at the NSE. Until the 1970's it was common to use benchmarks to evaluate the liquidity position of firms, for example one of the benchmarks commonly in use was the two to one ratio used with regard to the current ratio. In Kenya as in other countries such as the United States of America, the use of benchmarks to evaluate ratios has largely been abandoned. Contemporary approaches to the evaluation of ratios revolve around comparing a firms ratio with an industry average or evaluating the stability of a firms ratio over time, thus for example a firm with high liquidity ratio may still face considerable liquidity risk if its ratio has a high variance which suggests a reasonable likelihood that its liquidity level could drop below the critical level and plunge the firm into insolvency. The use of ratio variance to evaluate a firm is discussed more exhaustively by Dambolena and Khoury (1980).

Table 2: Mean Values for Selected Ratios for the period 1989 to 1997.

	CA/CL	WC/TA	TD/TA	CF/CL	CF/TL
Agricultural	1.90359	.05849	.3299	.7019	.60666
Commercial	1.16969	.06627	.57724	.1997	.1681

Financial	2.47575	.218414	.635786	.23493	.183377
Industrial	2.61993	.15937	.421109	.868916	.625391

Source: Research data

KEY: **CA/CL**- ratio of current assets to current liabilities,

WC/TA- working capital to total assets,

TD/TA- total debt to total assets

CF/TL- cashflow from operations to total liabilities

CF/CL- cashflow from operations to current liabilities

Table 3: Standard Deviations for Selected Ratios for the period 1989 to 1997.

	CA/CL	WC/TA	TD/TA	CF/CL	CF/TL
Agricultural	.2838	.06419	.0572	.28089	.2262
Commercial	.0627	.0266	.0277	.0fifty four9	.0425
Financial	.4376	.03188	.03461	.06414	.0fifty four21
Industrial	.1461	.1956	.03037	.04295	.8946

Source: Research data

Table 5 shows the variability of the ratios analysed over time. Dambolena and Khoury (1980) have shown that in addition to using ratio patterns to measure liquidity risk of a firm it is also possible to estimate liquidity risk by measuring the variation in the ratio over time irrespective of the level of the ratio during that period, they argue that the greater the variability in the ratio, the greater the likelihood that the firm will drop below the threshold of solvency, likewise a firm with a poorer liquidity position may be less risky if its liquidity ratios are stable or exhibit low variation with time. From the foregoing one can evaluate the variations presented in table 3 above. The commercial

sector shows the highest stability in its ratio patterns as evidenced by low deviations in its ratios with the highest standard deviation being in its current ratio (0.0627). The industrial and Agricultural sectors show a higher degree of variability in their ratio patterns with the industrial sector showing a variability of 0.894570 for the cashflow to total liabilities ratio.

A unique characteristic of listed companies which the researcher came across in the process of data collection is the tendency of quoted companies to use equity to finance their operations to such an extent that a significant proportion of the companies have no long-term debt in their capital structure. According to 'The Nairobi Stock Exchange facts and figures 1997' 21 out of the fifty four companies (38%) had zero long-term debt in 1996, this was an increase over 1995 where 18 companies reported no debt in their capital structure (33%). This has implications for anyone trying to make a distinction between short and long-term liquidity as in many cases if short-term debt is equal to total debt then it may not be possible to make the distinction. The following tables show the extent of inter-relatedness amongst the ratios used in this study. As noted earlier one would expect a high degree of correlation between ratios that are based on current liabilities and total liabilities.

Table 4: Correlation Matrix for the Industrial Sector

Industrial Sector	CF/TL	CF/CL	TD/TA	WC/TA	CA/CL
CF/TL	1				
CF/CL	0.69019	1			
TD/TA	-0.63124	-0.87769	1		
WC/TA	0.61629	0.80286	-0.80218	1	
CA/CL	0.395fifty four	0.70456	-0.64801	0.89620	1

Source: Research data

Of the 13 companies chosen from this sector four (31%) do not make use of long term debt between 1992 and 1997, these are BOC Kenya limited, Carbacid investments, East African cables and Kenya Orchards. This has the effect of creating some degree of correlation between cashflow from operations to total liabilities and cashflow from operations to current liabilities since in the absence of long term debt current liabilities is equal to total liabilities.

Table 5: Correlation Matrix for the Commercial and Services Sector

Commercial Sector					
	CA/CL	WC/TA	TD/TA	CF/CL	CF/TL
CA/CL	1				
WC/TA	0.82641	1			
TD/TA	-0.29636	0.05832	1		
CF/CL	0.583fifty four	0.27378	-0.48270	1	
CF/TL	0.41356	0.08769	-0.53903	0.80093	1

Source: Research data

Of nine companies chosen from this sector, two (22%) did not feature long term debt in their capital structures at 1996, these are Hutchings-biemer, a relatively small family owned business and Standard newspapers.

Table 6: Correlation Matrix for the Finance and Investment Sector

Financial sector					
	CA/CL	WC/TA	TD/TA	CF/CL	CF/TL
CA/CL	1				
WC/TA	0.95fifty four5	1			
TD/TA	-0.88084	-0.88141	1		
CF/CL	0.47048	0.42637	-0.13508	1	
CF/TL	0.63811	0.61822	-0.34718	0.96637	1

Source: Research data

This sector shows the highest aversion to long term debt financing, of seven companies sampled, six (85%) had no long-term debt as at 1996. As a result there is a very high

degree of correlation between cashflow from operations to current liabilities and
cashflow from operations to total liabilities.

Table 7: Correlation Matrix for the Agricultural Sector

Agricultural Sector	CF/CL	TD/TA	WC/TA	CA/CL	CF/TL
CF/CL	1				
TD/TA	-0.53252	1			
WC/TA	-0.09276	0.02801	1		
CA/CL	-0.35068	-0.09108	0.48115	1	
CF/TL	0.97104	-0.51152	-0.23586	-0.41928	1

Source: Research data

Of the five companies sampled three (60%) had no long term debt in their capital
structure as at 1996.From the above correlation matrices one can observe the high degree
of correlation between long and short-term liquidity measures as a result of aversion to
debt amongst a significant proportion of quoted companies. As expected the correlation
between CF/CL and CF/TL is high ranging from 0.97104 to 0.69019.In addition WC/TA
also showed a high degree of correlation with CA/CL in the financial and commercial
sectors.

The tables below show the results obtained from running Ordinary Least Squares

multiple regression. The model that was used is described below

$$(LIQ^*) = \beta_{(0)} + \beta_{(1)} I + \beta_{(2)} X + \beta_{(3)} R + \Sigma \, \mathcal{g}$$

where

(LIQ^*) are the liquidity ratios outlined earlier

I ,X and R are the economic variables inflation , the NSE index and interest rates

respectively.

The parameter $\beta_{(0}$ represents the component of a firms liquidity that is autonomous , that

is , that part that is not affected by the independent variables used in this study. In this

study $\beta_{(0)}$ could represent the impact of factors not included in this model

For purposes of the regression analysis whose results are shown below two ratios

(current asset ratio and the total debt to total assets ratio) have been transformed into

natural logs so as to reduce their deviations from normality.

THE FINANCIAL SECTOR

Table 8: Regression Output for the Financial Sector

SUMMARY OUTPUT	(ln)CA/CL	WC/TA	CF/TL	CF/CL	(ln)TD/TA
Regression Statistics					
Multiple R	0.51115	0.41025	0.62736	0.76007	0.52996
R Square	0.26127	0.16831	0.39358	0.57771	0.28086
Adjusted R Square	-0.84682	-0.97107	-0.51605	-0.05572	-0.79786
Standard Error	0.15604	0.05707	0.08117	0.07906	0.14474
Intercept	0.81256	0.28167	0.17735	0.20886	-0.85044
NSE INDEX	-0.00004	-0.00001	0.00001	0.00002	0.00004

INTEREST RATES	-0.00170	-0.00024	-0.00420	-0.00570	-0.00075
INFLATION	-0.00298	-0.00099	0.00363	0.00529 '	0.00441

Source: Research data

The table above shows the regression output for the financial sector with the five ratios as the dependant variables and interest rates, inflation and the NSE index as the independent or predictor variables. Two of the ratios, total debt to total assets and current assets to current liabilities, which have a technical lower limit of zero, have been transformed into natural logarithms in an attempt to restore normality. The results of the regression analysis indicate moderate to high correlation in this sector both or all measures of liquidity with multiple R coefficients ranging from 0.41 to 0.76. The nature of the relationship obtained is generally inverse, for example an increase in interest rates will have an adverse effect on liquidity, inflation and interest rates will have an adverse effect only in the case of (ln) CA/CL and WC/TA.

THE COMMERCIAL SECTOR

Table 9: Regression Output for the Commercial and Services Sector

Regression Statistics	(ln)CA/CL	CF/TL	CF/CL	(ln)TD/TA	WC/TA
Multiple R	0.89196	0.69294	0.82fifty four5	0.44786	0.87817
R Square	0.79559	0.48017	0.68137	0.20058	0.77118
Adjusted R Square	0.48899	-0.29957	0.20342	-0.99855	0.42795
Standard Error	0.04800	0.04510	0.04040	0.05044	0.02499
Intercept	-0.09306	0.10937	0.13741	-0.57834	-0.04238
NSE INDEX	0.00004	0.00001	0.00001	-0.00001	0.00002
INTEREST RATES	0.00416	0.00196	0.00403	0.00041	0.00202
INFLATION	0.00080	0.00040	-0.00153	-0.00134	0.00048

Source: Research data

The commercial sector shows a greater degree of correlation than the financial sector with correlation coefficients (Multiple R) ranging

between 0.44 and 0.89.unlike the financial sector however the regression

coefficients (b_i) are mostly positive indicating that inflation and interest

rates do not have an adverse impact on liquidity in this sector.

THE INDUSTRIAL SECTOR

Table 10: Regression Output for the Industrial and Allied Sector

SUMMARY OUTPUT					
Regression Statistics	CF/CL	(In)CA/CL	WC/TA	(In)TD/TA	CF/TL
Multiple R	0.63884	0.97145	0.91958	0.51358	0.68820
R Square	0.40811	0.94372	0.84564	0.26376	0.47362
Adjusted R Square	-0.47972	0.85930	0.61409	-0.84059	-0.31595
Standard Error	0.12323	0.03325	0.01370	0.07728	0.18620
	Coefficients	Coefficients	Coefficients	Coefficients	Coefficients
Intercept	0.59295	0.46827	0.12466	-1.04002	0.72952
NSE INDEX	0.00005	0.00006	0.00001	-0.00003	0.00004
INTEREST RATES	-0.00153	0.00529	-0.00003	0.00185	-0.00252
INFLATION	-0.00014	-0.00219	0.00147	-0.00148	0.00900

Source: Research data

THE AGRICULTURAL SECTOR

Table 11: Regression Output for the Agricultural Sector

SUMMARY OUTPUT	CF/CL	CF/TL	WC/TA	(In)CA/CL	(In)TD/TA
Multiple R	0.98152	0.94096	0.87193	0.60282	0.87490
R Square	0.96339	0.88fifty four0	0.76026	0.36339	0.76fifty four6
Adjusted R Square	0.90847	0.71351	0.40065	-0.59153	0.41364
Standard Error	0.09529	0.13021	0.06257	0.60822	0.17579
	Coefficients	Coefficients	Coefficients	Coefficients	Coefficients
Intercept	-0.32051	-0.13342	0.08501	0.38128	-1.64107
NSE INDEX	0.00032	0.00024	-0.00002	-0.00007	-0.00005
INTEREST RATES	-0.00771	-0.00500	-0.00243	-0.01576	0.00701
INFLATION	0.01953	0.01231	0.00433	0.02006	0.00550

Source: Research data

This sector displays the highest sensitivity to the macro-economic factors with correlation coefficients ranging between 0.6 and 0.98.

In addition to the correlation coefficients outlined above the tables above also reveal the nature of the relationships existing between each of the three independent variables.

4.05: RESULTS OF SIGNIFICANCE TESTS

The charts below show significance tests for parameters b_0 and b_1 conducted at a significance level of 95%. These conclusions are based on a two-tailed t-test.

THE COMMERCIAL SECTOR

Table 12: Hypothesis Tests for the Commercial and Services Sector

(ln)TD/TA	Coefficients	Standard Error	t Stat	P-value	H0
Intercept	-0.5783	0.0968	-5.9755	0.0269	ACCEPT
NSE index	0.0000	0.0000	-0.4338	0.7067	ACCEPT
Interest rates	0.0004	0.0025	0.1604	0.8873	ACCEPT
Inflation	-0.0013	0.0022	-0.6235	0.5966	ACCEPT
WC/TA	Coefficients	Standard Error	t Stat	P-value	
Intercept	-0.0424	0.0479	-0.8839	0.4700	ACCEPT
NSE index	0.0000	0.0000	1.2910	0.3258	REJECT
Interest rates	0.0020	0.0013	1.6003	0.2507	REJECT
Inflation	0.0005	0.0011	0.4488	0.6975	ACCEPT
CF/TL	Coefficients	Standard Error	t Stat	P-value	
Intercept	0.1094	0.0865	1.2640	0.3336	REJECT
NSE index	0.0000	0.0000	0.2843	0.8029	ACCEPT
Interest rates	0.0020	0.0023	0.8611	0.4799	REJECT
Inflation	0.0004	0.0019	0.2066	0.85fifty four	ACCEPT
CF/CL	Coefficients	Standard Error	t Stat	P-value	
Intercept	0.1374	0.0775	1.7728	0.2183	REJECT
NSE index	0.0000	0.0000	0.3117	0.7848	ACCEPT
Interest rates	0.0040	0.0020	1.9773	0.1866	REJECT
Inflation	-0.0015	0.0017	-0.8892	0.4677	ACCEPT
(ln)CA/CL	Coefficients	Standard Error	t Stat	P-value	
Intercept	-0.0931	0.0921	-1.0104	0.4187	ACCEPT
NSE index	0.0000	0.0000	1.6436	0.2420	REJECT
Interest rates	0.0042	0.0024	1.7176	0.2280	REJECT
Inflation	0.0008	0.0020	0.3911	0.7335	ACCEPT

THE INDUSTRIAL SECTOR

Table 13: Hypothesis Tests for the Industrial and Allied Sector

CF/TL	Coefficients	Standard Error	t Stat	P-value	H0
Intercept	0.5930	0.2364	2.5078	0.1290	REJECT
NSE index	0.0000	0.0001	0.8234	0.4969	REJECT
Interest rates	-0.0015	0.0062	-0.2463	0.8284	ACCEPT
Inflation	-0.0001	0.0053	-0.0258	0.9818	ACCEPT
(In)CA/CL	Coefficients	Standard Error	t Stat	P-value	
Intercept	0.4683	0.0638	7.3395	0.0181	REJECT
NSE index	0.0001	0.0000	4.0689	0.05fifty four	REJECT
Interest rates	0.0053	0.0017	3.1526	0.0876	REJECT
Inflation	-0.0022	0.0014	-1.fifty four15	0.2631	ACCEPT
WC/TA	Coefficients	Standard Error	t Stat	P-value	
Intercept	0.1247	0.0263	4.7424	0.0417	REJECT
NSE index	0.0000	0.0000	1.5666	0.2577	REJECT
Interest rates	0.0000	0.0007	-0.0384	0.9729	ACCEPT
Inflation	0.0015	0.0006	2.5080	0.1289	REJECT
(In)TD/TA	Coefficients	Standard Error	t Stat	P-value	
Intercept	-1.0400	0.1483	-7.0136	0.0197	ACCEPT
NSE index	0.0000	0.0000	-0.7102	0.5512	ACCEPT
Interest rates	0.0019	0.0039	0.4749	0.6817	ACCEPT
Inflation	-0.0015	0.0033	-0.4473	0.6984	ACCEPT
CF/CL	Coefficients	Standard Error	t Stat	P-value	
Intercept	0.7295	0.3573	2.0420	0.1779	REJECT
NSE index	0.0000	0.0001	0.4362	0.7053	ACCEPT
Interest rates	-0.0025	0.0094	-0.2685	0.8135	ACCEPT
Inflation	0.0090	0.0079	1.1329	0.3748	REJECT

Source: Research data

THE AGRICULTURAL SECTOR

Table 14: Hypothesis Tests for the Agricultural Sector

CF/CL	Coefficients	Standard Error	t Stat	P-value	H0
Intercept	-0.3205	0.1828	-1.7529	0.2217	ACCEPT
NSE index	0.0003	0.0000	7.0572	0.0195	REJECT
Interest rates	-0.0077	0.0048	-1.6022	0.2503	ACCEPT
Inflation	0.0195	0.0041	4.8029	0.0407	REJECT
CF/TL	Coefficients	Standard Error	t Stat	P-value	
Intercept	-0.1334	0.2498	-0.5340	0.6467	ACCEPT
NSE index	0.0002	0.0001	3.9084	0.0597	REJECT
Interest rates	-0.0050	0.0066	-0.7615	0.5259	ACCEPT
Inflation	0.0123	0.0056	2.2164	0.1570	REJECT
WC/TA	Coefficients	Standard Error	t Stat	P-value	
Intercept	0.0850	0.1201	0.7081	0.5523	REJECT
NSE index	0.0000	0.0000	-0.6892	0.5619	ACCEPT
Interest rates	-0.0024	0.0032	-0.7708	0.5214	ACCEPT
Inflation	0.0043	0.0027	1.6215	0.2464	REJECT
(In)CA/CL	Coefficients	Standard Error	t Stat	P-value	
Intercept	0.3813	1.1670	0.3267	0.7749	ACCEPT
NSE index	-0.0001	0.0003	-0.2483	0.8271	ACCEPT
Interest rates	-0.0158	0.0307	-0.5134	0.6587	ACCEPT
Inflation	0.0201	0.0260	0.7731	0.5203	REJECT
TD/TA	Coefficients	Standard Error	t Stat	P-value	
Intercept	-1.6411	0.3373	-4.8653	0.039745	ACCEPT
NSE index	-0.0001	0.0001	-0.6486	0.583146	ACCEPT
Interest rates	0.0070	0.0089	0.7906	0.512012	REJECT
Inflation	0.0055	0.0075	0.7337	0.539466	REJECT

Source: Research data

Table 15: Hypothesis Tests for the Finance and Investment Sector

(ln)CA/CL	Coefficients	Standard Error	t Stat	P-value	H0
Intercept	0.8126	0.2994	2.7140	0.1132	REJECT
NSE INDEX	0.0000	0.0001	-0.5825	0.6191	ACCEPT
INTEREST RATES	-0.0017	0.0079	-0.2157	0.8493	ACCEPT
INFLATION	-0.0030	0.0067	-0.4483	0.6978	ACCEPT
WC/TA	Coefficients	Standard Error	t Stat	P-value	
Intercept	0.2817	0.1095	2.5724	0.1237	REJECT
NSE INDEX	0.0000	0.0000	-0.4445	0.7002	ACCEPT
INTEREST RATES	-0.0002	0.0029	-0.0849	0.9400	ACCEPT
INFLATION	-0.0010	0.0024	-0.4062	0.7239	ACCEPT
CF/TL	Coefficients	Standard Error	t Stat	P-value	
Intercept	0.1773	0.1557	1.1387	0.3728	REJECT
NSE INDEX	0.0000	0.0000	0.3759	0.7431	ACCEPT
INTEREST RATES	-0.0042	0.0041	-1.0254	0.4130	ACCEPT
INFLATION	0.0036	0.0035	1.0488	0.4043	REJECT
CF/CL	Coefficients	Standard Error	t Stat	P-value	
Intercept	0.2089	0.1517	1.3768	0.3024	REJECT
NSE INDEX	0.0000	0.0000	0.5882	0.6160	ACCEPT
INTEREST RATES	-0.0057	0.0040	-1.4280	0.2895	ACCEPT
INFLATION	0.0053	0.0034	1.5684	0.2573	REJECT
(ln)TD/TA	Coefficients	Standard Error	t Stat	P-value	
Intercept	-0.8504	0.2777	-3.0623	0.0921	ACCEPT
NSE INDEX	0.0000	0.0001	0.6283	0.5940	REJECT
INTEREST RATES	-0.0008	0.0073	-0.1027	0.9276	ACCEPT
INFLATION	0.0044	0.0062	0.7141	0.fifty four93	REJECT

Source: Research data.

4.06: IMPACT OF THE REGRESSORS (EXPLANATORY VARIABLES)

1. INFLATION

Inflation can be defined as a persistent increase in general price levels in an

economy over time. Inflation effectively reduces the purchasing power of a currency.

Low or moderate levels of inflation in a country can have a positive effect on the business sector in that they can act as an incentive to production. High levels of inflation however can harm a company's profitability by affecting the cost of inputs as well as reducing final demand for its output. Ultimately the effect of inflation on a firm is affected by the nature of its operations as well as its competitive environment. A firm which experiences inelastic demand for its products may be able to cushion itself from adverse impact of inflation by transferring the price increases to final consumers, thus leaving its margins untouched. The same could be said of a company operating in a sector with low levels of competition.

From a liquidity point of view inflation is likely to result in an erosion of the real value of any financial claims outstanding as opposed to the nominal value of such claims which may remain unaffected. Therefore a firm may find itself with receivables whose real value is diminished, thus inflation harms lenders and tends to benefit borrowers. This defect is to some extent remedied by indexing interest payments to the prevailing rate of inflation, however this arrangement is more typical of long term borrowing arrangements between lenders and lending institutions and is not common in short term credit arrangements especially amongst non-financial institutions.

From a Sectoral point of view, a sector with a large portfolio of lendings will find the real value of its lendings eroded unless it has an indexing clause. Similarly a sector with large debt portfolios will find itself paying less in real terms.

The results of the analysis conducted reveal varying relationships existing between inflation and the liquidity of the firms used in this study. The financial sector displayed a generally inverse relationship between the indicators and the ratios used. Of the five ratios analysed, two (CA/CL and WC/TA) had negative b_i's signifying that an

increase in inflation over this period would result in a reduction in liquidity for this sector. In addition the total debt to total assets ratio showed a positive b_i, however since an increase in this ratio denotes a deteriorating liquidity position then we can conclude that generally therefore there is an inverse relationship for the liquidity of this sector. Both the cashflow based ratios computed for this sector failed to show adverse relationships with the macro-economic environment. For the financial sector, total debt to total assets as well as both the cashflow based ratios were found to be statistically significant at a significance level of 95%, these conclusions were based on a two tailed t-test.

The Commercial and Services sector showed generally positive relationship between its liquidity and the macro-economic environment. Only the cashflow to current liabilities ratio showed a negative b_i. Again in this case, a negative b_i for total debt to total assets means that there is a positive relationship. However none of the relationships outlined above for the commercial and services sector was found to be statistically significant.

The Industrial and Allied sector also reported a positive relationship between its liquidity and the macro-economic environment with the exception of the current asset ratio and the cashflow from operations to current liabilities. It would seem therefore that the positive relationship is more likely to arise in the long term probably because of adjustments made by management. In this sector it was possible to establish statistical significance for two of the ratios (working capital to total assets and cashflow from operations to current liabilities).

The Agricultural sector generally shows a positive relationship between the liquidity of this sector and the macro-economic environment. The only exception in this

sector is the total debt to total assets ratio and even here the co-efficient is quite low, however inflation was found to have a statistically relationship in all the ratios analysed.

In summary therefore inflation seems to result in an apparent increase in the liquidity of the firms in this study. A notable exception is the financial and services where a generally inverse relationship was established.

2. THE NSE INDEX

The NSE index is a geometric mean of the share prices of 20 of the most actively traded shares at the Nairobi Stock Exchange. The chief advantage of the NSE index over other economic indicators is that it is probably the only major indicator that is generated independent of the government, thus it may probably exhibit a greater degree of reliability and accuracy. The NSE index is generated daily and is therefore available immediately for interpretation by investors and other decision-makers. Perhaps the greatest advantage over other indicators is that a stock exchange index is an aggregation of the behaviours of numerous stock market participants and represents therefore the collective wisdom of the market. Furthermore the index is also able to incorporate future expectations about the performance of the economy, thus the NSE index, for example a downturn in the level of the index may be caused by diminished expectations by investors about the future of the economy and not necessarily by current or prevailing conditions. The ability of the index to incorporate accurately future or anticipated conditions is to some extent reliant on the level of efficiency prevalent in the market, particularly concerning availability of information at low cost and in a timely manner.

Given that the NSE index is an indicator of general economic performance, one would expect it to be closely and positively correlated to the health of the economy. If

firms are experiencing adequate returns and are expected to continue doing so then the index should be relatively high.

From the analysis obtained, the b_i'S obtained are quite small, these co-efficient however reflect the impact of a unit change in the NSE index, therefore overall, given that the index can change by as much as 20 points over the course of a day's trading, one can conclude that the overall impact of this factor is quite considerable.

The financial sector displays a generally inverse relationship between the NSE index and the liquidity of this sector, again an exception arises in the cashflow based ratios both of which failed to show an inverse relationship.

The Commercial and Services sector shows a uniformly positive relationship with higher b_is appearing amongst the short term liquidity measures. The Industrial and Allied sector also shows a similar profile to the Commercial and Services sector. The Agricultural sector however showed an inverse relationship in the case of the short term balance sheet ratios.

The behaviour of the Commercial and Services, the Industrial and Allied and to a lesser degree the Agricultural sector conforms to earlier expectations, however the finance and investment sector seems contrary to expectations.

3. INTEREST RATES

Interest rates represent the cost of borrowing capital for a given period of time. Due to the fact that borrowing is a significant source of finance for many firms, prevailing interest rates are of much concern to many firms, because of indexing of interest rates to inflation in some borrowing arrangements, interest rates continue to affect a firm for the whole period that the borrowing arrangement is outstanding. For lending and other financial intermediaries interest rates represent both a compensation for

the loss in the value of loaned capital arising chiefly from inflation as well as a profit margin to compensate the lender for the default risk he exposes himself to during the loan period. Higher interest rates deter prospective borrowers and increase the default risk of a loan portfolio already held, thus high interest rates may adversely financial institutions whose chief activity is lending of funds, this phenomenon of bad debts was observed in early 1999.

The results of the analysis conducted reveal that the finance and investment sector shows a generally inverse relationship for all the ratios analysed with the exception of the total debt to total assets ratio where however the b_i co-efficient for this factor was considerably smaller. The Commercial and Services sector showed a positive relationship for all the ratios except the total debt to total assets ratio, again however the co-efficient for this factor was considerably weaker. The Industrial and Allied sector showed an inverse relationship for all ratios except the current asset ratio. The Agricultural sector showed a uniformly inverse relationship for all ratios.

The results of the regression analysis reveal that the finance and investment sector possesses a unique liquidity profile that is often inverse to that of the other sectors. This sector is however heavily reliant on the other sectors in that a significant proportion of its loan portfolio is held by the general business sector.

The results of the regression analysis reveal a relationship that is, in a significant number of cases statistically significant at a confidence level of 95%. Twenty-one of the hypotheses tested were rejected meaning that a significant relationship was found to exist between the liquidity measures and the economic indicators used. The results obtained are to a large degree influenced by the sample chosen, for example the financial sector shows the least sensitivity to the economic performance, out of five ratios tested against

three factors, inflation was the dominant factor that was found to be statistically significant, influencing two long-term and one short-term liquidity ratio, the NSE index was also found to have an impact on the long-term debt ratio. The Agricultural sector was found to have the largest sensitivity to economic indicators with virtually all five ratios having significant relations to the indicators chosen. Inflation affected virtually all the liquidity measures while the NSE index affected both cashflow-based ratios. Interest rates only affected the long-term debt ratio. The other two sectors display somewhat moderate relationships with four out of five ratios being significantly linked to the indicators. An interesting outcome in the commercial and services sector is that no significant relationship exists with inflation.

The results presented above must be evaluated bearing in mind that the firms evaluated in this study are quoted companies and therefore meet certain minimum conditions regarding their performance and financial health for example from the results above one could conclude that the financial sector is well insulated from economic conditions. One must bear in mind that the financial institutions listed at the NSE comprise of either subsidiaries of foreign banks or locally owned banks in which the government has a significant stakeholding and in which the government has demonstrated its willingness to bolster through cash infusions to see them through liquidity crises. It is quite possible that the overall sensitivity of this sector may be higher especially if one could take account of the significant proportion of indigenous banks which seem to go through periodic liquidity crises, indeed one indigenous institution the Kenya Finance Bank was excluded from this analysis following its de-listing because subsequent information is unavailable.

5.00: CONCLUSIONS OF THE STUDY

This study sought to establish a link between the liquidity of firms and the performance of the economy. A linear model was applied to explain this relationship. The model used was found to be statistically significant in a considerable number of cases. This study was conducted on the basis of quoted companies at the Nairobi Stock Exchange (NSE). The companies used in this analysis were further broken down into the four industry classifications currently in use at the NSE, these are the Agricultural, Commercial and Allied, Finance and Investment and Industrial and Allied sectors. Five liquidity measures from each of the companies were computed. These liquidity measures attempted to measure both short and long-term liquidity. In addition the ratios were obtained both from the balance sheets of the selected companies as well as from their cashflow statements thus providing both static and dynamic measures of liquidity. An interesting characteristic of the quoted firms at the NSE is the preference of equity finance over debt finance such that in 1997 twenty one of the fifty four companies (39%) listed had zero long term debt, an implication of this is that the distinction between the long term measures of liquidity and the short term measures is likely to be blurred. The inter-relatedness between the ratios selected in this study is explored by use of correlation co-efficient in tables 4 -7, this however is not much of a problem since none of the ratios are regressed in the same model. From this table it is evident that a relatively high degree of correlation exists between the short and long term measures of liquidity especially cashflow from operations to current liabilities and cashflow from operations to total liabilities, this correlation is highest in the financial sector and the Agricultural sector.

The results of the Ordinary Least Squares (Ordinary Least Squares) regression reveal that a significant relationship exists between the liquidity of quoted firms and the condition of the economy. The Beta coefficients (b_i) suggest that increases in interest rates adversely affects the liquidity of all the sectors with the exception of the commercial and services sector where a generally positive relationship was found to exist. The NSE index was found to move inversely to the liquidity of the financial sector while it showed a positive relationship with the liquidity of the commercial and services sector and to a lesser degree to the industrial and allied sector as well as the Agricultural sector. Inflation was found to an adverse impact on the finance and investment sector while it had generally positive impacts on the liquidity of the other sectors.

Of the five ratios included in this study two (cash flow from operations to current liabilities and current assets to current liabilities) are short-term liquidity measures, which are intended to evaluate the ability of the firm to satisfy obligations arising within a period of one year. Table 5 shows that short term measures exhibit greater variability over time .The results of the correlation analysis indicate that short term liquidity registers a substantially greater degree of correlation with macroeconomic indicators than is the case with long term liquidity measures. This is especially so in the case of the commercial, industrial and to a lesser degree in the Agricultural sector. The financial sector however shows less of a distinction between short and long term liquidity and generally has the weakest relationship between its liquidity and the economy.

The results of this study are consistent with what is generally known about liquidity of firms and insolvency in general, that downturns in economic performance affect the performance of certain business sectors adversely. In addition different sectors display different sensitivity to the economy, the financial sector displays the least

sensitivity meaning that this sector is least affected by the risk of insolvency arising from economic downturns. This characteristic of the financial sector may be as a result of the fact that this sector makes the least use of long term debt as well as the heavy regulation imposed on this sector by the government. The Agricultural sector displays the greatest sensitivity to the economy signifying higher risk of insolvency in the event of an economic downturn.

Argenti (1976) has categorised the factors that influence the liquidity risk in firms into internal and external factors, these are;

1. Internal factors: these include bad management manifested through :

   - Lack of responsiveness to changes in technology
   - Bad communications
   - Misfeasance and fraud
   - Insufficient consideration for cost factors especially research and development
   - Poor knowledge of financial matters
   - High leverage position which is particularly harmful in an economic downturn.

2. External factors: these include

   - Labour unions: too high a wage settlement causing firms to pay employees in excess of their marginal product.
   - Government regulations which impede in some instances the functioning of the market system distorting in the process its signals to the corporate decision makers
   - Natural causes these include natural disasters demographic changes and so on.

A study carried out by the Central Bank of Kenya suggests that the factors outlined by Argenti may also be at work in Kenya. Twenty-nine financial institutions were wound up between 1984 and 1996, the reasons cited for the collapse of these institutions revolves around poor management, misfeasance and fraud as well as high leverage positions, Appendix 2 shows the cyclical nature of these collapses. This

study has established that the economy does impact differently on firms liquidity, as suggested by Argenti, the impact of the economy on the liquidity of a firm is mitigated by the level of professionalism exhibited by the management of the firm in question. A professionally run firm will be less responsive to changes in economic cycles as a result of planning and setting aside of reserves such as retained earnings. In the case of the financial and services sector, regulation by the government may also play a part in insulating a sector from economic downturns.

5.01: LIMITATIONS OF THE STUDY

The first limitation of this study is that the sample chosen may not be representative of Kenyan firms. Listed firms are generally considered to be more robust than non-listed firms, this is because the NSE together with the capital markets authority regulate the listing of firms and strive to ensure that listed firms remain safe investments for investors both current and prospective. Again because of the restrictive requirements for listing companies at the NSE listed companies are generally large companies in terms of asset base. These characteristics mean that the conclusions derived may not be applicable to non-quoted companies, which may be smaller and probably less professionally run.

The results of this study generally indicate a moderate to strong relationship between the liquidity of firms and economic performance, however caution must be exercised in interpreting the results. The conclusions obtained are only applicable within the relevant range of the data included in this study.

Granted that the data used in this study was obtained from published financial statements, one must be cautious of the limitations associated with such data. This data

may to some degree be manipulated by the management of a firm to present a rosy view of the firm's position. This kind of manipulation is known as "window dressing". The possibility of the conclusions of this study being contaminated by window dressing has been controlled to some extent by the use of five separate ratio measures of liquidity instead of just one measure.

5.02: RECOMMENDATIONS

The risk of insolvency is an issue of great concern to society in general and to policymakers in particular. Profit is the primary goal of any business enterprise and it is also affected by the business cycle, however a firm may survive for a considerable period of time despite sustaining losses. An insolvent firm however has no such options, insolvency may involve a considerable and sometimes irreversible cost to society in the form of permanent loss of jobs, tax revenue to the government and a reduction in the capital base of a country. It is important for policy makers to consider the impact of their decisions on the liquidity or insolvency risk of the business sector in Kenya. Certain sectors of the Kenyan economy are known to go through periodic liquidity crises. The financial sector is only beginning to recover from its latest liquidity scare caused by a wave of bad debts. There is a need therefore to put extra emphasis on solvency of the business sector as opposed to the large emphasis currently placed on profitability alone.

Argenti (1976) has suggested that quality of management may influence the liquidity position of a firm. Indeed many of the failures in the banking sector have been attributed to the lack of professionalism exhibited by shareholder managers who are plagued by conflict of interest. It can therefore be suggested that improving the quality of

management of firms through voluntary measures such as training may reduce instances of insolvency in the corporate world.

One of the suggestions made following the recent banking crisis was that small banks should form a voluntary protection fund whose duty would be to offer relief to banks experiencing temporary distress. This is an idea that may be implemented on a wider scale in other sectors apart from the financial sector.

It is in the interests of Kenyan industry to build a resilient business sector by reducing the instances of insolvency that accompany downturns in every economic cycle. Although comparative studies on the liquidity of Kenyan firms vis a vis other countries have not been under taken one could venture to say that Kenyan firms are quite sensitive to the macroeconomic environment and also that by improved management this sensitivity can be minimised so as to avoid the negative consequences of insolvency.

Having established a link between liquidity and the economic environment , it is in order that credit decision models should be modified so as to distinguish between uncreditworthy firms and firms which are still relatively solvent but are labouring under the effects of an economic downturn. An interesting trend emerging in Kenya is the emergence of credit rating agencies, which have attempted to provide credit rating information on Kenyan companies , one such institution is Credit Reference Kenya limited established in 1990 . This company compiles data on actual defaults on credit and other lending arrangements and then sells this information to its subscribers thus enabling them to recognise and avoid companies with liquidity problems. One of the hindrances affecting the development of such agencies is the lack of a freedom of information Act which means that there is a reluctance to provide information which is in the public domain , such as , for example information on default. The development of credit rating

agencies in this country is an area that deserves additional attention from the relevant authorities as this can help companies reduce their exposure to insolvent firms.

APPENDICES

- LIST OF COMPANIES INCLUDED IN THIS STUDY

- CORRELATION MATRIX FOR THE INDEPENDENT
  VARIABLES USED IN THIS STUDY

- NUMBER OF BANK FAILURES IN KENYA BETWEEN
  1984 AND 1996

- COMPUTED RATIOS ON A SECTORAL BASIS

LIST OF COMPANIES INCLUDED IN THIS STUDY

AGRICULTURAL SECTOR

1. Eaagads (K) LTD
2. Sasini tea and coffee LTD
3. Theta group LTD
4. George Williamson LTD
5. Kakuzi LTD

COMMERCIAL AND SERVICES SECTOR

1. A. Baumann and company
2. CMC holdings LTD
3. Car and general LTD
4. Express Kenya LTD
5. Hutchings-biemer LTD
6. Lonrho motors
7. Marshalls
8. Nation media group
9. Standard newspapers

FINANCE AND INVESTMENT

1. CFC bank LTD
2. Diamond trust bank
3. ICDC investment company
4. Jubilee insurance company
5. NIC bank
6. Pan African insurance company
7. Standard chartered bank

INDUSTRIAL AND ALLIED SECTOR

1. British American Tobacco
2. Bamburi Cement Company
3. BOC Kenya Limited
4. Carbacid Investments
5. Crown Berger
6. Dunlop
7. E.A.Cables
8. E.A.Packaging Industries
9. E.A.Portland Cement
10. East African Breweries
11. Kenya National Mills
12. Kenya Oil Corporation
13. Kenya Orchards
14. Kenya Power and Lighting Company
15. Total Kenya

RESULTS OF LILLIEFORS NORMALITY TEST ON UN-TRANSFORMED AND TRANSFORMED RATIO DATA

The main concern raised by previous research into financial ratios is their lack of normal distribution, which may be a hindrance to the use of parametric testing. Suggested solutions to this problem revolve around the use of transformations. This study has employed the recommendation made by Frecka and hopwood (1983)

Of the ratios used in this study TD/TA has been shown by Deakin not to be significantly different from the normal distribution. In addition Deakin has shown that lognormal transformation can restore normality to the current ratio in 12 of the 19 years that formed the sample frame for this analysis. Logarithmic transforms have been applied to CA/CL and TD/TA in this study. This transform is not available for the other three ratios in this study because they do not have a lower bound of zero. Normality has been tested amongst the ratio categories using the Lilliefors test, which was conducted using the SPSS package. The output of this test is shown below.

normality tests	test	STAT	DF	SIG	H0
ACA/CL	Lilliefors	0.105	9	0.2	REJECT
ACF/CL	Lilliefors	0.283	9	0.0363	ACCEPT
ACF/TL	Lilliefors	0.325	9	0.0067	ACCEPT
A((ln))CA/CL	Lilliefors	0.202	9	0.2	ACCEPT
A((ln))TD/TA	Lilliefors	0.116	9	0.2	REJECT
ATD/TA	Lilliefors	0.156	9	0.2	REJECT
AWC/TA	Lilliefors	0.081	9	0.2	REJECT
CCA/CL	Lilliefors	0.166	9	0.2	REJECT
CCF/CL	Lilliefors	0.174	9	0.2	REJECT
CCF/TL	Lilliefors	0.128	9	0.2	REJECT
C((ln))CA/CL	Lilliefors	0.11	9	>0.2	REJECT
C((ln))TD/TA	Lilliefors	0.307	9	0.0146	ACCEPT
CTD/TA	Lilliefors	0.206	9	0.2	ACCEPT
CWC/TA	Lilliefors	0.165	9	>0.2	REJECT
FCA/CL	Lilliefors	0.248	9	0.1159	ACCEPT
FCF/CL	Lilliefors	0.18	9	0.2	REJECT

FCF/TL	Lilliefors	0.162	9	0.2	REJECT
(ln)CA/CL	Lilliefors	0.25	9	0.1121	ACCEPT
D/TA	Lilliefors	0.197	9	0.2	REJECT
FTD/TA	Lilliefors	0.242	9	0.1385	ACCEPT
FWC/TA	Lilliefors	0.237	9	0.1526	ACCEPT
ICA/CL	Lilliefors	0.24	9	0.1445	ACCEPT
ICF/CL	Lilliefors	0.214	9	0.2	ACCEPT
ICF/TL	Lilliefors	0.152	9	0.2	REJECT
I(ln))CA/CL	Lilliefors	0.17	9	0.2	REJECT
I(ln))TD/TA	Lilliefors	0.291	9	0.0269	ACCEPT
ITD/TA	Lilliefors	0.197	9	>0.2	REJECT
IWC/TA	Lilliefors	0.151	9	0.2	REJECT

Source: SPSS output of research data.

The Lilliefors test is a non-parametric test that was used in this case to test for deviations from the normal distribution amongst the ratios used here. The likelihood of non-normality amongst the ratios used has already been minimised to some extent by breaking the ratios into their respective industry classes. The SPSS output shown above shows that logarithmic transforms can have modest success in reducing skewness in ratio data so that it conforms more closely to the normal distribution.

ratio	Proportion of ratios differing significantly from the normal distribution. before the application of transformation				
	AGRICULTURAL	COMMERCIAL	FINANCIAL	INDUSTRIAL	PROPORTION(NORMAL)
CA/CL	NON	NON	NOR	NOR	50%
CF/CL	NOR	NON	NON	NOR	50%
CF/TL	NOR	NON	NON	NON	25%
TD/TA	NON	NOR	NOR	NON	50%
WC/TA	NON	NON	NOR	NON	25%
PROPORTION (NORMAL)	40%	20%	60%	40%	

Source: Research data

Ratio	Proportion of ratios differing significantly from the normal distribution. after the application of transformation				
	AGRICULTURAL	COMMERCIAL	FINANCIAL	INDUSTRIAL	PROPORTION (NORMAL)
CA/CL	**NOR**	NON*	NOR	NOR	75%
CF/CL	NOR	NON	NON	NOR	50%
CF/TL	NOR	NON	NON	NON	25%
TD/TA	NON*	**NOR**	**NOR**	NOR	75%
WC/TA	NON	NON	NOR	NON	25%
PROPORTION (NORMAL)	60%	20%	60%	60%	

Source: Research data

The results of the transformations applied to the data show moderate success in reducing cases of non-normality. The shaded cells show cases where non-normality was converted to normality through the use of a natural logarithm transformation. Cells with bold type show instances where transformation was not necessary, while cells with a star show cases where the transformation process could still not restore normality. After the application of the transformation only two ratios remained predominantly non-normal, these are the working capital to total assets ratio and the cashflow from operations to total liabilities. After the application of transformations only one sector, the commercial and services sector remained predominantly different from normal, all other sector reported normality in three out of five (60%) of the ratios for that sector.

CORRELATION MATRIX FOR THE INDEPENDENT VARIABLES USED IN THIS STUDY

The table below shows the correlation coefficients between the economic indicators used in this study. This analysis was done so as to forestall the occurrence of multicollinearity in the model being used. The level of correlation between the independent variables is shown in the shaded cells and is at most moderate. A fourth variable that was considered for inclusion in this study was the exchange rate (Kshs/US$). This factor was struck out because of its high correlation with inflation.

Table 16: Correlation Matrix for the Independent Variables

	underlying	overall	91 day t/b	Kshs/US$	INDEX
underlying	1.00				
overall	0.93	1.00			
91 day t/b	(0.61)	(0.48)	1.00		
Kshs/US$	(0.87)	(0.77)	0.62	1.00	
INDEX	0.40	0.10	(0.44)	(0.57)	1.00

Source: Research data

COMPUTED RATIOS ON A SECTORAL BASIS

Table 17: Computed Ratios for the Agricultural Sector

	CF/CL	TD/TA	WC/TA	CA/CL	CF/TL	(ln)CA/CL	(ln)TD/TA
1997	0.9079	0.3629	-0.0555	1.3642	0.8622	-0.7244	-1.3931
1996	0.5958	0.3094	-0.0077	1.8575	0.5348	0.1452	-1.6345
1995	0.6534	0.2439	0.0312	1.8501	0.5796	0.2526	-1.8060
1994	1.3584	0.2392	0.0920	1.9427	1.0662	0.4745	-1.5520
1993	0.6983	0.3890	0.1316	1.5978	0.5643	0.4134	-1.1350
1992	0.4824	0.3279	0.1485	2.1663	0.4162	0.6255	-1.4308
1991	0.4315	0.3958	0.0528	2.0287	0.3156	0.4387	-1.3246
1990	0.5951	0.3640	0.0592	2.2943	0.fifty four94	0.4906	-1.4968
1989	0.5947	0.3377	0.0743	2.0307	0.5716	0.4728	-1.4759

Source: Research data

Table 18: Computed Ratios for the Financial Sector

	CA/CL	WC/TA	TD/TA	CF/CL	CF/TL	(ln)TD/TA	(ln)CA/CL
1997	2.1480	0.1919	0.6326	0.1496	0.1160	-0.6119	0.5004
1996	3.4767	0.2963	0.fifty four76	0.2815	0.2517	-0.8635	0.7936
1995	2.4262	0.2032	0.6363	0.1612	0.1184	-0.6144	0.fifty four77
1994	2.2922	0.2015	0.6603	0.3338	0.2550	-0.5665	0.5197
1993	2.1617	0.1989	0.6491	0.1908	0.1460	-0.6012	0.5053
1992	2.8279	0.2326	0.6393	0.2896	0.2258	-0.6787	0.6417
1991	2.3475	0.2233	0.6505	0.2104	0.1753	-0.6257	0.5589
1990	2.5081	0.2146	0.6433	0.2832	0.2101	-0.6460	0.5804
1989	2.0935	0.2033	0.6631	0.2145	0.1522	-0.5763	0.5165

Source: Research data

Table 19: Computed Ratios for the Industrial and Allied Sector

	CF/TL	CF/CL	TD/TA	WC/TA	CA/CL	(ln)CA/CL	(ln)TD/TA
1997	0.84569	1.03305	0.40042	0.15817	2.49280	0.75750	-1.19618
1996	0.73514	0.99fifty four6	0.43109	0.17403	2.70550	0.80875	-1.07062
1995	0.61701	0.63876	0.44382	0.16956	2.69627	0.77159	-1.04788
1994	0.71869	1.07665	0.38813	0.21375	3.39193	0.78943	-1.12737
1993	0.57432	1.04864	0.39925	0.20725	4.43017	0.73856	-1.05110
1992	0.61450	0.98255	0.38348	0.17830	2.45660	0.56441	-1.08083
1991	0.70299	0.78678	0.42149	0.14598	2.35786	0.52675	-1.03504

1990	0.41009	0.63329	0.45247	0.09105	1.48660	0.31719	-0.86957
1989	0.41009	0.62507	0.46983	0.09624	1.56164	0.3fifty four07	-0.79988

Source: Research data

Table 20: Computed Ratios for the Commercial and Services Sector

	CA/CL	WC/TA	TD/TA	CF/CL	CF/TL	(In)TD/TA	(In)CA/CL
1997	1.1735	0.0635	0.5373	0.2800	0.2049	-0.6581	0.1392
1996	1.2164	0.0820	0.6011	0.2221	0.1243	-0.5569	0.1777
1995	1.1162	0.0264	0.5759	0.2079	0.1920	-0.6266	0.0731
1994	1.2490	0.0821	0.5623	0.2031	0.1902	-0.6455	0.1821
1993	1.2686	0.1032	0.5575	0.2797	0.2412	-0.6396	0.2087
1992	1.0861	0.0209	0.5665	0.1662	0.1623	-0.6243	0.0389
1991	1.1578	0.0753	0.5620	0.1205	0.1074	-0.6407	0.1353
1990	1.1268	0.0683	0.6153	0.1fifty four8	0.1432	-0.5347	0.1131
1989	1.1329	0.0749	0.6173	0.1636	0.1479	-0.5259	0.1158

Source: Research data

NUMBER OF BANK FAILURES IN KENYA BETWEEN 1984 AND 1996

Bank failures(1984-1996)
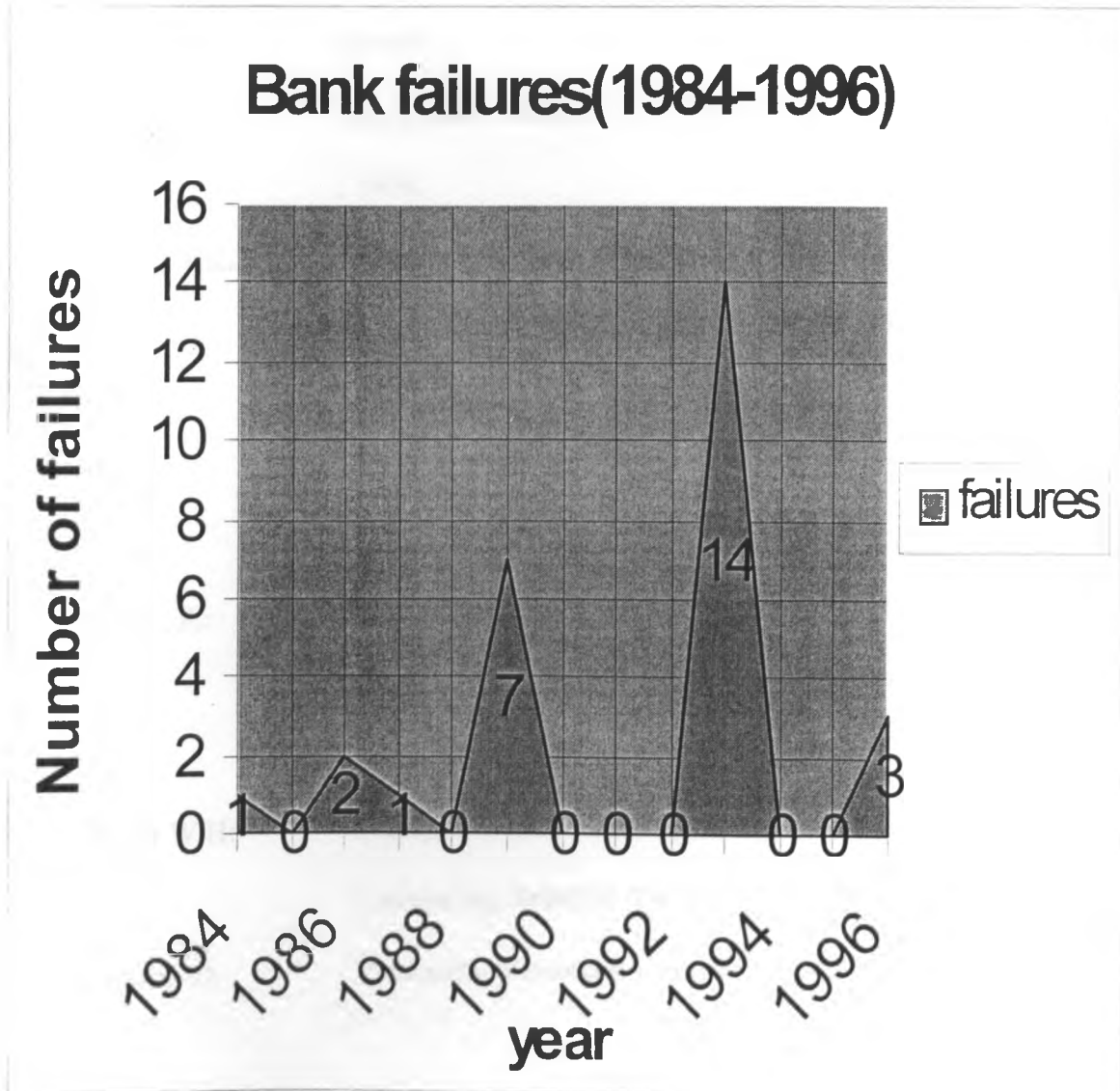
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