

DETERMINANTS OF LIQUIDITY OF COMMERCIAL BANKS IN KENYA: AN EMPIRICAL STUDY

BY

KAMOYO ELIAS MAORE

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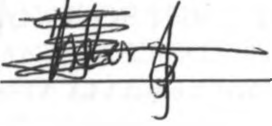
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DECLARATION

This research project is my original work and has not been presented for the award of a degree in any other university.

Name: Kamoyo Elias Maore

Signature:  Date: 23/11/2006

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

SUPERVISOR:

Name: Mrs. Angela Kithinji

Lecturer

Department of Accounting

Faculty of Commerce

University of Nairobi

Signature:  Date: 23/11/2006

TABLE OF CONTENTS

DECLARATION.....	ii
TABLE OF CONTENTS.....	iii
LIST OF TABLES.....	v
ABBREVIATION.....	vi
DEDICATION.....	vi
ACKNOWLEDGEMENT.....	viii
ABSTRACT.....	ix
CHAPTER ONE: INTRODUCTION.....	1
1.1 BACKGROUND.....	1
1.2 STATEMENT OF THE PROBLEM.....	4
1.3 RESEARCH HYPOTHESIS.....	6
1.4 OBJECTIVE OF THE STUDY.....	6
1.5 IMPORTANCE OF THE STUDY.....	7
1.6 IMPORTANT ASSUMPTION.....	7
CHAPTER TWO: LITERATURE REVIEW.....	8
2.1 LIQUIDITY MANAGEMENT.....	8
2.1.1 Measuring Liquidity Needs.....	9
2.1.2 Liquidity Risk.....	9
2.1.3 Emergency Liquidity Funding Policy.....	10
2.2 MEASURES OF LIQUIDITY.....	11
2.2.1 The Central Bank of Kenya Measure of Liquidity.....	11
2.2.2 Accounting Measures of Liquidity.....	11
2.2.3 Cash Flow Measures.....	12
2.2.4 Measures of Solvency.....	13
2.3 DETERMINANTS OF LIQUIDITY IN COMMERCIAL BANKS.....	14
2.3.1 Liquid Assets Composition.....	14
2.3.2 Liquid Liabilities Composition.....	17
2.3.3 Loan Commitments.....	17
2.3.4 Profitability.....	19
2.3.5 Maturity Structure of Long-term Debt.....	20
2.3.6 Growth Opportunities.....	20
2.3.7 Bank Size.....	22
2.3.8 Cash Flows.....	22
2.3.9 Cash Flow Variability.....	23
2.3.10 Leverage.....	24
2.3.11 Ownership Structure.....	24
2.3.12 Agency Theory.....	25
2.3.13 Other Determinants.....	25
CHAPTER THREE: RESEARCH METHODOLOGY.....	29
3.1 RESEARCH DESIGN.....	29
3.2 POPULATION AND SAMPLE OF THE STUDY.....	29
3.3 DATA COLLECTION.....	29
3.4 DATA ANALYSIS: INFORMATION.....	30
3.5 JUSTIFICATION OF THE DATA ANALYSIS METHOD.....	30
3.6 MODEL SPECIFICATION.....	31
3.7 EMPIRICAL IMPLEMENTATION.....	31

CHAPTER FOUR: DATA ANALYSIS AND INTERPRETATIONS OF THE FINDINGS AND DISCUSSIONS	32
4.0 EMPIRICAL RESULTS	32
4.1 RESPONSE RATE	32
4.2 DESCRIPTIVE STATISTICS.....	32
4.3 DIAGNOSTIC TESTS FOR THE ERROR TERM	34
4.3.1 Testing Error Term for Normality and Constant Variance	34
4.3.2 Test Results for Constant Variance and Normality of the Error Term	34
4.4 ESTIMATION RESULTS	35
4.4.1 Liquid Assets	36
4.4.2 Leverage	36
4.4.3 Liquid Liabilities	36
4.4.4 Size.....	37
4.4.5 Cash Flows	37
4.4.6 Profitability	37
4.4.7 Growth.....	37
4.4.8 Maturity.....	37
4.4.9 Loan Commitments	38
4.5 POST ESTIMATION SPECIFICATION TEST	38
 CHAPTER FIVE: SUMMARY, CONCLUSIONS, POLICY IMPLICATIONS, LIMITATIONS OF THE STUDY AND SUGGESTIONS FOR FURTHER RESEARCH	 39
5.1 SUMMARY OF FINDINGS AND CONCLUSIONS.....	39
5.1.1 SUMMARY OF FINDINGS.....	39
5.1.2 CONCLUSIONS	40
5.2 POLICY IMPLICATIONS.....	40
5.3 LIMITATIONS OF THE STUDY	40
5.4 SUGGESTIONS FOR FURTHER RESEARCH	41
REFERENCES	42
APPENDIX	49

LIST OF TABLES

	PAGE
Table 3.1 Summary of independent variables to be used and expected coefficient sign.	30
Table 4.1 Descriptive statistics of data used in the estimation.	32
Table 4.2 Correlations matrix, rank correlation and test for independence.	33
Table 4.3(a) Cook-weisberg test for heteroskedasticity.	34
Table 4.3(b) Skewness / kurtosis tests for normality.	34
Table 4.4 Estimation results.	35
Table 4.5 Specification test for the post estimation.	38

ABBREVIATIONS

CFL	CASH FLOWS
LAA	LIQUID ASSETS
LLA	LIQUID LIABILITIES
SIZ	BANK SIZE
MAT	MATURITY
GAR	GROWTH
LAB	LEVERAGE
PAR	PROFITABILITY
COM	LOAN COMMITMENTS
LIQ	LIQUIDITY

DEDICATION

This Research Project is dedicated to my loving Mum Judith, Dad Kamoyo and my best friend Jeremiah Mithika for their relentless support through my time in college. To my entire family; my sisters, step sisters, my brothers and step brothers for their prayers, love, understanding and moral support.

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ABSTRACT

The paper empirically analyzed the determinants of the liquidity of the commercial banks in Kenya using a multiple linear regression model. The motivation was to establish whether the determinants of liquidity are empirically robust. The focus was exclusively on a cross section of 30 commercial banks in Kenya. This was because earlier cross-country studies recommended country-specific empirical investigation as an area warranting further research. Employing the linear regression model uncovered an economically meaningful relationship between bank's liquidity and its determinants.

The findings from a cross sectional analyses indicate that significant factors that determine the liquidity of the commercial banks in Kenya are liquid liabilities, growth and maturity. Liquid liabilities and maturity have a positive impact on liquidity whereas growth has a negative impact. The other factors such as liquid assets and cash flows have a positive but insignificant effect on the liquidity of commercial banks. Similarly, leverage, size, profitability and loan commitments have an insignificant negative effect on banks' liquidity.

The estimated model results indicate that all the variables included in the model significantly determines 80 percent of the variation in liquidity. The findings further indicate that the estimation results are free from any problems of normality and heterogeneity as shown by the normality and heterogeneity test results. The model also fits the data correctly as indicated by the post-estimation results. The implication of these findings is that the Central Bank of Kenya needs to devise legal requirements that give benchmarks of the above ratios to ensure a sustainable liquidity of the commercial banks. This will help create a stable banking and financial sector that provides a conducive environment for sustainable economic growth and development.

CHAPTER ONE: INTRODUCTION

1.1 BACKGROUND

Over the years, banks remained and will continue to be an important institution for any economy as they play the most fundamental role in the payments system. In most developing countries, commercial banks are the most dominant financial institutions, with the capital market institutions playing a minimal role. Of the main functions of commercial banks is the availing of funds (monetary) to its customers. For a bank to be in a position to do so, it must be in a healthy liquidity position (Litter, Silber and Udell, 1996).

Argenti (1976) suggests that the level of management of the firm in question mitigates the impact of the economy on the liquidity of a firm. He notes further that the level of regulation by the government tends to play a part in insulating a sector from economic down turns. As money will not manage itself, the regulation of money will be debated for years to come (Stals, 1999).

Liquidity is the availability of funds or assurance of the availability of funds to honor a bank's cash flow commitment including the off-balance sheet cash flow items as they fall due (The Bank of Mauritius, 1988). According to the Central Bank of Kenya (2002), liquid assets comprise of notes and coins (local and foreign), balances with the Central Bank of Kenya, balances with domestic commercial banks, balances with banks abroad, balances with financial institutions, balances with mortgage finance companies, balances with building societies, treasury bills, treasury bonds, certificates of deposits or government bearer bonds, foreign currency, and bearer certificates of deposit.

Therefore when managing a financial institution, the institution should be able to meet in full all its obligations as they fall due. By enabling banks to meet their financial obligations promptly, Bernstein and Wild (2000), argue that, this instills a sense of confidence in the customers which goes further into building customers loyalty and satisfaction. On the contrary, a poor liquidity status could lead to inability of banks to

meet their financial obligations. In the event of such situations, bank customers lose confidence and may engage in a run on the bank. This eventually results to bank failures since poor liquidity situation would further result to; inability to take advantage of favorable discount and other opportunities, lower profitability, delay in collection of interest and principal payments for creditors, and damage to customer relationships.

The bank is under a general contractual duty to its customers to pay on demand all debts to the extent of the funds in a depositor's account. The bank should therefore be prudent in its operation; it should exercise careful and practical judgment with regard to, objectives of the bank, all risks to which the bank is exposed, the amount and nature of the bank (Central Bank of Kenya Regulations, 2001). Allan (2000), argues that regulation of banks shapes market behavior thus providing a protection to poorly informed clients and avoiding moral hazard.

In Kenya regulation of banks is the responsibility of the Central Bank of Kenya. The Banking Supervision Department carries out the function of supervising banks to ensure the liquidity, solvency, and proper functioning of a stable market based banking system. Further, to this, audited performance of the banking sector is measured in terms of capital adequacy, asset quality, liquidity, and earnings based on the Central Bank internal rating system, (The Kenya Banking Act).

The World Trade Centre disaster also raised the issue of liquidity and how to access funds when needed. During such an emergency people often withdraw cash from the bank, and this puts great pressure on a bank's liquidity. Regarding this, Corner (2001), observed that it is necessary for banking institutions to hold cash and cash equivalents in more than one federal home bank.

The Central Bank Regulation on liquidity management is issued under section 33 of the Banking Act. Under the Banking Act, the Central Bank may determine, vary or alter such minimum levels of liquid assets to be held by all institutions and to those already defined under section 19 (2) (a) - (d) of the Banking Act (The Kenya Banking Act). The CBK, in its Central Bank of Kenya Liquidity Regulations Supplement (2002), observes that the

purpose of the regulation among others is to; ensure that each institution meets the minimum liquidity requirements, guide institutions in the formulation of liquidity risk management strategies, policies, procedures, management information systems, internal controls and contingency plans for unexpected distress situations, protect deposit funds, promote a stable and efficient banking system, and endear confidence in the financial sector.

The banks supervisory department continues to adopt and implement effective and sound supervisory methods in order to minimize the risk inherent in the banking system. In ensuring a healthy liquidity status by banks, the Central Bank of Kenya requires commercial banks to meet the liquidity requirements, the indicator being the liquidity ratio, which is adjusted from time to time, (CBK, 2002).

According to the Central Bank annual reporting, an institutions ability to access markets for new funding or unwind specific exposures is a function of their liquidity strategies, market conditions, as well as their financial conditions. The liquidity strategy for banks must outline specific policies on key areas of liquidity management. Such areas include; composition of assets and liabilities, management of liquidity currencies, reliance on certain financial instruments (the source of assets should be well diversified), liquidity, and marketability of assets. However limits should be set on various categories of assets depending on their convertibility.

Ross (2001), argues that the deregulation and globalization of financial markets has made liquidity risk management, credit risk and market risk more diverse and complex because banks have to succumb to the existing market forces that are typical of the market kind of an economy. Amid changes in the financial environment and forecasted trends, market conditions are in a situation of constant fluctuations. The funding gap for commercial banks is managed through a stable funding base along with detailed forecasting.

Mureithi (2003) finds evidence that provides strong support for the hypothesis that growth options, size and cash flows of firms exert a positive impact on firms' liquidity holding decisions and that firms with other liquid assets tend to hold less cash. However,

there is less support for the view that firms use high debt capacity as a substitute for liquidity. Further, he finds that the maturity structure of debt does not play a significant role in firms' liquidity decisions whereas source of debt matters. Finally, he suggests that unobserved firm heterogeneity and endogeneity problems are crucial in analyzing firms' liquidity decisions.

The level of liquidity can be an indicator of the success or failure of the firm. Kiragu (1991) on the other hand finds that most firms in Kenya fail due to poor funds management and unwise debt policies and the implications are that firms must maintain sufficient liquidity to avoid insolvency problems.

The study intends to investigate the determinants of liquidity for Kenyan firms. Our population will be all commercial banks in Kenya between 1995 and 2004. We shall specifically analyze the effect of the following factors on liquidity. Size, profitability, cash flow, leverage, cash flow variability, growth options, maturity structure of debt, liquid assets composition, liquid liabilities composition and loan commitment.

1.2 STATEMENT OF THE PROBLEM

Liquidity always comes first, without it, a bank does not open its doors, and with it a bank may have time to solve its basic problem (Hubbard, 2000). Liquidity is an important determinant of financial distress; because without liquidity a bank cannot meet the deposit withdrawals and satisfy customer loans (Mervin, 1942; Beaver, 1996). However Miegs and Miegs (1999), observe that being too liquid is costly yet having too little liquidity is also risky, calling for a need for commercial banks to have a trade - off between liquidity risk and costs associated with illiquidity. The objectivity of liquidity management therefore is to ensure that banks will be able to meet in full all their obligations as they fall due (Gardner & Mills, 1994).

According to the Central Bank of Kenya guidelines on liquidity, liquidity management is a crucial element in the management of an institution. It is therefore important for management of any banking institution to not only measure liquidity on an on going basis but also examine ways of how to fund liquidity requirements during distress.

Under section 19 of the Banking Act, an institution shall maintain a minimum holding of liquid assets as the Central Bank may from time to time determine. Currently an institution is required to maintain a statutory minimum of 20% of its deposit liabilities with the Central Bank. However although this ratio applies to all commercial banks as defined in the Kenya Banking Act, it is for sure that liquidity requirements vary from one institution to another depending on the cash flows. In the year 2002, one of the banks was reported to have a liquidity ratio of 10%, despite having been below the average liquidity requirement, the bank is still operational to date. For this reason, every institution must therefore identify its liquidity requirements over specific time periods and plan for appropriate funding (Central Bank of Kenya Liquidity Regulations Supplement, 2002). Other than the liquidity ratio, which is an off-site form of surveillance, the bank may also conduct on-site surveillance, with the aim of assessing; capital adequacy, earnings, performance, liquidity, asset quality and interest rate sensitivity.

The institution is also required to submit data on its liquidity in the prescribed format (Form CBK/ PR9, Liquidity Statement), and in accordance with the completion instructions attached, after each (10) working days period. In addition to the liquidity data, data on its maturity analysis of assets and liabilities will also be provided, in the prescribed format (Form CBK/PR6, Maturity Analysis of Assets and Liabilities). The CBK emphasizes that it is the responsibility of every board of directors of institutions to develop and document liquidity risk management strategy and relevant policies. However with all these controls banks are still failing.

Maintaining the liquidity requirement may mean that banks keep most of their assets in the form of short -term and easily convertible assets, which most of the times give lower returns. However, according to the CBK's annual report, the liquidity ratio on a global basis measured 45.5% in the year 2001, 45% in 2000, 40% in 1999 and 38% in 1998, which is much higher than the liquidity ratio requirement in Kenya of 20%. This situation could therefore be a pointer that there exist other factors that tend to influence the liquidity level of commercial banks.

This raised questions, which are relevant to the study:

- Why do some commercial banks have more liquidity than others?
- To what extent, are the liquidity disparities due to variations in management controllable internal factors influence the liquidity of these institutions?
- What determines liquidity of commercial banks?

Stals (1999) attempted to investigate monetary policy and money stability in South Africa, while Wahiu (1999) studied the relationship between liquidity and macro - economic trends across industries. Maru (2004) surveyed the factors influencing liquidity levels of commercial banks and identified the factors as: banking regulation, credit creation, monetary policy, interest rate, contingency planning, management policy, profitability, taxation, economic cycles, balance of payments status and government expenditure. No known study has been undertaken in Kenya on determinants of banks liquidity. Thus, an explicit analysis of the commercial bank liquidity in Kenya is necessary.

1.3 RESEARCH HYPOTHESIS

H₀: size, growth options, cash flows, cashflows variability, leverage, liquid assets composition, liquid liabilities composition, loan commitments and maturity structure of long –term debt do not influence the level of liquidity.

H₁: size, growth options, cashflows, cashflows variability, leverage, liquid assets composition, liquid liabilities composition, loan commitments and maturity structure of long –term debt influence the level of liquidity.

1.4 OBJECTIVE OF THE STUDY

The main objective of the study is to find out the determinants of the commercial banks liquidity. The specific objectives are:

- To determine the direction and the extent to which the following bank specific characteristics affect the level of liquidity in commercial banks; maturity structure of long-term debt, growth opportunities, size, cash flow, leverage, profitability, liquid assets, liquid liabilities and loan commitments.

- To determine the percentage of the variations in liquidity explained by the variables included in the model.

1.5 IMPORTANCE OF THE STUDY

This study will be useful to the following parties;

The policy makers

The findings would be important in the issue of prudential guideline on liquidity that can be used in policy formulation. Central Bank of Kenya could employ the findings of this study in formulating guidelines that will enhance liquidity in the banking sector, while protecting those who rely on deposit withdrawals and bank credit.

Academic researchers

The findings will add to the existing body of knowledge in area of business finance and banking.

Commercial Banks

The study will enrich the field of the study in liquidity especially bring out the factors that influence the liquidity of commercial banks. The bank will get to know of the factors that influence their liquidity. The study will open grounds for analysis of such factors to determine which factors the bank would have direct control on and how.

Financial Analysts

Liquidity is a key indicator and predictor of bankruptcy and solvency. Financial analysts will therefore be in a position to appreciate the factors that influence the liquidity level of commercial banks and therefore advice the banks appropriately.

1.6 IMPORTANT ASSUMPTION

- i) The study will assume that the economy and other systematic factors have an equal contribution to commercial banks liquidity. This is important if one is to make any inferences from the data collected, as this factor will not have been controlled.
- ii) It is assumed that the bank specific effects are not observable but have Significant effects on the level of liquidity.

CHAPTER TWO: LITERATURE REVIEW

2.1 LIQUIDITY MANAGEMENT

The maintenance of adequate liquidity is normally the responsibility of management. No bank should rely on a single source of liquidity. Bernstein and Wild (2000), observe that the ability to meet liquidity needs is gauged by both asset and liability management. Bank assets may be classified into four main categories; primary reserves, secondary reserves, bank loans and investments.

Liability management is based on the banks external sources of funds and dependent on the overall safety and soundness of the bank. Banks may make use of the liability side of the balance sheet. Banks could target their asset growth as given and then adjust their liabilities as required. Liability management assumes that certain types of banks liabilities are more sensitive to interest rate changes. Such liabilities include; certificates of deposits, federal funds, repurchase agreements, and commercial paper. The liquidity gained by liability management would be useful to commercial banks to counter act deposit inflows and outflows, reduce the variability of deposit inflows and outflows, such funds as would be attracted by liability management could be used to meet increase in loan demand by the banks' customers (Deep and Schaefer, 2004).

However, liquidity can be either short term or long term. Short-term liquidity enables the company to meet the short-term obligations. Banks short-term obligations will include paying suppliers, customers, salaries and others. Bernstein and Wild (2000) propose that the implication of illiquidity to customers and suppliers would be damage to their relationship and consequently, result to disloyalty or important customers and suppliers. Long-term liquidity will be important in supporting long-term projects and can be assessed from operating cash flows and other sources and used of cash.

Liquidity sources include: cash, short-term securities, federal funds sold, commercial paper, marketable securities, and securities purchases under agreement to resell. Nevertheless, there also exists purchased forms of liquidity such as borrowing from federal reserves, securities sold under agreement to repurchase, large customer deposits,

public deposits, and other forms of liability. The emerging sources of liquidity include; purchase of long-term securities, making of loans and mortgages, selling consumer loans and mortgages, and the use of capital market obligations (Sinkey, 1992).

2.1.1 Measuring Liquidity Needs

Bank liquidity needs consist of immediate obligations such as deposit withdrawals or legitimate loan demands. Although the bank liquidity needs may be high and may require that most of the assets be in form of liquid assets, it may become an opportunity cost. This may lead to long-term productivity being affected if the bank has got too much in low earning liquidity. However on the contrary too little liquidity may lead to severe financial crisis or even bank failure.

Bank needs for liquidity may be measured as short term, cyclical or contingent. Short-term liquidity needs are increase or decrease depending on the season. If a bank is situated in the areas that are purely agricultural, the bank may require liquidity at given time periods such as the planting season while during the harvesting season such institutions will have less urgency for liquidity. Deposits will also be high during the harvesting season. Cyclical liquidity needs are much more difficult to estimate and occur due to unpredictable economic cycles. Trend liquidity needs on the other hand are required for those needs that can be predicted over a long period of time. Contingent liquidity needs are caused by unusual events that are difficult to predict (Hempell et al, 1994). Although firms require liquidity for various reasons, it has been proposed that the financial markets may have to consider factors such as; the purpose of the liquidity, access to money markets, management philosophy, costs and characteristics of liquidity sources, and interest rate focus as determinants of liquidity.

2.1.2 Liquidity Risk

Liquidity risk may be approximated by comparing a proxy of a banks liquidity needs with a banks liquidity sources and short - term securities. However funding loans may also be a major liquidity need and purchasing liabilities an important source of liquidity. Financial intermediary's assets are relatively illiquid especially when liability claims are suddenly withdrawn or not renewed. In such situations holding relatively low liquid

assets exposes an institution to liquidity risk and a consequent run on the bank. In optimizing its holding of liquid assets therefore, a financial institution must trade the benefit of cash immediacy for lower returns. To counter liquidity risk, a crisis plan must be established in order to promote good communication from bank lenders to the funding manager and from the funding manager to the banks institutional investors and rating agencies as well as to conduct exercises for testing and establishing marketability of bank assets and acquire steps to broaden, deepen and stabilize markets for bank liabilities (Deep and Schaefer, 2004).

2.1.3 Emergency Liquidity Funding Policy

This policy should be adopted by central banks in order to fund those banks that might be experiencing difficulties. The central bank as a lender of the last resort will give this to banks, which are illiquid but not insolvent. Banks may request for emergency liquidity funding from the central bank in the event of a run on deposits or maturity transformation. When a bank is receiving emergency liquidity funding, collateral should be provided such as gold, foreign currency, government paper and the borrowing bank should be solvent either by law or policy. In the event of a systemic crisis all banks may be bailed even in the absence of collateral. However, emergency liquidity funding should only be provided to those banks experiencing short - term liquidity problems (Duett and Zuniga, 2001).

2.2 MEASURES OF LIQUIDITY

According to Bernstein and Wild (2000), financial analysts normally measure liquidity for the sake of making investment decisions.

2.2.1 The Central Bank of Kenya Measure of Liquidity

The CBK uses one measure of liquidity, the liquidity ratio (CBK Liquidity Regulation Supplement, 2002), which is given by the percentage of net liquid assets as a proportion of net deposit liabilities. Net assets comprise of; notes and coins (local and foreign), balances with central bank of Kenya, balances with domestic commercial banks, balances with banks abroad, balances with financial institutions, balances with mortgage finance, companies, balances with building societies, treasury bills, treasury bonds, certificates of deposit/government bearer bonds, and foreign currency bearer certificates.

Net deposit liabilities comprise of; deposit from parastatals, deposit from other sources, and balances due to banks, balances due to financial institutions, balances due to mortgage companies, balances due to building societies.

2.2.2 Accounting Measures of Liquidity

Working capital, which is given by current assets less current liabilities. It is considered that, between two banks, the one having the larger net working capital has the greater ability to meet its current obligations. This is not necessary so as Pandey (1999) argues, the measure of liquidity is a relationship, rather than the difference between current assets and current liabilities. Net working capital, however measures the bank's potential reservoir of funds. It can be related to net assets (or capital employed).

Current ratio is given as current assets as a proportion of current liabilities. However it should be noted that changes in the figures of current ratio do not necessarily imply changes in liquidity or operating performance as inflation may increase the balances of the current assets and current liabilities. The ratio may also be falseful due to window dressing of assets.

Cash ratio, which is given as the total sum of cash, cash equivalents, marketable securities to current assets. Since cash is the most liquid asset, a financial analyst may examine cash ratio and its equivalent to current liability. In India, firms have credit limits sanctioned from banks, and can easily draw cash (Pandey 1999)

Cash to current liabilities, which is the proportion of the total sum of cash, cash equivalent and marketable securities to current liabilities and the ratio, reflects the cash available to pay for the liabilities (current obligations).

Acid test (quick) ratio is a measure of the assets that can easily be converted to cash and is given by the total sum of cash, cash equivalents marketable securities and account receivable as a proportion of current liabilities.

2.2.3 Cash Flow Measures

Cash flow ratio, which is the proportion of operating cash flow to current liabilities. An analysis of cash flows is useful for short-run planning. A firm needs sufficient cash to pay debts maturing in the near future, to pay interest and other expenses and pay dividends to share holders. Pandey (1999) observed that a firm can make projections of cash inflows and outflows for the near future to determine the availability of cash. This cash balance can be matched with the firm's need for cash during the period, and accordingly, arrangements can be made to meet the deficit or invest the surplus cash temporarily. Cash flow statement focuses attention on immediate or near term liquidity instead of potential or medium term liquidity.

The above liquidity ratios tell of a company's liability to generate cash in the short -term. While profit may be seen as an end in itself liquidity is a constraint both directly and indirectly. Directly, firms must settle their debts and indirectly the firms must report an ability to continue doing so in the foreseeable future. Liquidity has a time dimension as it depends on the sale ability of assets termed as liquid. However in the times of inflation the values of assets are greatly understood.

2.2.4 Measures of Solvency

The **debt to equity ratio** is a measure of the amount of owners' versus lender's money at stake. It is given by total liabilities divided by owner's equity. Pandey (1999) observe that this relationship describes the lenders' contribution for each shilling of the owners' contribution. A low debt-equity ratio implies a greater claim of owners than creditors. From the point of view of creditors, it represents a satisfactory situation since a high proportion of equity provides a larger margin of safety for them. During the periods of low profits, the debt servicing will prove to be less burdensome for a bank with low debt-equity ratio. However, from the shareholders' point of view, there is a disadvantage during the periods of good economic activities if the bank employs a low amount of debt. The higher the debt -equity ratio, the larger the shareholders' earnings, when the cost of debt is less than the bank's overall rate of return on investment. Thus, there is a need to strike a proper balance between the use of debt and equity. The most appropriate debt-equity combination would involve a trade-off between return and risk.

Solvency ratio is a proportion of owner's equity to total net assets, and it measures the amount of money that owners are contributing towards supporting the firm. How much funds are being contributed together by lenders and owners for each shilling of the owner's contribution? That is net asset to net worth.

Debt to asset ratio shows what the lenders are contributing to the firm and is given as the proportion of total liabilities to total assets. It is a measure of the financial risk of the firm. Generally, the more debt in the firm's financial structure, the more volatile its earnings and the greater the risk to owners and creditors. Whatever way the debt ratio is calculated, it shows the extent to which debt financing has been used in the business. A high ratio means that claims of creditors are greater than those of owners (Pandey, 1999).

A high level of debt introduces inflexibility in the firm's operations due to the increasing interference and pressures from creditors. A high debt company is able to borrow funds on very restrictive terms and conditions. The loan agreement may require a firm to maintain a certain level of working capital, or a minimum current ratio, or restrict the payment of dividends, or fix limits to the officers' and employees' salaries and so on.

Heavy indebtedness leads to creditors' pressures and constraints on the management's independent functioning and energies. During the periods of low profits, a highly debt-financed company suffers great strains: it cannot even pay the interest charges of creditors or depositors demands. As a result, their pressure and control are further tightened. To meet their working capital needs, the firm finds difficulty in getting credit. It may have to borrow on highly unfavorable terms. Thus, it get entangled in a debt trap.

2.3 DETERMINANTS OF LIQUIDITY IN COMMERCIAL BANKS

According to Argenti (1976), the factors that influence the liquidity risk of firms may be categorized into internal factors and external factors. The internal factors are due to poor management and they are manifested through lack of responsiveness to changes in technology, poor communication, misfeasance and fraud, insufficient considerations for cost factors especially research and development, poor knowledge of financial matters, and high leverage position. The external factors include, labor unions (high wage settlements), and government regulations.

Gardener and Mills (1994) observed that the factors that influence the liquidity status of commercial banks could be grouped into factors such as the size of the institution, its financial stability, its industry and the risk return preference of managers and owners. A review of literature and cross- references reveals many studies about the determinants of commercial bank liquidity. In this section, we provide a brief review of the bank-specific characteristics identified by theory as relevant in determining liquidity policies.

2.3.1 Liquid assets composition

Superior and efficient credit allocation through the provision and the monitoring of loans on the asset composition has been shown by Diamond (1984) and Calomiris and Kahn (1991) among others. Diamond and Rajan (2001a and 2001b) emphasize the importance of a liquidity-mismatched balance sheet - calling it a "fragile capital structure" - as being central to the economic role and rationale for the bank.

On the asset side, Deep and Schaefer (2004) consider the following to be fully liquid: cash and balances from depository institutions, government and non-government

securities, federal funds sold, and acceptances of other banks. And finally all loans with maturity less than one year to be liquid.

Extending the Diamond - Dybvig set up, Jacklin and Bhattacharya (1988) relax the assumption that bank loans are risk less by introducing information asymmetry about the credit quality of loans as well as early liquidation costs and concludes that banks optimal financing mix tilts towards more equity than deposits with increasing credit risk. Copper and Ross (1998) consider only the risks of early asset liquidation and find that banks would increase their liquid asset holding so as to remain solvent even in a bank run. These two papers provide important insights into how the liability and assets sides respectively of the banks balance sheets would respond to the introduction of asset risk. However both consider banks that operate without deposit insurance.

Assets risk does not have to be necessary introduced as an appendage to the liquidity transformation mode of banks. According central focus to the asset side and allowing the possibility of risky loans yields on independent rationale for the existence of bank (Deep and Schaefer, 2004). Diamond (1984) introduces asymmetric information between depositors and borrowers regarding the credit quality of loans made by bank and shows that banks perform useful credit screening and monitoring of loan contracts and thus mitigate incentive problems. When monitoring is costly, the economic value added by the bank stems from more efficient delegated motoring that banks perform avoiding duplicating of effort as well as the temptation of free -riding by depositors (or more broadly, investors).

According to Deep and Schaefer (2004) an important feature of the conception of banking is even as a bank maker risky loans to borrowers, it offers a virtually risk less claim (or the "standard debt contract" as labelled by Townsend, 1979) to its depositors. In the sense, the bank plays the role of a "risk transfer" (rather than pure broker). Since deposit financing is obtained at close to the risk less rate of interest, the reward for this role is the risk premium offered by risky loans.

The process under which commercial banks advance loans many times greater as compared to legal money at the disposal of commercial banks. The liquidity ratio act as a controller for credit creation, banks can only advance credit to a limited level, which is determined by the liquidity ration set by the regulator. In Kenya credit rationing can only be five times their current assets.

Baumol and Blinder (1988), observe that if the required reserve ratio is some fraction R , an injection of 1\$ of excess reserve in to the bank would result to a creation of $1/r$ in new money. Marshall (1974), notes that banks will want to squeeze the maximum possible money supply out of any given amount of cash reserve by keeping their reserve at a minimum when the demand for bank loans is buoyant, profits are high and many investments suddenly start to look profitable. Nevertheless banks are to hold portfolios that are not too risky as to jeopardize their operations in the long run.

Most countries set a minimum liquid asset reserve requirement to strengthen their monetary policy. The depository institutions are therefore required to hold minimum ratios of liquid assets to deposits and this allows the central bank to gain a greater control over the growth of deposits. Therefore most banks may wish to maintain a low level of liquidity in order to create credit. The regulators would also wish to improve solvency and reduce vulnerability of financial institutions to systematic liquidity shocks.

In accordance with the Central Bank (2001), an institution ability to access markets for new funding or unwind specific exposures is a function of their liquidity strategies, market conditions as well as their financial conditions. The liquidity strategy for bank must outline specific policies on key areas of liquid management. Such areas include; composition of assets, this has a direct impact on liquidity, reliance on certain financial instruments, the sources of assets should be well diversified, liquidity and marketability of assets. Limits should be set on levels of various categories of assets depending on their convertibility. This is also highly influenced by their risk taking or risk averse behavior.

2.3.2 Liquid Liabilities Composition

The relationship between deposit insurance and liquidity transformation might be weakened for large banks that are considered "too big to fail" (Boyd and Gertler (1994)) in other words, the beneficial effect of deposit insurance would not promote additional liquidity transformation for banks that already enjoy Implicit protection due to their large size. Liquid liabilities include all demand and deposits of individuals and governments, money market deposit accounts, certified checks, foreign deposits, federal funds purchased, trading liabilities, and acceptances issued (Deep and Schaefer, 2004). Additionally, they considered time deposits as well as other borrowed money, both of maturity one year and less, to be liquid liabilities.

Bhattacharya and Thakor (1993) emphasize, "The dominance of the non-traded deposit contract is predicated on the pay off attributes of the long-lived assets financed by the deposits". Similarly, Calomiris and Kahn (1991) illustrate how demandable debt is necessary for creating the correct incentives for banks to perform the role of credit allocation and monitoring. Thus the economic benefits that flow from the role of banks, irrespective of how they accrue, do not derive solely from banks' assets or liabilities in isolation; they accrue because of the joint structure of bank assets and liabilities (Deep and Schaefer, 2002).

Tobin (1958) introduced the broad contours that determine the choice between liquidity and risk. Holmstrom and Throle (2000) examine the role of liquidity and risk management in the determination of corporate capital structure.

Bryant (1980) and Diamond and Dybvig (1983), these studies were the first to formally show how deposit insurance protects banks from runs and thus facilitates liquidity transformation.

2.3.3 Loan commitments

Loans commitments are contractual promises to make loans at pre-specified terms in the future at the discretion of the borrower. In US between 1990 and 2001, the volume of unused loan commitments rose from \$743 billion to \$1.6 trillion (Ergungor, 2001). Banks receive a fee for this service but these commitments do not appear on their balance sheet.

Explanations for why banks offer loan commitments vary: Kashyap, Rajan and Stein (2002) argue that lack of perfect correlation in liquidity demanded by depositors and firms makes it efficient that these two services to provided by a bank while Kareken (1987) suggests that it is commercial banks access to the discount window that gives them an edge in selling loan commitments. Irrespective of the source of this synergy, banks may be considered "Liquidity providers." Could it be the case that the bulk of liquidity transformation has not vanished from banks, it has simply moved off - balance sheet? According to Deep and Schaefer (2004) a closer inspection is necessary, not just to explain the low liquidity transformation gap, but, even to validate its very definitions as the scaled difference between liquid deposits and liquid assets.

A loan commitment is not a loan - it is a promise to make a loan on demand, subject to certain conditions related to the borrowers credit quality, only when the borrower utilizes a loan commitment, does it become a loan and appears on the balance sheet.

Therefore loan commitments are best delivery mechanisms, for loans. Sometimes, as Kanatas (1987) argues they may also serve as hedging or signaling devices, therefore if loans financed by deposits constitute instruments of continuous liquidity loan commitment by themselves of contingent liquidity provision. Furthermore, compared to total loans, loan commitments still play a relatively small role for most banks.

Examining the liability side of the balance sheet, Kashyap, Rajan and Stein (2002) suggests that banks that make loan commitments would hold more demandable deposits. Thus loans commitments would have a salutary impact on the liquidity. On the asset side, Boot and Thankor (1991) argue that the provision of loan commitments induces banks to take on less credit as they seek to signal a higher likelihood of remaining solvent in the future to honour these commitments. Avery and Berger (1991) find some empirical support for this. Alternatively, signalling models such as Boot Greenbaum and Thankor (1993) and Billet, Fannery and Gerfinkel (1995) argue that "good quality" banks use loan commitments a positive signal, Mosebach (1999) confirms this hypothesis empirically.

2.3.4 Profitability

Wahiu (1999), observed that one of the two most important requirements of liquidity is profitability the second receive in cash more that what it pays out. Profitability and liquidity must however be being care and thoroughness in administration. It is only when a firm is profitable that it will seen in the light of Market growth, market share and progress through product and industry life cycles. Dernburg (1985), observed that in managing their portfolios, the commercial banks have two main aims that may conflict; maintenance of stock of liquid assets in case their cash is under pressure and the wish to earn high rate of return on their assets in order to maximize profits. He noted that high-risk borrowers and long term investments tend to earn banks higher returns. On the contrary, low risk and short-term investors will earn firms low returns. However, such high return assets were also noted to be illiquid. Therefore in the pursuit of profits, banks would wish to hold as small proportion of assets as possible in the liquid form. At the same time, financial prudence would require that banks hold adequate cash and other liquid assets to meet their obligations as they fall due. The banks are therefore faced with a conflict choice between short term and long-term securities. High rate of return is associated with low liquidity. Hence low profitability would be expected to be associated with high liquidity. Consistent with the foregoing argument, Molyneux and Thornton (1992) had also found a weak inverse relationship between profitability and bank liquidity. However, Bourke's (1989) results had indicated a significant positive relationship between profitability and bank liquidity. One possible reason for the conflicting findings may be different elasticity's of demand for loans in the two samples. Guru (1999), in their research concluded that commercial banks should not over commit in loans, since the liquidity variable as proxied by the loans to deposit ratio, was generally found to have a negative impact on bank profitability. Pandey (2005), proposes risk-return trade off of liquidity versus profitability where bank can use conservative policy by investing in lower return and risk investments or an aggressive policy of higher return and risk investments.

2.3.5 Maturity Structure of Long-term Debt Customers Deposits

The face long-term debt can be either be repaid as a lump sum at the end of the loan period or it can be settled in periodic installments. Bond covenants will give different maturity structure depending on the agreement between the borrower and lender.

There are several reasons why maturity structure and sources of debt financing might exert influence on the banks liquidity decision. For example, it is argued that short-term debt is riskier than long-term debt because it crates a liquidity risk (Kiragu 1991). Banks with higher debt of shorter maturity facing liquidity risk would then be expected to hold more liquid assets than those with debt of longer maturity.

One element of risk of borrowing is the risk that the banks cash inflows will not be sufficient to cover the fixed outflows necessary to service the debt. One way in which to attempt to deal with this risk is to follow a hedging policy whereby the maturity of debt is chosen to approximately equal the life of the asset. This assumes that the cash flows generated by the asset will be sufficient to service and retire the debt. Maturity is thus the ratio of the debt that matures in more than one year to total debt and we thus expect a negative correlation between maturity structures of long-term debt to liquid assets holding.

2.3.6 Growth Opportunities

The main purpose of firms is to create wealth for the shareholders. For firms to continuously meet this objective they must identify and seize growth opportunities. A firm can grow organically through expansion of existing products or it might increase its size and revenue streams by acquiring other existing firms, through acquisition or mergers.

Mureithi (2003) predicted that there is a positive relation between liquid holdings assets and growth opportunities of firms. This prediction is based on the view that external financing is more costly for banks with greater growth opportunities and in order to avoid costly external financing, these growth firms accumulate more liquid assets.

Hitt et al (2001) reports that in the 1970's liquid assets e.g. cash was a very popular medium of financing acquisitions. However, in the 1980's the emphasis was placed debt as a primary means of such financing. However, due to the high cost for financing the use of debt dramatically reduced in the 1990's to be replaced by use of stock. However, a mix of debt, cash and stocks was being used in the late 1990, for instance the Swiss drug maker Roche agreed to pay about \$ 1.1 billion to acquire Corange, the parent company of the German company Boehringer Mannheim GmbH, the number two diagnostic company in the world then. This was paid in cash since Roche had a cash balance of 5 Billion Swiss Francs (3.54 Billion US)

Opler et al. (1999) Provides evidence that firms hold liquid assets to ensure that they will be able to keep investing and paying demand deposit when cash flows is too low relative to planned investment and when outside funds are expensive. In addition, since firms with high growth opportunities have a higher appetite for liquid assets then subsequently face more costly external financing to fund the opportunities. They thus exhibit higher agency costs. It can also be argued that firms with greater growth opportunities are expected to incur higher bankruptcy costs. This is because although growth opportunities are capital assets, which add value to a firm, they cannot be collateralized and do not generate income. They are intangible in nature and their value will fall precipitously in financial distress and bankruptcy. Larger expected bankruptcy costs would imply that firms with greater growth opportunities have larger liquid assets holdings to avoid financial distress and bankruptcy.

Myers (1977) finds that firms with risky debt pass some of these valuable investment opportunities. In addition, firms with greater investment opportunities would hold greater amounts of liquid assets in attempts to ensure that they do not give up valuable investment opportunities due to lack of liquidity. To proxy for growth opportunities of firms the past studies use the market-to-book ratio defined as the ratio of book value of total assets minus the book value of equity plus the market value of equity to book value of assets.

Due to unavailability of information, this study will use the year increase in total assets to proxy for growth. Another method to proxy for growth would be to take the year on year increase in turnover. We thus take the position that growth itself is manifested by increase in total assets or sales of the firm. Beltz (1996) finds that total corporate assets or sales can be used interchangeably to account for size of the firm.

2.3.7 Bank Size

In finance the size of the firm is depicted by the value of the assets and the size of its annual revenues. Opler et al. (1999) report that large firms with greater access to the capital markets and those with high credit ratings tend to hold lower liquid assets. They also argue that there could be economies of scale in cash management that are related to firm size.

It is argued that larger firms are more likely to be diversified and thus less likely to experience financial distress. Conversely, smaller firms are more likely to be liquidated when they are in financial distress (Titman and Wessels, 1988). The above argument suggests a negative relationship between size and liquid assets holding of firms. Faulkender (2003) also finds that small, non-rated firms and firms with strong investment opportunities and riskier cash flows hold more liquid assets. Beltz (1996) reports that firm size by itself, whether measured by sales or by total corporate assets, does a remarkably good job of accounting for corporate liquid assets positions. Larger firms hold a lower proportion of their assets in the form of cash. There is evidence of size economies of scale. This relationship is highly stable across years. He also finds that distinguishing between sales and total assets as measures of firm size is difficult since they seem to play very much the same role in accounting for corporate liquid assets holdings. We use the logarithm of total assets for every year to proxy for the size of bank.

2.3.8 Cashflows

Myers and Majluf (1984) argue that in the presence of asymmetric information and signaling problems associated with external funding, firms tend to follow a hierarchy in their financing policies. Thus, firms have a preference for internal over external finance and for debt over equity. Myers and Majluf (1984) is also supported by Ouma (2001)

who finds that limited number of Kenyan firms use long-term debt to finance their cash position. Therefore, such firms with high cash flows are therefore expected to have higher cash for possible use to finance any growth options. In either way, one would expect a positive relation between cash flow and cash holdings.

On the other hand, cash flow might exert a negative impact on liquid assets of banks. Kim et al (1998) argues that cash flow provides a ready source of liquidity for investment and maturing liabilities. Furthermore, the risk of having to pass up valuable investment opportunities and facing financial distress is lower for banks with higher cash flows. Accordingly, such firms can afford to have lower liquidity. We measure cash flows as the ratio of "cash-flows from operations" to total assets. We use "cashflows from operation" as computed in accordance with International Accounting Standards (IAS) Standard Number 8.

2.3.9 Cash flow Variability

Banks are able to predict and forecast the cashflows overtime. Cashflows variability is thus the difference between the actual cashflows and the expected cashflows.

Perhaps the single most important type of risk for the corporate treasurer is due to fluctuations in the operating cash flows. The treasurer needs to ensure that the company has money available when and where it is needed, and yet needs to ensure that the firm's financial resources are not being under-utilized. The greater the firm's cash flow variability the greater the number of states of nature in which the firm will be short of liquid assets. As mentioned earlier, it may be costly to be short of liquid assets if the firm has to pass up valuable investment opportunities. There is evidence that firms with liquidity shortfalls do indeed fail to take up some of valuable growth opportunities. For example, pinkowitz (2001) show that firms with higher cash flow volatility permanently forgo investment rather than reaching to cash flow shortfalls by changing the discretionary investment timing.

Firms with better investment opportunities are expected to hold more liquidity because the opportunity cost of lost investment is larger for these companies. Similarly, firms with more volatile cash flows are expected to hold more liquidity to protect against the higher likelihood of liquidity shortfalls (Dittmar et al, 2001). The measure to use for cash flow variability is: the standard deviation of the first difference in cash flows scaled by the average book value of total assets for 4 years prior to the current year (Mureithi, 2003).

2.3.10 Leverage

The impact of leverage on liquid assets holdings decisions of firms is not clear-cut. On the one hand, to the extent that leverage ratio acts as a proxy for the ability of firms to issue debt one would expect a negative relation between leverage and liquid assets holdings. This is because firms can use borrowing as a substitute for holding high levels of liquid assets like cash and marketable securities. More over, Baskin (1987) argues that the cost of funds used to invest in liquidity increases as the ratio of debt financing increases. This, in turn, implies a reduction in liquid assets holdings with increased debt in capital structure.

However one should note that higher debt levels could increase the likelihood of financial distress. In that case, one would expect a firm with a high debt ratio to increase its cash holdings to decrease the likelihood of a financial distress. This would induce a positive relation between leverage and cash holdings. According to Mureithi (2003), leverage is measured by the ratio of total debt to total assets.

2.3.11 Ownership Structure

Ownership structure can be a proxy for agency problems and thus closely held firms have lesser agency costs as the owners are able to enforce stricter monitoring to the managers (Mureithi, 2003). One way the shareholder may control agency costs it to leave less cash in the firm. However, the effect of concentrated ownership may go either direction. Larger ownership stakes by the largest shareholder may give him more power, which he uses to remove the temptation of free liquid assets from within the firm by lowering liquidity. Faulkender (2003) finds that firm with more shareholders have more cash,

which can be interpreted as less monitoring due to the greater diffusion of ownership leading to leaving more cash in the firm. However, the finding is also consistent with firms that have had greater access to capital in the past having higher observed liquid assets holdings. While ownership, structure is certainly relevant, whether that effect is due to the impact of agency costs or the availability of capital is uncertain.

2.3.12 Agency Theory

Dittmar et al (2002) finds that agency problems are an important determinant of corporate liquidity. For a sample of more than 11000 firms from 45 countries, he finds that corporations in countries where shareholders' rights are not well protected hold up to twice as much cash as corporations in countries with good shareholder protection. In addition, when shareholder protection is poor, a factor that generally drives the need for liquidity, such as investment opportunities and asymmetric information, actually become less important. These results strengthen after controlling for capital market development. In fact, consistent with the importance of agency costs, Mureithi (2003) found that managers actually hold larger liquid assets when it is easier to access capital markets. Evidence indicates that investors in countries with poor shareholder protection cannot force managers to disgorge excessive cash balances (Mureithi, 2003).

We shall not be building this firm-specific factor into our model, as we want to limit the model into more manageable variables.

2.3.13 Other Determinants

The determinants in 2.3.1 to 2.3.10 are the firm-specific factors that will be subject to our analysis. However, we note that the liquidity behavior of banks may also be influenced by other factors beyond the control of the bank. Such factors are general macro economic conditions prevailing in the country.

Macroeconomic aggregates could be an important determinant of bank's liquidity behavior. As such volatility in macroeconomic conditions would affect managers' determination of the appropriate level of liquid asset holdings. Hence, a firm facing higher uncertainty in its cash flows may find it optimal to accumulate liquid assets, in order to offset the adverse effects of negative cash flow shocks.

Given that all managers will face this choice to a greater or lesser degree, we expect that changes in macroeconomic stability will trigger adjustments in banks' liquid assets holdings as managers react to volatile economic conditions. Naturally, this would thus generate variations in the cross-sectional distribution of corporate liquid assets holdings. Baum et al (2003) reports that large firms, durable-goods makers, higher-growth firms and financially constrained firms make larger adjustments in their liquid assets holdings in response to macroeconomic volatility than will smaller or more slowly growing firms, those producing non-durable goods, or those who do not face financial constraints.

We now consider some these factors here.

2.3.13.1 Interest rate

Interest rate will change in order to equate demand for money with its supply. The forces of demand and supply determine the price of bonds and their interest. A fall in the price of bonds means a rise in the rate of interest. Wahi (1999) indicates that an increase in interest rates adversely affects the liquidity of all sectors except the commercial and services sector where a positive correlation was found to exist.

2.3.13.2 Banking regulation

In Kenya, the central bank acts as a regulator of the banking institutions and the non-banking financial institutions. The regulators will normally set minimum liquid asset requirements for financial institutions for reasons such as; monetary policy, taxation, and meeting liabilities expected and unexpected. However for such policies to be effective they must be straightforward.

2.3.13.3 monetary policy

Monetary policies control money supply and interest rates. Hardwick et al (1997) observed that there exists a positive relationship between the growth in money supply and the rate of inflation; this however has an effect on the level of liquidity of commercial banks.

2.3.13.4 Contingency planning

Hempel, Simonson and Coleman (1994), observed that contingency plans to handle a liquidity crisis should be put in place. The strategy should include procedures for making up liquidity shortfalls in emergency situations. Each institution should develop a backing up liquidity strategy for circumstances in which its normal approach to funding operations is disrupted.

2.3.13.5 Taxation

Hyman Hardwick et al (1997), noted that if the government undertakes expansionary fiscal policy like cutting tax, real GNP will grow faster and interest rates will rise, inflation will rise and this has the effect of reducing investments. When investments are low, the level of liquidity tends to rise.

2.3.13.6 Economic cycle

Wahiu (1999) noted that the 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. In his research, he found out that different sectors displayed different sensitivity to the economy. The financial sector displayed least sensitivity meaning that this sector was least affected by the risk of insolvency, which arose from economic downturns. He added that this situation could be due to the heavy regulations, which was imposed in Kenya. The liquidity level will only decrease in quantity but not in percentage. From his study he found out that inflation had an adverse impact on the finance and investment sector while it had positive effects on the liquidity of other sectors. He concluded that there exists a linear relationship between the liquidity of a firm and the economic performance.

2.3.13.7 Balance of payment status

Thai Monetary Policy (2001), observes that the surplus in balance of payment in Thailand which would be triggered by an improvement in tourism, and net capital inflows would lead to higher interest rates than abroad have a positive effect on liquidity. On the contrary, if the balance of payment states is in deficit, the liquidity level will be low.

2.3.13.8 Government expenditure

Hyman (1991) observed that the variables of government expenditure include income support, national defense, transport, community service, agriculture, health, international affairs, education, executive legislative and judicial activities, as well as interest payments. According to Hardwick et al (1997), when the central bank issues new currency, it obtains interest earning government securities in return, and this helps it to finance its expenditure. The people who receive money in terms of wages, pensions and others from the government are customers of the commercial banks and they deposit this money in the commercial banks. Due to this, the commercial banks deposits rise and an expansion of the credit base is raised. The money supply also increases. The effect is that the liquidity level of the commercial banks tends to rise.

2.3.14 Related Studies

Sinkey (1979), Siems, suggest that poor asset allocation decisions and insensitivity to customers and markets contribute to an institution's demise and quantifies management role in bank failures. Stanhouse (1986) states that in Standard Bank portfolio models, the optimal levels of assets holdings are determined for a given level of uncertainty of reserve deficiencies; that is; protecting them against failure to meet their day-to-day obligations. The findings are that, information may be analyzed as a variable input in determining an optimal bank portfolio.

In the Kenya there has been extensive research in the area of banking and finance. Koros (2002) found out that most of the non-bank financial institutions that converted into banks did not register improved performance hence low liquidity anticipated. The evidence obtained from the study indicated insignificant changes in performance and in many of the performance indicators show a declining trend. Kathanje (2000) study on the financial performance before and after liberalization found that the performance of banks improved during the post-liberalization period. Ochung (1999) study established a very strong correlation between the deposit of banks and financial institutions and their individual performance. He concluded that deposits contribute significantly to the profitability hence liquidity and recommended that banks should undertake to attract deposits at the lowest cost.

CHAPTER THREE: RESEARCH METHODOLOGY

3.1 RESEARCH DESIGN

This research is an empirical study based on data recorded at the banks' annual reports and financial statements. There are 40 operational commercial banks in Kenya.

3.2 POPULATION AND SAMPLE OF THE STUDY

The population of interest in this study consisted of the all commercial banks in Kenya as at December 2004. The period of study was between 1995 and 2004. The choice of period of ten years and was taken to be reasonable because average ratios shift overtime, (Altman, 1968).

For the purpose of this study, an institution had to meet the following criteria to be considered relevant for the study.

- i) The bank must have been in operation in September 2005.
- ii) Its annual accounts must have been accessible as the study was based on liquidity measures that are accounting based.

The object of using this criterion was to ensure that any outlier that may arise from new or existing banks is eliminated.

A sample of 30 commercial banks was studied. These are listed in appendix 1.

3.3 DATA COLLECTION

The data for the determinants considered in this study were obtained from the annual reports and financial statements of the banks. The data from the above sources were supplemented with the information collected from the discussion and research papers published by the Central Bank of Kenya.

Data has been collected from the banks for a ten-year period (1995-2004). This period is chosen because it coincides with period of sharp focus on Non-performing loans and more disclose requirements.

3.4 DATA ANALYSIS: INFORMATION

Thus to come up with a valid empirical evidence of the determinants of liquidity of commercial banks, the information was sought and analyzed.

The dependent variable is liquidity.

TABLE 3.1 Summary of Independent Variables and Expected Coefficient Sign

Variables	Abbreviations	Expected correlation	Definition
1. Cash Flows	CFL	Positive	Cashflows is the ratio of pretax profits plus depreciation to total assets. A positive correlation is expected because an increase in cash flows results in an increase in liquidity.
2.Liquid Assets	LAA	Positive	Liquid assets is the ratio of liquid assets to total assets. A positive correlation is expected because an increase in liquid assets results in an increase in bank liquidity.
3.Liquid Liabilities	LLA	Negative	Liquid liabilities is the ratio of liquid liabilities to total assets. A bank with liquid liabilities requires more liquidity to settle demand deposits, periodic interest payments and the par value of debt. This exerts negative pressure in levels of liquidity held.
4. Bank Size	SIZ	Negative	Size is the log of total assets. We expect larger banks to have easier access to the customer deposit/confidence and capital markets compared to smaller banks.
5. Maturity	MAT	Negative	Maturity is the ratio of the customer deposits and debt that matures in more than one year to total assets. The expected correlation is negative meaning that the more long term debt and customers deposits a bank holds, the less liquidity it need to keep.
6. Growth	GAR	Positive	Growth is a year increase in total assets as a ratio of total assets Based on the argument that banks require to keep some precautionary liquidity, the higher the variability on inflows, the more liquidity the banks needs to keep to cater for the periodic outflows.
7. Leverage	LAB	Negative	Leverage is the ratio of total debt to total assets. A bank with debt requires more liquidity to settle periodic interest payments and the par value of debt. This exerts negative pressure in the levels of liquid asset held.
8. Loan Commitments	COM	Negative	Loan commitments is the ratio of unused loan commitments to total assets. A bank with large loan commitment requires more liquidity when loans are used.
9. Profitability	PAR	Positive	Profitability is the ratio of profit before taxation over total assets. A positive correlation is expected because an increase in profit results in an increase in liquidity.
10. Liquidity	LIQ	Not applicable	Liquidity is the ratio of total deposit liabilities to total assets. This is the dependent variable and the variables 1-9 above will be used to explain the variations in the dependent variable.

Source: Research Data

3.5 JUSTIFICATION OF THE DATA ANALYSIS METHOD

A model derived using multiple regressions was used. The independent variables were the nine bank characteristics as shown in table 3.1 above. The liquidity is the dependent variable. Tests of significance were carried out to ensure that observed relationships are significant and not spurious. The reason for adopting this model was that the data

available was annual. In addition for the predictor variables, which are taken the previous three years, average to predict the current year liquidity. The study can therefore safely assume that the movement in the predictor variable over the preceding three years explains the observed liquidity. Averaging over three years also enables to take care of any unusual fluctuations and extreme values.

3.6 MODEL SPECIFICATION

This model is adopted from the study of Deep and Schaefer (2004), where the authors applied the model to measure liquidity transformation gap of commercial banks. Mureithi (2003) called the model, static cash-holding model and used it to identify determinants of corporate cash holding.

This model implies that the actual liquidity of banks revert towards a target. The model thus takes the general form:

$$LIQ_{it} = \beta_0 + \beta_1LAA + \beta_2LAB + \beta_3LLA + \beta_4SIZ + \beta_5CFL + \beta_6PAR + \beta_7GAR + \beta_8MAT + \beta_9COM + \epsilon_{it}$$

Where:

β_0 = Intercept coefficient .

$\beta_1, \beta_2, \dots, \beta_9$ = Coefficient for each variable 1-9, respectively.

$i=1,2,\dots,N$ = Number of banks, in this case 30 commercial banks.

$t=1,2,\dots,T$ = Time periods, in this case one year.

ϵ_{it} = The error term that is assumed to have zero mean and constant variance.

The coefficient for each independent variable (Beta) was determined by method of ordinary least squares.

3.7 EMPIRICAL IMPLEMENTATION

Before carrying out the estimation the error term was tested whether it has a constant variance and normally distributed using Cook-Weisberg test for heteroskedasticity and the Jarque-Bera normality test, respectively. This ensured that the results were robustness. The significance of each independent variable was examined based on the Student's t- statistic and the overall explanatory power of the model was tested using the F-statistic. Finally, post estimation was carried out to ensure that the results and research findings were based on a well-specified model that gives valid and unbiased results.

CHAPTER FOUR: DATA ANALYSIS AND INTERPRETATIONS OF THE FINDINGS AND DISCUSSIONS

4.0 EMPIRICAL RESULTS

4.1 RESPONSE RATE

The study findings are based on the data obtained from financial statements of a sample of 30 commercial banks from a total population of 40 commercial banks in Kenya. This is a more representative sample as it represents 75 percent of the total number of the commercial banks. This was the only data available. However, the main issues and research objectives were conclusively addressed.

4.2 DESCRIPTIVE STATISTICS

The descriptive statistics of the data used are in table 4.1 below:

Table 4.1: Descriptive Statistics of Data used in the Estimation

Variables	No. of Banks	Mean	Std. Dev.	Minimum	Maximum
LAA	30	.5736567	.2001125	.1423	.8727
LAB	30	.3871033	.1554917	.1388	.7013
LLA	30	.7399867	.2105461	.1371	.9169
LIQ	30	.7271133	.1922276	.1371	.8811
SIZ	30	9.836333	.5696308	8.73	11.03
CFL	30	.0039467	.0787521	-.1491	.3031
PAR	30	.0206333	.0205568	-.0441	.0506
GAR	30	.16256	.2164252	-.1651	.8147
MAT	30	.0412742	.1269958	-.000161	.669701
COM	30	.0365733	.0623437	0	.2359

Source: Research Data.

Table 4.1 describes the data used in the study. The first column shows the 10 variables used in the study as explained in the abbreviation list and the second column show total number of banks used in the study. The third and fourth columns give the mean and the standard deviation of those variables, respectively. Finally, the last two columns give the extreme values (that is, the minimum and maximum values) of the variables used in the study.

Table 4.2 below shows correlation matrix of liquidity and each independent variable and the associated Spearman's rho (Spearman rank correlation coefficient) and the p-value (probability value). The null hypothesis tested is that liquidity and each independent variable is independent. If the p-value (Prob. > |t|) is less than 5 percent level of significance then we reject the null hypothesis of independent, otherwise we cannot reject the null hypothesis.

The table indicates that cash flows, profitability, maturity and growth are negatively but insignificantly uncorrelated with the liquidity as shown by the negative sign and the p-value that is greater than 5 percent. Leverage, liquid liabilities and size are significantly positively correlated with liquidity. This is shown by the p-value that is less than 5 percent. Although the other two variables liquid assets and loan commitments are positively correlated with the liquidity, they are statistically insignificant at 5 percent significance level.

Table 4.2: Correlation Matrix, Rank Correlation and Test for Independence

Variables	LIQ	Spearman's rho	Prob. > t
LIQ	1.0000		
LAA	0.4795	0.2316	0.2182
LAB	0.2080	0.3615	0.0497
LLA	0.7893	0.8220	0.0000
SIZ	0.4442	0.4922	0.0057
CFL	-0.1009	-0.0127	0.9470
PAR	-0.1323	-0.2294	0.2227
GAR	-0.0560	0.0309	0.8711
MAT	-0.1518	-0.0453	0.8120
COM	0.0861	0.2462	0.1898

Source: Research Data

The first column shows dependent and the independent variables. The second column shows the correlation coefficient between all the variables and dependent variable, liquidity. The third column shows the Spearman rank correlation coefficient and the last column shows the probability value that indicates the level of significance.

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4.3 DIAGNOSTIC TESTS FOR THE ERROR TERM

4.3.1 Testing Error Term for Normality and Constant Variance

Before the estimation of the regression equation was carried out, error terms were tested whether they satisfy the constant variance and normality assumption of the OLS method using the Cook-Weisberg test for heteroskedasticity and the Jarque-Bera normality test, respectively. The results of the tests as indicated by the p-values, that is, Prob.>chi2, in table 4.3 (a) and 4.3(b) show that at 5% significance level the error term has a constant variance and is normally distributed and therefore can be estimated using OLS method assuming that other assumptions hold.

4.3.2 Test Results for Constant Variance and Normality of the Error Term

Table 4.3(a) Cook-Weisberg Test for Heteroskedasticity

Cook-Weisberg test for heteroskedasticity using variables specified				
Ho: Constant variance				
chi2 (1)	=	6.54		
Prob. > chi2	=	0.1060		

Source: Research Data

From table 4.3(a) above, the Prob. > chi2 = 0.1060, which is greater than 5 percent shows that the null hypothesis of constant variance cannot be rejected and thus heteroskedasticity is not a serious problem.

Table 4.3(b) Skewness/Kurtosis Tests for Normality

Skewness/Kurtosis tests for Normality				
joint				
Variable	Pr (Skewness)	Pr (Kurtosis)	adj chi2 (2)	Prob.>chi2
Resid	0.000	0.005	15.93	0.0003

Source: Research Data

From table 4.3(b) above, the Prob. > chi2 = 0.0003, which is less than 5 percent, shows that the null hypothesis of non normality of the error term is rejected and therefore the error term follows a normal distribution with zero mean and constant variance.

Since the error term has a constant variance and is normally distributed and assuming that other assumptions of the OLS method of estimation are satisfied the next step is to estimate the linear regression model using the OLS method. The next section gives the estimation results of the model.

4.4 ESTIMATION RESULTS

The estimation results of the cross sectional data using the OLS are shown in table 4.4 below:

Table 4.4: Estimation Results

Source	SS	df	MS	Number of obs = 30		
				F(9, 20)	=	13.90
Model	.923920857	9	.102657873	Prob > F	=	0.0000
Residual	.147671197	20	.00738356	R-squared	=	0.8622
				Adj R-squared	=	0.8002
Total	1.07159205	29	.03695145	Root MSE	=	.08593
liq	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]	
LAA	.0601223	.1263291	0.48	0.639	-.2033955	.3236401
LAB	-.1549749	.1307957	-1.18	0.250	-.4278099	.1178602
LLA	1.142316	.2015929	5.67	0.000	.7218006	1.562831
SIZ	-.0402777	.0543498	-0.74	0.467	-.1536493	.0730939
CFL	.284192	.2713042	1.05	0.307	-.2817386	.8501227
PAR	-.8703171	1.018799	-0.85	0.403	-2.995495	1.25486
GAR	-.2462157	.09892	-2.49	0.022	-.4525592	-.0398722
MAT	.8900005	.2468426	3.61	0.002	.3750959	1.404905
COM	-.1107434	.309724	-0.36	0.724	-.7568164	.5353296
CONS	.3276783	.4480265	0.73	0.473	-.6068885	1.262245

Source: Research Data

The estimation results from table 4.4 show that the most significant factors that determine the liquidity of the commercial banks in Kenya are liquid liabilities, growth and maturity.

The regression model for estimation was as follows:

$$LIQ=0.33+0.06LAA-0.15LAB+1.14LLA-0.04SIZ+0.28CFL-0.87PAR-0.24GAR+0.89MAT-0.11COM$$

Definition

LIQ = Liquidity

LAA = Liquid Assets

LAB = Leverage

LLA = Liquid Liabilities

SIZ = Bank size

CFL = Cash Flows

PAR = Profitability

GAR = Growth

MAT = Maturity Structure of long-term debt and customer deposits

COM = Loan commitments

The signs of the coefficients showed mixed results as illustrated below.

4.4.1 Liquid Assets

The hypothesis of a positive coefficient means that an increase in the liquid assets to total assets ratio results in an increase in the bank's liquidity, is consistent with the results. Although the sign is positive, however, it is insignificant at 5% level of significance, as shown by the p-value that is greater than 5%.

4.4.2 Leverage

LAB is the ratio of total debt to total assets and captures leverage. A bank with a high leverage requires more liquidity to settle periodic interest payments and the maturity value of the debt. The results indicate that the higher the leverage the lower the liquidity of the commercial banks. This is consistent with the hypothesized negative relationship between leverage and liquidity of commercial banks, though it is also insignificant.

4.4.3 Liquid Liabilities

The hypothesis was that the relationship between the liquid liabilities to total assets ratio

is negative. This is inconsistent with our findings because the higher the current liabilities the higher the liquid assets, and hence the higher the liquidity required settling these liabilities. This is highly significant.

4.4.4 Size

The study expected larger banks to have less cash requirements than small banks because they have easier access to customer deposits/confidence and capital markets and therefore lower liquidity. The direction of the relationship between size and liquidity is consistent with our expectations although it is insignificant.

4.4.5 Cash Flows

The hypothesized directional relationship between liquidity and cash was positive and is consistent with our findings, because an increase in cash flow leads to an increased in liquidity.

4.4.6 Profitability

A positive relationship was expected between profitability and liquidity. This is because an increase in profitability leads to increased liquidity if the profits are not reinvested in long-term investment projects. However, this is not consistent with the research findings that indicate an insignificant negative relationship.

4.4.7 Growth

The higher the variability in assets the more liquidity the banks need to maintain in their reserves. The relationship between growth and liquidity was expected to be positive. However, the regression results show that it is negative and significant.

4.4.8 Maturity

The expected relationship was positive because the longer the maturity of long-term debt and customer deposits the less the liquidity requirements. However, this hypothesis is inconsistent with our findings of positive and significant relationship between maturity and liquidity.

4.4.9 Loan Commitments

The findings indicate that the relationship between a bank’s loan commitments to a customer is negative. This is consistent with the hypothesized relationship.

The intercept term is positive and insignificant at 5 percent significance level. Overall, the adjusted R-squared of 0.8002 indicate that all the nine independent variables included in the regression model determine 80 percent of the variation in the commercial banks’ liquidity. The other percentage, that is, 20 percent is determined by other factors not included in the model because they could not be captured. These factors may include the regulatory environment such as the Central Bank of Kenya supervision and regulation of the banking industry and macroeconomic conditions in which the commercial banks operate.

4.5 POST ESTIMATION SPECIFICATION TEST

The post estimation specification tests that the linear regression model is not correctly specified, using the link test is decisively rejected at 5 percent as shown by the p-value (Prob. > F = 0.0000). This shows that the estimated model was correctly specified and hence the results are consistent and unbiased. The test results are shown in table 4.5 below:

Table 4.5: Specification Test for the Post Estimation

Source	SS	df	MS	Number of obs = 30		
				F(2, 27)	=	84.52
Model	.92399986	2	.46199993	Prob > F	=	0.0000
Residual	.147592194	27	.005466378	R-squared	=	0.8623
				Adj R-squared	=	0.8521
Total	1.07159205	29	.03695145	Root MSE	=	.07393
liq		Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
hat		1.042098	.3585372	2.91	0.007	.3064405 1.777756
hatsq		-.0369674	.3075106	-0.12	0.905	-.6679271 .5939922
cons		-.0099271	.1006445	-0.10	0.922	-.2164325 .1965783

Source: Research Data

CHAPTER FIVE: SUMMARY, CONCLUSIONS, POLICY IMPLICATIONS, LIMITATIONS OF THE STUDY AND SUGGESTIONS FOR FURTHER RESEARCH

5.1 SUMMARY OF FINDINGS AND CONCLUSIONS

5.1.1 SUMMARY OF FINDINGS

The paper empirically analyzed the determinants of the liquidity of the commercial banks in Kenya using a multiple linear regression model. The motivation was to establish whether the determinants of liquidity are empirically robust. The focus was exclusively on a cross section of 30 commercial banks in Kenya. This was because earlier cross-country studies recommended country specific empirical investigation as an area warranting further research. Employing the linear regression model uncovered an economically meaningful relationship between bank's liquidity and determinants.

The findings from a cross sectional analysis indicate that there is strong evidence that significant factors that determine the liquidity of the commercial banks in Kenya are liquid liabilities, growth and maturity. Liquid liabilities and maturity have a positive impact on liquidity whereas growth has a negative impact. The other factors such as liquid assets and cash flows have a positive but insignificant effect on the liquidity of commercial banks. Similarly, leverage, size, profitability and loan commitments have an insignificant negative effect on banks' liquidity.

The estimated model results indicate that all the variables included in the model significantly determines 80 percent of the variation in liquidity. The findings further indicate that the estimation results are free from any problems of normality and heterogeneity as shown by the normality and heterogeneity test results. The model also fits the data correctly as indicated by the post-estimation results. The implication of these findings is that the Central Bank of Kenya needs to devise legal requirements that give benchmarks of the above ratios to ensure a sustainable liquidity of the commercial banks. This will enhance a stable and predictable banking industry free of bank panics, efficient intermediation process and a sustainable economic development.

5.1.2 CONCLUSIONS

The findings of this study are mixed. This is because some findings are consistent with theoretical expectations and others are not. This can be explained by the repressed nature of the financial sector in Kenya, data limitations, uncompetitive nature of the banking industry, lack of judicious supervisory and regulation of the banking sector and unpredictable macroeconomic environment. However, the study documented the determinants of liquidity of the commercial banks in Kenya.

The conclusions that are drawn from the research findings are three-fold: First, liquid liabilities, growth in assets and long-term liabilities significantly affect the liquidity of commercial banks in Kenya. Second, the other factors like liquid assets, debt ratio, bank size, cash flow, profitability, and loan commitments do not significantly affect bank's liquidity. Finally, a stable and judicious well regulated financial sector and specifically banking industry is required to ensure sustainable financial sector development.

5.2 POLICY IMPLICATIONS

The policy implications arising from this research relate to the question of whether there is need to focus on the ensuring that there is enough liquidity in the commercial banks to ensure an effective and efficiency cash holding and intermediation function of banks. There is need for commercial banks to hold enough cash reserves to facilitate profitability and stability of the financial institutions. Also, the Central Bank of Kenya needs to lower its legal reserve requirement ratio and strict supervisory especially in liquidity of the commercial banks. This will go hand in hand in ensuring that commercial banks remain liquid, accept deposits from savers and lend those deposits to potential investors to ensure a sound and stable banking industry for sustainable economic development.

5.3 LIMITATIONS OF THE STUDY

First, the major limitation of the study was to find for a consistent time series data on the both the dependent and independent variables used in the study. The commercial banks do not have a consistent data on these variables. However, cross sectional data for commercial banks was used.

The second limitation encountered was the usual problems such as unreliability associated with the data in developing countries such as Kenya.

Third, the study used information from financial statements that is prone to manipulation by the management to distort the financial position of banks in order to please the shareholders. It was difficult to capture non-accounting information such as bank regulation, repressed nature of financial sector and macroeconomic stability.

Finally, the study was conducted within the constraints of time and limited resources and the inherent problems associated with these limitations. Despite all these limitations the main issues and the objectives of the study were addressed.

5.4 SUGGESTIONS FOR FURTHER RESEARCH

First, this study provides a starting point for other researchers to venture in determining the determinants of liquidity of commercial banks on a bank-by-bank basis using time series data. This enables researchers to capture the rich dynamics and dynamisms associated with time series analysis.

Second, future researchers need to determine whether there is a one-way or two-way causal linkage between liquidity and its determinants. This will enable the researchers to uncover whether liquidity is determined or a determinant of the independent variables used in the study.

Thirdly, future researchers should also devise methods of capturing the effects of macroeconomic stability, financial repression, and non-accounting information on liquidity of commercial banks in Kenya.

Finally, there is need for researchers to develop bank specific models of liquidity determinants. This will help clarify the liquidity determinants among small, medium and large commercial banks in order to come up with comprehensive liquidity models for effective and efficient monitoring of the banking industry.

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APPENDIX

APPENDIX A: RESEARCH DATA

BANK/VARIABLE	LAA	LAB	LIA	LIQ	SIZ	CFL	PAR	GAR	MAT	COM
Bank of Africa Kenya Limited	0.8727	0.3465	0.8497	0.8185	9.69	-0.0531	0.0282	-0.1201	0.019101	0.1378
Bank of Baroda (K) Ltd	0.4922	0.6489	0.8615	0.8618	9.92	0.0065	0.0329	0.0421	0.030201	0
Bank of India	0.678	0.6781	0.8228	0.8228	9.78	0.0203	0.0203	0.0299	0	0
Barclays bank of kenya Ltd	0.6801	0.3501	0.8792	0.7689	11.03	0.0312	0.0506	0.0988	0.003301	0.1214
CFC Bank Limited	0.4882	0.3809	0.6152	0.3719	10.47	0.0071	0.0295	0.8147	0.193901	0
Charterhouse Bank Limited	0.4002	0.4002	0.8357	0.8357	9.53	0.0752	0.0312	0.3049	0	0
Chase Bank Limited	0.3079	0.3079	0.6831	0.6831	9.32	-0.0441	-0.0441	0.2218	0	0
City finance Bank Ltd	0.1423	0.1423	0.1371	0.1371	8.73	-0.1491	0.0203	-0.1651	0	0
Commercial Bank of Africa Ltd	0.6671	0.6697	0.9028	0.8811	10.31	0.0397	0.0216	0.0981	0.000099	0.2359
Consolidated Bank of Kenya Ltd	0.3032	0.3032	0.7147	0.7147	9.44	-0.0328	-0.0328	0.1273	0	0
C-operative Bank of Kenya Ltd	0.5522	0.2997	0.8781	0.8499	10.67	0.0358	0.0081	0.4342	0.050701	0.0055
Credit Bank Limited	0.7656	0.4522	0.8453	0.8315	9.43	-0.0647	0.0174	0.2568	0	0.0698
Development Bank of Kenya Ltd	0.4094	0.5998	0.3977	0.2766	9.35	0.0761	0.0429	-0.1241	0.161801	0.1514
Diamond Trust Bank of Kenya Ltd	0.7466	0.2921	0.8629	0.8331	10.05	0.0215	0.0215	0.2896	0.008401	0
Dubai Bank Limited	0.8097	0.2641	0.5948	0.5211	8.96	0.0078	0.0336	0.1751	0	0
Equatorial Commerical Bank ltd	0.8521	0.3593	0.8184	0.7983	9.46	-0.1375	0.0361	-0.0231	0.000101	0
Equity Bank Limited	0.6591	0.4893	0.1408	0.7576	9.83	0.0504	0.0325	-0.1301	0.669701	0
Fidelity Commercial Bank Ltd	0.8704	0.2371	0.8322	0.8213	9.19	-0.0067	0.0007	0.2761	0.000371	0.0384
Fina Bank Limited	0.6495	0.4649	0.8673	0.8505	9.77	-0.0404	-0.0086	0.0211	0	0.0381
Guardian Bank Limited	0.6717	0.2672	0.8326	0.7957	9.61	-0.0546	0.0131	0.0113	-0.000161	0
Habib AG Zurich	0.7013	0.7013	0.8565	0.8565	9.65	0.0126	0.0126	0.1072	0	0
Imperial Bank Limited	0.751	0.2711	0.6971	0.8051	9.76	-0.0319	0.0461	0.1815	0.006801	0.1626
Investment and Mortgages Bank Ltd	0.5627	0.3456	0.8671	0.8419	10.17	-0.0331	0.0249	0.2293	0.017571	0.0485
Kenya Commerical Bank Ltd	0.4026	0.3575	0.8735	0.8265	10.84	0.0591	0.0155	0.1506	0.003201	0.0379
K-Rep Bank Ltd	0.1859	0.1859	0.5246	0.5246	9.41	0.0247	0.0247	0.1581	0	0
National Bank of Kenya Ltd	0.282	0.1388	0.9061	0.8318	10.48	-0.0116	0.0243	0.1803	0.008101	0
National Industrial Credit Bank Ltd	0.4967	0.2507	0.7985	0.7724	10.22	0.0245	0.0224	0.5144	0.042701	0
Prime Bank Limited	0.6599	0.4626	0.8802	0.8341	9.76	0.0483	0.0181	0.0913	0.002331	0
Standard Chartered Bank Ltd	0.6134	0.4632	0.9169	0.8446	10.83	-0.0659	0.0401	0.0466	0.001301	0.0499
Transnational Bank Limited	0.536	0.4829	0.5072	0.4447	9.43	0.3031	0.0353	0.5782	0.018701	0

Source: Research data

APPENDIX B: RESULTS

APPENDIX B.1 DESCRIPTIVE STATISTICS RESULTS

Variable	Obs	Mean	Std. Dev.	Min	Max
laa	30	.5736567	.2001125	.1423	.8727
lab	30	.3871033	.1554917	.1388	.7013
lia	30	.7399867	.2105461	.1371	.9169
liq	30	.7271133	.1922276	.1371	.8811
siz	30	9.836333	.5696308	8.73	11.03
cfl	30	.0039467	.0787521	-.1491	.3031
par	30	.0206333	.0205568	-.0441	.0506
gar	30	.16256	.2164252	-.1651	.8147
mat	30	.0412742	.1269958	-.000161	.669701
com	30	.0365733	.0623437	0	.2359

APPENDIX B.2 CORRELATION TEST RESULTS

VARIABLES	lig	Spearman's rho	Prob > t
lig	1.0000		
laa	0.4795	0.2316	0.2182
lab	0.2080	0.3615	0.0497
lia	0.7893	0.8220	0.0000
siz	0.4442	0.4922	0.0057
cfl	-0.1009	-0.0127	0.9470
par	-0.1323	-0.2294	0.2227
gar	-0.0560	0.0309	0.8711
mat	-0.1518	-0.0453	0.8120
com	0.0861	0.2462	0.1898

APPENDIX B.3 DIAGNOSTIC TEST

(a) Normality Test Results

Skewness/Kurtosis tests for Normality				
joint				
Variable	Pr(Skewness)	Pr(Kurtosis)	adj chi2(2)	Prob>chi2
resid	0.000	0.005	15.93	0.0003

(a) Heteroskedasticity Test Results

Cook-Weisberg test for heteroskedasticity using variables specified		
Ho: Constant variance		
chi2(1)	=	6.54
Prob > chi2	=	0.1060

APPENDIX B.4 REGRESSION RESULTS

Source	SS	df	MS	Number of obs = 30	
				F(9, 20)	= 13.90
Model	.923920857	9	.102657873	Prob > F	= 0.0000
Residual	.147671197	20	.00738356	R-squared	= 0.8622
				Adj R-squared	= 0.8002
Total	1.07159205	29	.03695145	Root MSE	= .08593
lig	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
laa	.0601223	.1263291	0.48	0.639	-.2033955 .3236401
lab	-.1549749	.1307957	-1.18	0.250	-.4278099 .1178602
lia	1.142316	.2015929	5.67	0.000	.7218006 1.562831
siz	-.0402777	.0543498	-0.74	0.467	-.1536493 .0730939
cfl	.284192	.2713042	1.05	0.307	-.2817386 .8501227
par	-.8703171	1.018799	-0.85	0.403	-2.995495 1.25486
gar	-.2462157	.09892	-2.49	0.022	-.4525592 -.0398722
mat	.8900005	.2468426	3.61	0.002	.3750959 1.404905
com	-.1107434	.309724	-0.36	0.724	-.7568164 .5353296
cons	.3276783	.4480265	0.73	0.473	-.6068885 1.262245

APPENDIX B.5 POST ESTIMATION TEST RESULTS

Source	SS	df	MS	Number of obs = 30	
				F(2, 27)	= 84.52
Model	.92399986	2	.46199993	Prob > F	= 0.0000
Residual	.147592194	27	.005466378	R-squared	= 0.8623
				Adj R-squared	= 0.8521
Total	1.07159205	29	.03695145	Root MSE	= .07393
lig	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
hat	1.042098	.3585372	2.91	0.007	.3064405 1.777756
hatsq	-.0369674	.3075106	-0.12	0.905	-.6679271 .5939922
cons	-.0099271	.1006445	-0.10	0.922	-.2164325 .1965783