

EFFECT OF ASSET LIABILITY MANAGEMENT ON LIQUIDITY RISK OF MICRO-FINANCE BANKS IN KENYA

A SURVEY OF BANKS IN NAIROBI COUNTY

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Abstract

Asset Liability Management is an important determinant of financial distress. The main objective of the study was to investigate the course of asset liability management on the liquidity risk of micro-finance banks in Kenya. The specific objectives of the study was to; examine the effect of liquidity stress testing on liquidity risk of Micro-finance banks in Kenya; To determine the effect of loan to deposit ratio on liquidity risk of Micro-finance banks in Kenya; To determine the effect of return on assets on liquidity risk of Microfinance banks in Kenya; and to determine the effect of return on equity on liquidity risk of Microfinance banks in Kenya. The study was grounded on Redington's Theory of Immunization, Liquidity Preference theory, The Commercial Loan Theory, and The Liability Management Theory. The study adopted a descriptive research survey. The study was carried out in Micro finance banks headquarters in Nairobi County. The research adopted census; therefore all the twelve registered Micro-finance banks by Central Bank of Kenya were included in the study. Primary data was collected using questionnaire. The validity of the research instrument was determined through a pilot study while the reliability was determined through Cronbach alpha. The secondary data were obtained from annual Central

bank of Kenya, Banks supervision reports as well as microfinance banks annual and published financial reports. Multiple linear regressions were applied using SPSS 21. Further, the test for significance was t-test and calculating the correlation coefficient of determination and analysis of variance. The findings were significant to the micro finance banks for effective asset liabilities management and policy formulation. The results of the regression analysis indicates that there is a great positive correlation between liquidity risk and liquidity stress testing, and a significant negative relationship between loan to deposit ratio, Return on Asset and Return on Equity. The findings of the analysis conclude that the independent variables have an effect on the dependent variable (Liquidity risk). The research gives the following recommendations. Micro-finance banks need to emphasize on creating an integrated view of risks facing the banks, the managers should implement robust and comprehensive balance sheet management approaches and have proper liquidity management approaches.

Keywords: Micro-finance, Liquidity, Assets, Liability, Management

INTRODUCTION

Over the past years, micro-finance banks have remained and will continue to be important banks for any economy as they play the most important role in the payments system. In most developing countries, micro-finance banks are the most important financial institutions, among the poor and middle class (Muchangi, 2012). Asset liability management is one of the approaches utilized by microfinance institutions to influence the value of assets and liability in the microfinance sector. Asset Liability Management on liquidity risk is a concept that many investors fail to take into account or comprehend and as a result of their financial arrangements fail to come through in such crucial terms times as retirement or college funding for a dependent Njeri, (2013). Brom (2009) defines Asset Liability management (ALM) as the practice of managing a business so that informed decisions and actions taken with respects to assets and liabilities are harmonized in order to ensure proper use of company's resources to increase its profitability.

Over the recent years, even large financial institutions were in a deep liquidity trap and in dire need of external mediation for survival Sharara, (2014). However, the practical importance of Asset Liquidity Management and Liquidity risk had been somewhat underestimated (Thuku, 2013). Even managements of large institutions, regulators, and observers saw how well-considered firms and credible institutions closed shop and were not able to find a way out of the deep liquidity trap. This has resulted in regulators appending high relevance to new ways

needed to ensure a proper liquidity management system. As a result, regulators have enhanced and in some physical locations, thoroughly revamped, regulatory oversight on ALM and liquidity management (Sharara, 2014).

According to Rosen and Zenios, (2006), Asset Liability Management (ALM) plays an important role in incorporating together the different business lines in financial institutions (Rosen and Zenios, 2006). Managing liquidity and the statement of financial are important to the existence of a financial institution and sustenance of its undertakings. It is also fundamental for seamless growth of the statement of the financial position in a profitable way. Fabozzi and Konishi (1995) like commercial banks, microfinance institutions administer services which leave them exposed to several risks like credit risk, interest risk, and liquidity risk just but a few. Asset liability management is a way that provides institutions with backing that makes such aforementioned risks acceptable. Asset liability management models advocates for institutions to manage risks as well as to provide suitable strategies for their management Muranaga and Ohsawa, (2002).

Asset Liability Management Components

There are a number of analytical elements used in the practice of asset-liability control. The main elements used in the managing of asset-liability management are; asset-liability-management policy; financial reporting, including spread analysis, ratio analysis, cash-flow analysis, and asset liability combination analysis; predictions or forecasting; budgeting; gap analysis; duration analysis; what-if analysis ; rate shock scenarios; net economic value (NEV)analysis. Ratio scrutiny enables management to control and detect trends in every aspects of credit union operations. Important ratios should be reviewed frequently and actions taken when reverse trends emerge. "Stop-loss "method should be determine, either in the asset-liability-management approach or the credit union business arrangement, that define levels of important ratios that acted as a trigger for management and the board to review associated policies and credit union activities. Plans and estimates should include an analysis of associated ratios, and budgeted ratios to actual results that were measured on an ongoing basis

Micro-Finance banks in Kenya

The Microfinance law started working with effect from May 2nd 2008. The major purpose of the Micro-finance deed was to manage the introduction and undertakings of microfinance banks in Kenya through controlling and management of their operations. CBK (2015), the Microfinance Move, 2006 and the Microfinance (Deposit Taking Institutions) laws 2008 issued sets out the authorized, regulatory and supervisory boundaries for the microfinance industry in Kenya.

According to CBK (2015) There are twelve registered Micro-Finance banks in Kenya (deposit taking), while there was no data on none deposit taking intuitions. The deed enables deposit taking microfinance institutions approved by the Central Bank of Kenya (CBK) to collect savings from the conventional public, thus enhancing contention, productivity and access. Through an act of Parliament, Microfinance Act (2006) was amended by removing the term institution and replacing it with bank legalized under this deed; microfinance bank means a financial institution which is legalized to carry on microfinance banks pursuit, the pursuits includes all categories, offices, outlets and marketing units, and any other place of business operations that might be licensed by the Central Bank of Kenya AMFI (2014). Gikonya,(2011) States, asset liability management is an expectation by Central Banks of Kenya in order to ensure complete follow up to the set risk management Rules. These rules ensures the micro-finance banks just like banks, maintain an optimal level of assets and liability to efficiently meet their financial needs and mitigate various risks that could impact negatively on their financial performance

International studies

Bonfim & Kim, (2011) in a research on European and United States of America microfinance banks in the 2002-2009 period illustrated how banks manage liquidity risk. The study identified the determinants of liquidity risk and found that the type of relationship between liquidity risk and dimension, performance and the ratio between loans and deposits relies on the type of liquidity risk measure used. Microfinance institution size generally has a positive impact on institution's liquidity, while the performance measure has no certain relationship with liquidity risk. In Australia, studies conducted using panel data in a span of one decade found that there was a positive relationship between asset and liability management and profitability Stierwald, (2010). Conventionally, Microfinance banks have focused on the asset side of the balance sheet that is the client loan portfolio. This is because the center business for most new MFIs is lending, and hence, it is important that they establish the appropriate products, reports, operations, as well as procedures to support their credit activity and ensure high levels of repayment.

In USA for instance, Harvey (2013) on his study on the relationship between asset liability management and the financial administration of commercial banks on service firms using panel data for 3 years, he concluded that there was a positive relationship between asset liability management and financial performance of service firms. In Sweden, Di-Maggio (2013) conducting the same study as Stierwald, (2013) and Harvey, (2013) on the impact of asset liability management and financial performance of firms found that there was a positive correlation between asset liability controlling and financial performance of Swedish micro firms.

In Scotland, Rogers (2005) investigated the impact of asset and liability management on financial performance of commercial banks. Using a sample size of 100 commercial banks, through an explorative survey testing the relationship between the variables, the study established a positive correlation between the financial performance and asset liability management of commercial banks.

In Bangladesh, households' access to microfinance reduces the borrowing incidence from informal sources, but not the amount of borrowing. Never the less, less-poor households benefit more as a result of reducing their reliance on informal borrowing and these benefits amass over time. Furthermore, it was found out that, having access to microfinance increases women's informal borrowing for narrow consumption usage, without facilitating access to new business opportunities (Islam et al. 2015).

Regional studies

In Zimbabwe, on a study modeling the effects of asset liability management on the liquidity risk of commercial banks in Zimbabwe by Sharara, (2014). Despite the advantages of the new administration, vulnerabilities still exist in the financial sector with most banks and microfinance institutions still liquidity constrained. Financial institutions especially micro financial institutions ought to administer their liquidity risk judiciously through liquid assets on the statement of financial position and reserves at Reserve Bank of Zimbabwe. Liquidity risk results from size and maturity mismatches of assets and liabilities (Bessis, 2002). Liquidity deficits make finance institutions vulnerable to market liquidity risk. Market liquidity is the capability to reconstruct financial assets into cash at current market prices and the statement of the financial liquidity focuses on institution's cash holdings (Marshal, 2010).

A research carried out by the International Monetary Fund (IMF) (2010) in Zimbabwe, indicated that banks (avoided microfinance institutions) profitability had improved following more friendly economic environments during the new regime. However, despite the benediction of the many currency regimes, financial institution were subjected to liquidity risk. For instance, two liquidity ratios are the liquidity ratio and their loan to deposit ratio. The higher the liquidity ratio, the lesser the loan to deposit ratio and vice versa. In March 2009, the liquidity ratio for commercial banks was reported at 88.1%. The ratio of loan to depositors' was low at 29.2%. Progressively, banks liquidity ratio declined and as a result, led to increase in the ratio of loan to depositors'. In June 2011, the liquidity ratio was reported at 34.6% and the ratio of loan to deposit was at 70%. The low liquidity ratios and the high loan to deposit ratio respectively signaled illiquidity of some banks. Never the less, the problems of liquidity risk by some commercial banks can be drawn from the distributions of the accomplished liquidity ratio.

Local studies

In Kenya, limited studies have focused on asset liability management on liquidity risk. However, most studies have major focused on commercial banks. For instance a study carried out in Kenya on factors influencing liquidity level of commercial banks in Kisumu City by Kamau (2013). The study found that internal factors such as emergency planning and productivity in terms of generating profits are significant in influencing liquidity levels of commercial banks that are in Kisumu city. The researcher suggested that the findings of the study forms foundation for future research extending frontiers of liquidity level in financial markets.

This study therefore, focuses on asset liability management and liquidity risk in micro financial institutions. Microfinance institutions provide access to high-quality and affordable financial services to low-income people with an aim of building assets, stabilizing consumption and safeguarding against risks and uncertainty (Duvendack et al. 2011).

The origin of the concept of asset liability management came from Asia particularly in India in 1999, but started been practiced in Africa gradually from 2000. Micro-finance institutions avail funds to its customers, however, micro-finance institutions have to be well-built in liquidity position (Litter et al, 2004). According to this study, microfinance is a field of development that provides an institutional frame for channeling finances to the low-level income customers to stimulate economic activities. Since their introduction in Kenya, microfinance banks have proved the possibility of providing dependable financial services to poor population (Cull, et al. 2008). Regardless of the probable achievement and popularity, there has been mixed evidence on the effect of asset liability management on liquidity risk in microfinance banks and much is not well documented (Duvendack et al. 2011). The stability of micro-finance banks like other commercial banks as a whole in the economy solely depend on proper asset liability management structures. According to this study, asset liability management is the ability of the banks to retain capital, and absorb loan losses. Asset-liability management is the way by which a micro-finance banks manages its statement of financial position so that to allow for alternative liquidity, interest rate and credit risk scenarios. For a microfinance bank to achieve the same goals then, it has to guarantee proper asset liability management such as liquidity risk management, interest rate risk management and credit risk management (Francis, 2007). Better asset liability management has the tendency to absorb risks and shocks that microfinance institutions can face. Moreover, asset liability management is the prerequisite condition for the effectiveness and expansion of micro-finance banks. Most microfinance banks are transforming into regulated banks with a way to attract private equity and offer deposit products and services. On the same note, Asset and Liability Management (ALM) is a very important element in the successful management of any financial institution particularly for Microfinance Institutions that mobilize

deposits because they are responsible for protecting their depositors. The main objective of ALM is not to remove risk, but to manage it in a way that the instability of net interest profits is lessens in the short-run and financial value of the micro-finance is protected in the long run (Choundhry, 2011).

From available literature, Basel (2011) indicates that there are different methods that can be used to measure financial institutions asset liquidity such as bid-offer spread, market depth, immediacy and resilience. For instance, the Basel III Accord defines the minimum short-term and long-term resilience that were supposed to be fully adopted by commercial and micro-financial institutions by January 2015 and January 2018, respectively. On this note, microfinance banks may experience liquidity excess or liquidity shortage (Lamoo and Casey, 2005).

Sharara (2014) argues that assets that are liquid today are not necessarily going to be so as at the day the financial institution administration expects them to be liquid. Conversely, liquid shortage is a threat to institutions. Liquidity risk arises when an unexpected deposit withdrawal or a loan demand occurs. Microfinance institutions like banks cannot make enough money without taking on risk. Risk-taking, may lead to microfinance failure, thus, these institutions' business activities becomes more and more portfolio information driven. This study aims to examine the effect of asset liability management on liquidity risk on microfinance banks in Kenya to add to the body of knowledge and fills this gap.

Statement of the Problem

Despite the efforts made by microfinance bank to increase outreach in financial services in Kenya, there was still a lot of unmet demand for such services. With the growth of microfinance as a tool for enhancing the poor populations' to access financial services, it has brought to the attention of policy makers, donors and private investors to devise ways in which they can meet the needs of the customers. On these grounds, this has demanded the generation of clear evidence on the outcomes of microfinance banks particularly, on the effect of Asset Liability Management on liquidity risk, which are currently ambiguous, and under-researched (de Aghion & Morduch, 2010). As Thuku (2014) asserts, most of the financial institutions operations run through deposits. She finds that if the depositors begin withdrawing their deposits from the finance institutions, it created a liquidity trap for the finance institution. The finance institutions were forced to borrow funds either from the inter-bank market or the central bank or the at higher costs (Plochan, 2007).

Studies conducted globally and locally in relation to Asset Liability Management by researchers like (Tianwei & Paul, 2006; Oludhe, 2011; Ravi & Sharma 2012) have shown that liquidity risk management significantly leads to effective financial liquidity of microfinance banks. However, according to Maaka (2013) profitability of the most microfinance institution in Kenya is negatively affected due to increase in the liquidity gap. From the literature available there seem to be limited information on the effect of asset liability management on liquidity risk particularly on micro-finance banks in Kenya. However, available researches in Kenya by scholars such as (Kamau, 2013; Njeri, 2013 Gichua, 2014; and Thuku, 2014) have focused on commercial banks, with little focus on microfinance banks. On this note, researchers like Gareth (2008) recommend more research on asset liability management on liquidity risk of micro finance banks.. From these studies, it is evident that attempts to examine the effect of asset liability management on the liquidity risk of micro-finance banks by various scholars have been fruitless. This therefore, confirms the need for further research on effect of asset liability management on liquidity risk of MFI'S in Kenya.

Objectives of the Study

Main Objective

To determine the influence of asset liability management on the liquidity risk of micro-finance banks in Kenya.

Specific Objectives

- i. To determine the effect of liquidity stress testing on liquidity risk of microfinance banks in Kenya.
- ii. To determine the effect of loan to deposit ratio on liquidity risk of microfinance banks in Kenya.
- iii. To determine the effect of Return on Assets on liquidity risk of microfinance banks in Kenya.
- iv. To determine the effect of return on equity on liquidity risk of microfinance banks in Kenya.

Research Questions

- i. What was the effect of liquidity stress testing on liquidity risk of micro-finance banks in Kenya?
- ii. What was the effect of loan to deposit ratio's on liquidity risk of microfinance institution in Kenya?
- iii. What was the effect of Return on asset on liquidity risk of microfinance banks in Kenya?
- iv. What was the effect of return on equity on liquidity risk of microfinance banks in Kenya?

Hypothesis

Ho₁: Liquidity Stress testing does not have a statistical significant effect on liquidity risk of microfinance banks in Kenya.

Ho₂: Loan to deposit ratio does not have a statistical significant effect on liquidity risk of microfinance banks in Kenya.

Ho₃: Return on asset does not have a statistical significant effect on liquidity risk of microfinance banks in Kenya

Ho₄: Return on Equity does not have a statistical significant effect on liquidity risk of micro finance banks in Kenya.

Significance of the Study

The intention of carrying out this study was three pronged. First, this research study was significant because it deals with an issue Kenya microfinance banks are facing and continue facing in the future. In the present case, ALM is important for the microfinance industry due to deregulation of interest rate regime. It guides in assessing the risks and controlling the risks by taking relevant actions. Therefore, to understand the Asset liability management method and various ways that are important for the microfinance to manage the liquidity risk, this study was paramount.

Secondly, it was seen from the point of an attempt to fill an intellectual gap. As noted earlier, microfinance banks have emerged as tools for development among poor population in the world. However, weakness in Kenya micro-finance system is becoming apparent and was manifested in the relative controlled and fragmented financial system in the country. This was attributed to differences in regulations governing microfinance institutions, lack of autonomy and weak supervisory methods being undertaken by the central banks surveillance in enforcing micro-financing regulations. Liquidity risk in financial institutions was deeply related to the payment and settlement system and the structure of financial markets. Most studies on microfinance banks have dwelled on various issues affecting microfinance institutions and their customers consciously or unconsciously the effect of asset liability management on the liquidity risk of micro-finance institution, thus the need for this study.

Thirdly, the study was hypothetically vital for policy level intervention since the employed interventions and strategies have failed and blamed on inadequate information that can help to offer practical solutions to the underlying problem. Therefore, the study provides information through its recommendations that will lead to implementation of appropriate strategies and interventions and upholding critical components of microfinance activities to promote these

institutions in the country. The findings of this study should therefore, will be important in advancing guidelines and strategies of improving the microfinance sector.

Scope of the Study

The study was carried out in Nairobi county Kenya, since majority of this banks are located within Nairobi town (CBK 2015). The researcher focused on liquidity stress testing, loan to deposit ratio, Return on asset and return on equity. To investigate the influence of asset liability management on the liquidity risk of micro-finance banks. The researcher focused on all the microfinance banks since they are few and there was no justification for taking a sample. Currently there are twelve licensed micro financial institutions in the Kenya CBK (2015). It was paradoxical as most Kenyans experience financial inadequacy for investments. In this study, any relevant materials outside this framework which was used in this study did not form part of the conclusions and recommendations of this study making them irrelevant for decision making on the study findings.

Limitations of the Study

The researcher encountered challenges in regards to lack of co-operation from some members in the field (managers); some held vital information due to lack of incentives provided and some felt that the researcher was intruding on their privacy. The research was limited to only the 12 registered microfinance banks in Kenya and the results were applied on all other sectors of the economy, the study would have involved a wider area of the research, or in other areas of the economy,. Finally the study was limited to four variables that was liquidity stress testing, loan to deposit ratio, return on asset and return on equity. While there are so many other variables affecting asset liability management that was left out, for example size of the firm, capital adequacy ratios among others.

Delimitation of the Study

The researcher explained the purpose of the study and allowed the respondents to actively participate in making voluntary decision to join the study.

Operational Definition of Terms

Asset Liquidity Management: Is the way for planning, organizing, and controlling asset and liability capacity, maturities, charge, and succumb so as to reduce risks related to interest and maintain an acceptable profitability level in a microfinance institution.

Liquidity Risk Management: This refers to the managing of assets and liabilities to ensure enough liquidity.

Liquidity Management: How its defined here is not the same as cash flow management. It is the process of ensuring that the institution maintains enough cash and easily convertible assets.

Liquidity Risk: Is mainly important financial hazard for a financial institution. It occurs whenever the micro finance bank is not able to meet its obligations when they fall due

Liquidity stress testing: It's a test run by the central bank and individual banks to determine potential risk sources that they may encounter in scenarios of sever change in the macroeconomic locale and assessing their resilience.

Loan to deposit ration : Is majorly used statistic for assessing banks' ability to meet its obligations by dividing the banks total loans by its total deposits. Its expressed as a percentage. A higher ratio shows a higher liquidity risk and vice versa

Return on asset: it shows what earnings were generated from invested capital; it's calculated as a percentage. The higher the percentage shows higher generated profits thus liquidity of the micro finance bank.

Return on equity: It measures micro finance profitability by revealing how much profit a company generates with the money shareholders have invested. Its expressed as a percentage The higher the profit the higher the liquidity and vice versa.

LITERATURE REVIEW

Theoretical Review

This section contains the theories that anchor the study variable that is asset liability management and liquidity risk of microfinance institutions. The theories guiding this research are discussed below.

Redington's Theory of Immunization

This theory is an example of an Asset Liability Management model and is a practical model to date. The theory argues that the concept of comparing the mean-term of assets with the mean-term of liabilities has been used for many years by a number of insurance and microfinance institutions globally. In this theory, immunization is the process of making investments to protect existing enterprises from a change in the interest rates. The theory concluded that the outcome of investment can be unconditional under certain circumstances, with the primary condition being that the period of the payments going out of the business institution be the same as the length of the cash being received by that business institution. The theory asserts that if this criterion can be met, the assets and liabilities would then similarly be influenced by changes in

market rates of interest. Macaulay (1938) introduced the concept of duration and still remains a critical instrument for Asset Liability Management. Notwithstanding, its extensive utilization immunization has some weaknesses. For example, Cain and Treussard (2007) asserts that immunization is the process of establishing a position such that the value of the position is not sensitive to small changes in some specified areas and this usually enables strategic thinkers or managers to meet their target profit. Immunization describes a liability and supporting portfolio such that the net or increase market value of the situation is immune to diminutive changes in interest rates.

Liquidity Preference Theory

The theory of liquidity preference is one of the most contentious theories in understanding asset liability management and liquidity risk in a microfinance institution. Keynes a proponent of this theory presents liquidity preference theory as a liquidity theory of interest. This theory is supposed to fill the vacuity missing by what Keynes viewed as incoherent established savings theory of interest. The novelty of his contribution was widely seen in the analytical consideration for the demand of money only. Keynes's revolutionary claim regarding the flawed classical theory of interest that needed replacement appeared to be negatively criticized when (Hicks, 1939) proclaimed that liquidity preference and classical theories were comparable.

Liquidity Preference Theory asserts that ad interim bonds are more favored than long term bonds for two reasons. Entrepreneurs usually have a preference on short-term bonds to long-term bond for the reason that such bonds are more liquid. Altogether, borrowers react in precisely contrary behavior. Generally, borrowers have a preference of long-term financial liability because short-term financial liability renders them to the risk of having to repay it under undesirable circumstances. Consequently, borrowers are enthusiastic to pay higher rate, other things held stable for long-term progression than short-term ones. Taking together these two sets of preferences implies that under standard situations, a constructive maturity risk quality is present, which increases with maturity. For this reason, the yield curve should be upward sloping.

As a theory of balance sheet determination, it allows us not only to portray microfinance institutions' choice dilemmas in an accurate manner but also to recognize the environment of the changes that are taking place in this institution. Its basis was that every asset offers a mix of expected monetary returns and a liquidity premium in opposition to the conventional manner where an asset gives merely financial proceeds and the other gives only liquidity. On the other hand, each blend of liabilities means a dissimilar permutation of expenses of service debts and of risks of being unable to upturn them if needed. Liquidity preference theory helps us figure

which proportion of assets and liabilities are suitable to each individual agent, be it a person or a financial institution.

Therefore, liquidity preferences were shown in the compilation of possessions a business agent chooses, the value of market and his/her compilation of liabilities. Consequently, microfinance's judgment dilemma is how to share out the resources they create offer specific combinations of probable financial proceeds and liquidity premier, instead of just choosing between reserves and loans. Microfinance's liquidity preferences describe their balance sheet strategies, but not their claim for finance. On the other hand, microfinance institutions with liquidity preferences will not accommodate indifferently the demand for credit but will compare expected returns and liquidity premier of all purchasable assets (Kregel, 1997).

The Commercial Loan Theory

Historically, liquidity management was based on possessions and was strictly attached to credit policies. According to Emmanuel, (1997), microfinance is the provision of financial services to low-income earners and self-employed people (Otero, 1999). The monetary services are for example savings and credit, but however, can also include services such as insurance and payment services. Microfinance institutions recognize the advantage of making claims on authentic resources in order to determine the liquidity-earnings tribulations. A loan was considered self-liquidating if it was secured by finished goods in batch to their final target for resale. The loan could be recovered after the goods are sold. Loans of this type could ensure the microfinance institution continuous liquidity and earn profits.

One of the critics of this theory is that it suffers from the fallacy of composition. Such a system can keep one a finance institution liquid, but if all alternative finance institutions follow this procedure, then the overall liquidity needs will not be achieved during times of financial difficulties. Thus, a loan facility secured by goods cannot be repaid if the goods can't be sold off, or if the customer takes credit to acquire the goods. The micro finance institution theory is no more liquid or less liquid than it was before the business. In the truancy of central bank as lender of last resort and that stands ready to issue required liquidity to the system in general, the real bills doctrine is incomplete. Although commercial loans continue to be critical components of banks asset combination, development of other beneficiary of their funds has caused the contriving methods of modern banks to change considerably (Bank Theories, 2009).

The Liability Management Theory

In 1960s, the loan portfolios of financial institutions have been affected by the emergence of liability-management theory. This is an important liquidity management theory which argues that

there is no need to pursue precedent liquidity customs such as maintaining liquid assets and liquid investments. Lately, finance institutions have put more emphasis on liabilities side of the statement of financial position.. According to this theory, finance institutions can satisfy liquidity needs by borrowing in the funds.

Oracle White Paper (2011) states that the core functions of Asset liability management consists of administration of prime gaps while managing the risk of interest rates inside the general command approved by Asset Liability Committee. The gaps information usually tips to endowment gaps and excess funds at different points in time. According to Oracle White Paper, (2011), the challenge with the Asset Liability management function is that the gaps are animatedly sprouting and need continuous monitoring since the balance sheet keep on changing on daily basis.

Review of Empirical Studies

The Emergence of Microfinance Institutions

The concept of microfinance has been in existence for decades. For instance, in Indonesia, the Indonesian People's Credit Banks (BPR) opened in 1895. It became the largest microfinance system in Indonesia with close to 9,000 units. In the start of 1900, various alterations of these models began to appear in parts of South America. The aim of rural finance interventions is premised on modernizing the agricultural sector; they usually had specific issues such as improved business of the rural sector, by mobilizing inactive savings and increasing venture through credit and reducing repressive feudal dealings that were enforced through indebtedness. At the start of the 1970s government financial institutions took the task of serving the poor, usually with a focus on farmers. However, most state-run finance institutions such as banks were driven by political imperatives, and charged rates of interest that were well below those in the market and even then unruffled loan repayments only halfheartedly (Conning and Udry, 2007).

It was not until the mid-1990s that the concept micro-credit began to be replaced by the term microfinance, which not only included credit, but also financial savings and other financial services. Microfinance concept emerged as a term referred to a range of financial services to the poor, which also included insurance and money transfers (Cull et al. 2008). In early 1990s there was growing gusto for supporting microfinance as a strategy for poverty alleviation. The microfinance sector flourished in many countries, resulting to numerous financial services institutions serving the needs of micro-entrepreneurs.

In east Africa, micro-finance providers such as commercial banks, micro-deposit taking institutions, usually serve urban areas and favor financing commercial activities. However in the

recent past, microfinance institutions are reach out to everyone who needs to invest in business (ITC, 2011). Due to high demand of services of microfinance institutions, these institutions have to think about the effect of asset liability on liquidity risk. As Biety (2003) argues, when a formerly credit-only microfinance institution starts raising unintended savings and using them to finance the loan portfolio, the liquidity and asset-liability management of the institution becomes highly intricate. Liquidity and asset liability management in savings banks need a coordinated and planned approach.

Liquidity and Asset-liability Management strategies

Assets and Liabilities Management (ALM) is a changing process of planning, organizing, monitoring and controlling the assets and liabilities – their mixes, volumes, maturities, yields and costs in order to achieve a specified Net Interest Income (NII) The NII is the difference between interest income and interest expenses and the basic source of banks profitability. The easing of controls on interest rates has led to higher interest rate volatility in India. Charumathi,(2008).

The objective of ALM is to maintain a match in terms of rate sensitive assets with their funding sources in order to reduce rate of interest risk at the same time exploiting productivity. Interest rate risk refers to the risk that changes in the current market interest rates will be detrimental on the institution's financial liquidity risk. Financial liquidity risk will be impaired because the institution cannot adjust its income earned on loans growingly as the cost of these loans increases. The interest rate risk to some degree was unavoidable, but it was manageable manageable (Biety, 2003; Choundhry, 2011). ALM involves the management of the total statement of financial position dynamics and it involves quantification of the risks and cognizant judgment with view to asset liability arrangement in turn to get the most out of the interest earnings within the support of apparent risks.

Multiperiod stochastic models, as their name suggests, single-period models are concerned with optimal investment over a single period of time horizon. Their length can differ widely depending on their use. For example, central bank managers may set a strategic mark for foreign reserves investment over a period of one year. A commercial bank trader might be interested with which assets to procure today to generate a certain expected return over a one week period. E-trading seeks out ways in which to maximize income over very short period of time. Multiperiod (dynamic) models allow investors to rebalance their portfolios over several periods of time, adjusting to market prevailing conditions and perhaps new investment objectives. While single-period methods may perform well in some settings they are generally not flexible for most applications., SOA (2003), Rosen and Zenios (2006), Mulvey and Ziemba (1998), Kosmidou and Zopounidis (2008), and Mulvey and Vladimirou (1989). Note that many

risk measures can be, and have been, extended from single- to multiperiod models, and various ALM objectives (maximizing profit minus transaction costs, attaining certain goals, etc.) can be, and have been, used in both static and stochastic environments.

Single-period static models, the models in this category are based against small well-defined changes from the present condition of the elements of interest, such as interest or exchange rates. Portfolios are designed in such a way to act in a predictable and acceptable manner to the investor. ALM methods in this category include the following: Immunization: developed by Redington (1952) and properly analyzed recently by de la Grandville (2007), portfolio immunization main objective was to make a portfolio insensitive to small changes in a specified factor, most frequently interest rate movements. Dedication: A dedicated portfolio requires that asset and liability cash flows are fully matched to do away with exposure to changes in the factor(s) of interest. Gap/surplus management: IT usually refers to the difference between the defined values of assets and liabilities, and an organisation may be interested in minimizing the gap or maintaining it within an acceptable boundary. Surplus may be defined in the same manner as the gap metric, but the terminology was used typically when there was excess wealth.

Single-period stochastic models, these models describe the spread of returns of assets and liabilities due to random market movements. Unlike the static models, stochastic models explicitly incorporate and quantify risk, but they are concerned with uncertainty at the end of a single investment horizon only (versus dynamic ALM models with multiple or even continuous portfolio rebalancing opportunities). Most risk measures used in this category aim at minimizing downside asset movements;

According to Dynamic Business Analyst, (2011) a very important issue in strategic micro finance bank planning is asset and liability management, which is the evaluation and control of endogenous financial, operational, business and exogenous risks.

The objective of ALM is to maximize income through effective fund allocation given a reasonable and acceptable risk structure. ALM tend to be a multidimensional way, requiring interactions simultaneously among different dimensions. If the operating way of loan management is discarded the reducing risk in one dimension may result in unexpected increases in other risks. ALM has changed greatly in the past two decades with the growth and integration of financial organisations and the introduction of new financial products and services which has greatly influenced the expected income of most industries in Kenya.

New information-based activities and financial innovation increased types of endogenous and exogenous risks as well as the relationship between these. Consequently, the structure of the statement of financial position variables has become more complex and the volatility in the

banking system has increased. These developments require the use of quantitative ways to control risks more objectively and improve the expected performance. Diversity in financial organisation managers' attitudes toward risk results in diverse credit management strategies to sustain target or maximized profit. Risk taker managers tend to accept higher risk for higher expected returns whereas risk-averse decision maker tend to accept lower level of risks for lower expected returns. Consequences of high risk taking strategies might be more frustrating and unstable eternal environments such as emerging financial markets. On the other hand, financial risks may also increase a firm's overall risk.

Liquidity Risk

Biety (2003) define Liquidity as the ability of an institution to meet demands for funds. Whereas Basel Committee on banking management states that liquidity is the ability of a finance institution to support financially increases in assets and meet debts when due (Sharara, 2014). Liquidity management of a microfinance institution is ensuring that the institution maintains sufficient cash and liquid assets to satisfy client demand for loans and withdrawals. Liquidity management involves a microfinance institution doing a daily analysis of cash inflows and outflows daily and subsequent days to reduce risk that those saving will be unable to access their deposits in the moments they demand them. Therefore, for a micro financial institution to control liquidity, it must have a management information system in place which is able to make pragmatic growth and liquidity projections. The fundamental role of microfinance banks is the maturity transformation of short-term deposits into long-term loans which makes microfinance institutions inherently accessible to liquidity risk (both of an institution-specific nature and that which affects markets in general) (Sharara, 2014).

According to Oldfield and Santamero (1997), liquidity risk emerges from maturity disparities where liabilities have a limited gist than assets. The sudden rise in a borrower's demands above the expected level may lead to shortages of cash or liquid marketable assets. The extreme liquidity satiation and as a result of difficulties that persist today are showy illustrations of the decisive consequence of market liquidity to the finance sectors.

According to Diamond and Rajan (2005) a disparity in depositors demand and production of resources forces a microfinance institution to generate the resources at a superior cost. Therefore, it was essential for a microfinance institution to be aware of its liquidity position from a marketing perspective. This will help to expand its customer loans lest pretty market prospects (Falconer, 2001). A microfinance institution with liquidity problems loses a number of business opportunities. This places it at a spirited drawback, as a disparity to those of the challengers (Chaplin et al. 2000). The claim that microfinance institutions should look for

proceeds has an appealing succeeding quality, acknowledging slight transaction between social and business objectives (Cull et al. 2009).

In Kenya, most microfinance institutions try to keep up adequate resources to meet the unanticipated demands from depositors but maintaining the cash was extremely expensive. The major cause of liquidity risk is the maturity disparity between possessions and liabilities (Imai et al. 2010). The majority of the assets are funded by deposits most of which are current with a possibility to be called at any time. This situation is referred to as the mismatch between possessions and liabilities. This mismatch can be measured with the help of the maturity gap between assets and liabilities. This is also called liquidity gap. According to CBK, (2013), higher liquidity gap might create liquidity risk to most microfinance institutions in Kenya.

Asset Liability Committee Composition and Responsibilities

The Kenya's Central Bank's sensible principle on liquidity risk control argues that, for efficient managing of liquidity risk, a microfinance is required to determine an Asset Liability Committee (ALCO) whose roles include management of the overall liquidity of the institution, reporting directly to the board and in case it is a overseas incorporated microfinance institution, report to the senior management of the institution in the country. Finally, ALCO is responsible for ensuring that a microfinance institution's operations are within the parameters set by its board of directors.

Effect of Asset Liability Management on Liquidity Risk

Sharara, (2014) opines that asset liability management plays a critical function in entwining together the distinctive commerce lines in finance institutions. Management of liquidity and balance sheet are critical to the continuation of a microfinance institution and sustenance of daily operations. However, managing liquidity gaps alone is not adequate. Effective ALM is particularly, important for deposit taking microfinance institutions since the variety of liabilities available to them is more complex than those available to non-deposit-taking institutions.

Muranaga & Ohsawa (2002) assert that liquidity risk is the risk that an organization will not be able to meet its prime responsibility when due. It is useful to broaden this rationale to include access to adequate liquidity to meet expansion protrusion and to finance continuing process in liquidity disorder. This is paramount for all financial institutions but especially for microfinance institutions, where balance sheets are expanding hastily and where dealings like natural catastrophes can quickly have an adverse impact on cash flows. A number of researches have done determine the effect of asset liability management on liquidity risk. As discussed below.

In Zimbabwe, according to Oracle white paper (2011), a well-managed liquidity function includes liquidity contingency plan, liquid asset buffers and a liquidity policy and limits in harmony with the level of uncertainty that the administration considers is acceptable and controllable. In Kenya, Gikonya (2011) studied the relationship between asset liability management, productivity and profitability of in Kenya commercial banks. A cross-sectional survey was used in carrying out a research of forty three (43) licensed commercial banks in Kenya. The study found that asset liability management was positively related to profitability. The limitation of this study was that it did not investigate the effect of financial influence on productivity of microfinance institutions and the effect of financial risk, uncertainty, and profitability of the company.

Maina, (2011) researched on the correlation between liquidity risk management and profitability of the Oil companies in Kenya, he found that there was a debilitated relationship between liquidity and profitability. The study revealed that liquidity management is not a noteworthy contributor alone of the institution's productivity.

Vodová(2011), research on 22 banks during the 2006-2009 period, determined the factors affecting liquidity risk measured with different statement of financial position elements. The outcome show that the liquidity of Czech commercial banks tends to be higher when capital adequacy is at a higher level and when the interest rates on loans are higher. Additionally, the liquidity measures tend to identify a positive relationship with capitalization and with size. The researcher finds that bigger banks present lower liquidity in correlation with the "too big to fail" theory, In that it would seem that larger banks are less determine to hold liquidity since they depend on government intercession in case of a short fall.

Oludhe (2011) established that the adequacy of capital, quality of assets and liquidity had weak relationship with financial liquidity, while earnings had a strong relationship with financial liquidity. Gareth (2008)'s study on interest rate management found that executing a given plan is depended on its asset and liability committee's decision. Gareth suggested a further research on liquidity risk control by deciding that since the asset liability committee is also responsible for a microfinance's liquidity risk control.

Asiri (2007), researched on Assets-liabilities management in banks: by use of a statistical cost accounting method (SCA) to test whether asset and liabilities of a bank could help forecast its profits. All Kuwaiti listed commercial banks were studied over a duration of between 1980-1997for the asset liability relationship. The study concluded that assets mainly loans are the important variable in making profits whereas liabilities are reducing profits it also proved that a bank's profits are positively related to liquidity risk.

Rauch et al., (2010) researched on the factors affecting liquidity risk and liquidity creation. They found that the most important determinants in liquidity risk and liquidity creation are external economic variables and monetary policy, however they are not showing a significant relationship between liquidity generation and finance banks specific attributes like size, duration and performance. Adrian and Shin (2008) showed that in poor economic situations, the liquidity position is very important since it can change the whole bank reserves. Indeed; Aikaeli (2006) studied on the determinants of exorbitance bank liquidity. He noted that the credit risk, the proper level of funding, preference of cash, the volatility of deposits is important determinants of excess liquidity. Basel committee (2009) explained that the effectiveness of commercial banks depends on the position of the liquidity of a bank. Vallaand Saer Escorbia (2006) Researched on the liquidity determinants for banks in England. They established that profitability, Growth in the credit, GDP, monetary policy, Interest rates have an adverse impact on bank liquidity.

Fadare (2011), study on the banking industry liquidity and financial crisis in Nigeria with the aim of identifying the key causes of banking liquidity in Nigeria, and assessing the correlation between the determinants of banking liquidity and financial risks within the economy. It employed a linear least square model and time series data from 1980 to 2009. The study found that only liquidity ratio, monetary, policy rate and delay loan-to-deposit ratio were significant for predicting banking sector liquidity. Secondly, it showed that a decrease in monetary policy rate, liquidity ratios, volatility of output in relation to trend output, and the need for cash, creates an increase in current loan-to-deposit ratios; while a decrease in currency in circulation in proportion to banking sector deposits; and delayed loan-to-deposit ratios leads to a decline in current loan-to-deposit ratios

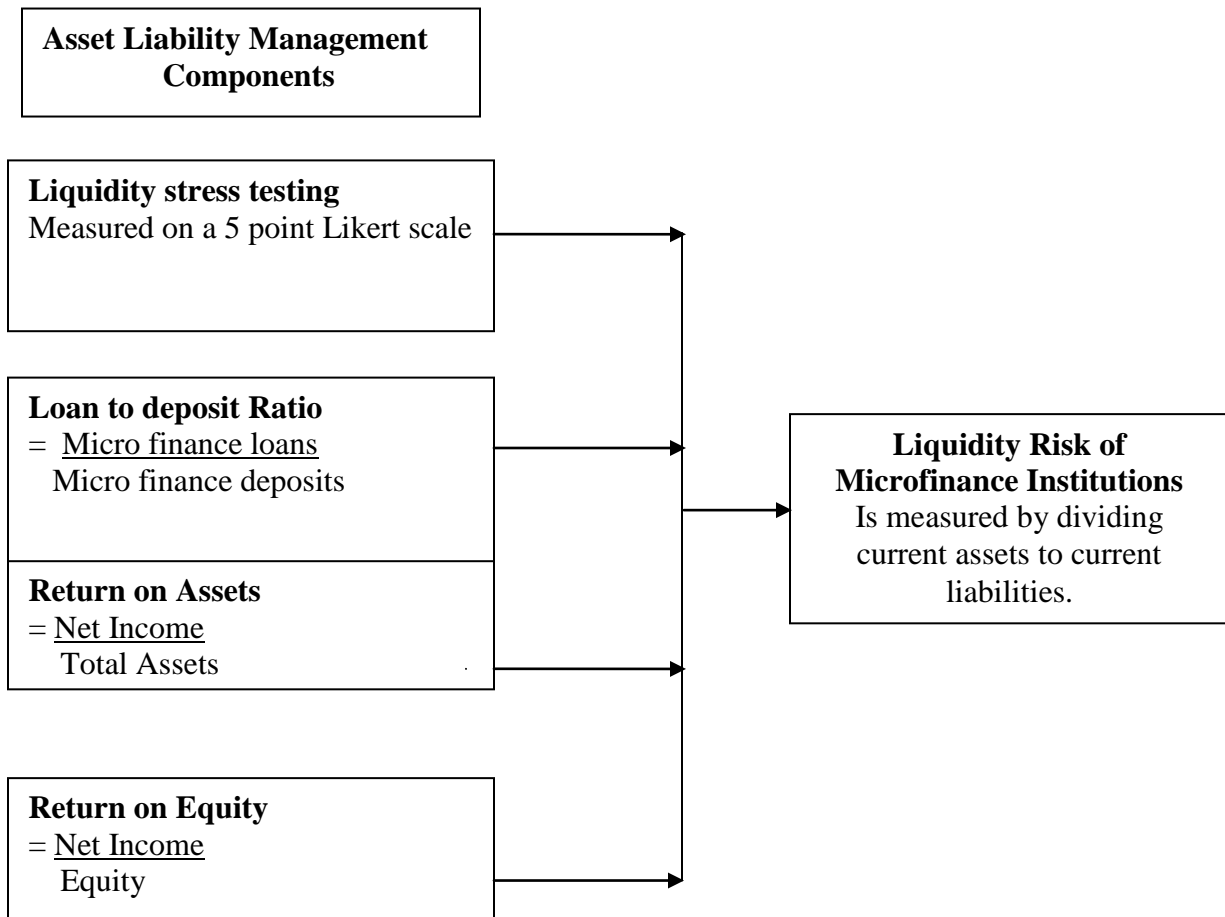
Summary of Literature Review

From the foregoing review of literature, various studies such as Bonfim & Kim (2011), Horvath et al. (2012), Kamau (2013) among others, have found that there is a relationship between liquidity risk and the ratio between loans and deposits. This relationship depends on the type of liquidity risk measure used. This implies that, enhanced liquidity creation can have some detrimental consequences. The implication here is that variations are caused by internal and external issues. In this case, internal factors are contingency planning, profitability, and management policies.

It is also evident that liquidity might expose the firm into financial losses when the microfinance institution fails to maintain a proper match between assets and liabilities. It is therefore, important for these institutions to balance between liquidity through implementing proper financial management practices in investing and risk management. From the literature

review, little focus has been laid on the effect of asset liability management and liquidity risk of microfinance banks of deposit taking microfinance banks in Kenya, thus, a knowledge gap. This study is therefore, geared towards establishing the effect of asset liability management and how it influences liquidity risk of microfinance institutions in Kenya.

Figure 2.1: The relationship between Asset Liability Management on the Liquidity Risk of Micro-finance banks



RESEARCH METHODOLOGY

Research Design

The research problem was considered through the use of descriptive survey research design. Morgan (2007) explained that the advantage of descriptive design is that the researcher was able to use various forms of data as well as incorporating human experience. The descriptive design was preferred since it was carefully structured to ensure absolute description of the circumstance, making sure that there was least bias in the collection of data and to diminish errors in interpreting the data collected.

Target Population

The research targeted all the managers of 12 deposit taking, registered microfinance banks in Kenya licensed by the central bank of Kenya. Therefore, a census was used. The argument for this population was because this is a regulatory requirement by central bank and microfinance institutions were easily accessible.

Census

Sampling procedure refers to part of research plan that indicates how cases are to be selected for observation while sample size refers to the number of items sampled from bigger populations that their findings were used to generalize about the whole population (Kothari, 2004). Given the small number of senior management, in all the micro finance banks, census was used.

Data Collection

The study made use of secondary sources of data obtained from published sources (covering a period of the last five financial years) such as the Central Bank of Kenya, association of microfinance banks in Kenya (AMFI), surveys and micro financial institutions supervision reports. The secondary data was added with primary data collected through a questionnaire managed through a drop and pick method. Before the expected actual data is collected, the researcher drafted a Questionnaire that was later sent to the twelve microfinance institution. The researcher made make an initial visit to the microfinance banks for familiarization as well as seek consent for the study.

Validity and Reliability of research instrument

Validity is the certainty and meaningfulness of inferences, which are relied on the research conclusions (Mugenda & Mugenda2003). The researcher established content validity of research instruments by presenting the questionnaire to three experts for scrutiny and advice. Their advice and recommendations were used to adjust the research instruments.

According to Mugenda and Mugenda (2003) reliability is the consistency and repeatability to which research instrument produce dependable results or data after repeated trials. To ensure reliability of the instruments, a pilot study was conducted in three micro finance banks that are licensed by the central bank. Cronchbach's alpha was calculated to determine the reliability of the research instruments, and an alpha co-efficient of 0.85 was attained thus exceeding the set 0.7 showing reliability of the research instrument.

Data Analysis

Secondary data from the Central Bank of Kenya (CBK) reports were reviewed for completeness and consistency in order to carry out statistical analysis. The data collected was analyzed using SPSS 21. Descriptive, correlations and regression analysis was applied to study and compare the effect of independent variables on the dependent variable. The questionnaire data obtained were checked for certainty and integrity of recording of the responses, coded and checked for coding errors and omissions. Hypothesis was tested using regression analysis

Analytical Model

The researcher used a regression model to determine the effect of asset liability management on liquidity risk of microfinance banks in Kenya; The regression model was as follows:

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + e$$

Where;

Y = Liquidity risk, is the dependent variable it was measured by dividing net liquid assets to total short-term liabilities

β_0 = gradient or slope of the regression measured the unit of change in y associated with a unit change in X

β_1 to β_4 = the regression coefficients

X_1 - liquidity stress testing it was determined by use of questioners

X_2 - Loan to deposit ratio was determined by dividing loans issued against deposits.

X_3 - Return on assets was determined by dividing net income over total assets.

X_4 - Return on equity was determined by dividing net income over equity.

e - Is error term within confidence interval of 5%

ANALYSIS AND FINDINGS

Response rate

The response rate of the respondents who participated in the survey is as shown in table 4.1 below. Out of the 12 questionnaires which were issued, 11 questionnaires were returned fully completed representing 91.7%, while 1 questionnaire was not returned representing 9.3% of the total questionnaires distributed to the respondents. It can be concluded that the generated response rate was good. According to Mugenda and Mugenda (2003), a response rate of 70% and above is very excellent for analysis and preparation of reports on the opinion of the entire population. Table 1 shows the response rate.

Table 1 : Response rate

| Questionnaire | Frequency | Percentage |
|---------------|-----------|------------|
| Administered | 12 | 100% |
| Returned | 11 | 91.7 |

Background characteristics of respondents

Gender of the Respondents

Table 2: Gender of the respondents

| Description | Frequency | Percentage |
|-------------|-----------|------------|
| Male | 7 | 63.6 |
| Female | 4 | 36.4 |
| Total | 11 | 100.0 |

Table 2 shows that 7(63.6%) of the respondents were male while 4(36.4%) were female. The findings on male: female ratio attained the gender parity which requires that not more than 2/3 of staff should come from either gender (Constitution of Kenya, 2010). This implies that both sexes were sufficiently represented in the study, hence satisfying the constitutional requirement that in any recruitment, female should for 2/3 of the whole staffs.

Age bracket of the Respondents

Table 3: Age of the respondent

| Age | Frequency | Percentage |
|--------------|-----------|--------------|
| 20-29 years | 1 | 9.0 |
| 30-39 years | 1 | 9.0 |
| 40-49 years | 5 | 45.5 |
| 50-59 years | 4 | 36.5 |
| Total | 11 | 100.0 |

Regarding the age of respondents, Table 3 shows that the majority 5(45.5%) of the respondents were of the ages between 40 to 49 years, 4(36.5%) were between 50-59 years, 1(9.0%) were between 30-39 years and another 1(9.0%) respondent were between 20-29 years. This implies that majority of the respondents were aged enough and therefore could easily achieve the micro financial institution targets target.

Level of education of the Respondents

Table 4: Education level of the respondents

| Description | Frequency | Percentage |
|---------------|-----------|--------------|
| Diploma | 1 | 9.1 |
| Undergraduate | 6 | 54.5 |
| Postgraduate | 4 | 36.4 |
| Total | 11 | 100.0 |

Table 4 indicates that majority 6(54.5%) of the respondents had undergraduate level of education, 4(36.4%) had post graduate level and 1(9.1%) had diploma level of education. The findings agree with Guthua (2014) that majority of micro financial institution managers had undergraduate qualification. This implies that the managers had adequate qualification for improvement of the institution performance.

Work period of the Respondents

Table 5: Working period of respondents

| Description | Frequency | Percentage |
|--------------|-----------|--------------|
| 1-2 years | 2 | 18.2 |
| 3-5 years | 6 | 54.5 |
| Above 5years | 3 | 27.3 |
| Total | 11 | 100.0 |

From the findings of this analysis, it was revealed that most 6(54.5%) of the respondents had worked at for a period of between 3-5years, 3(27.3%) had worked for a period of over 5 years while only 2(18.2%) had worked for more than 1-2 years. The findings agree with Guthua (2014) that majority of micro financial institution managers had worked for a period of more than 3 years in the micro financial institutions. This implies that the managers had enough work experience to ensure adequate performance of the micro financial institutions.

Effect of Liquidity stress testing on Liquidity risk

For the analysis of objective one, primary sources of data were used. Thereafter, the researcher employed both descriptive and inferential statistics. This statistic helped to determine the effect of liquidity stress testing on liquidity risk of Microfinance banks in Kenya. The analysis therefore

starts with the descriptive statistics (frequency, percentage and mean distribution) for the level of agreement on a five point Likert scale of the variable liquidity risk management (Table 4.6). Where; 1= Strongly Disagree, 2= Disagree, 3= Undecided, 4= Agree and 5= Strongly Agree

Descriptive statistics for liquidity stress testing and liquidity risk

For analysis purposes, frequency and percentages ratings of response for each item, were determined and summarized in Table 6.

Table 6: Descriptive statistics for liquidity stress testing and liquidity risk management

| Statement on data collection | | SD | D | U | A | SA | MEAN |
|---|--------|-----------|-----------|-----------|-----------|-----------|-------------|
| Liquidity Stressed testing inputs involve macro variables, capital controls and withdrawal of funding | F % | 1 9.1 | 2 18.2 | 1 9.1 | 3 27.3 | 4 36.4 | 3.64 |
| Liquidity Stress testing include prepayments obligations, bid-ask spreads and collateral demands | F % | 0 0.0 | 1 9.1 | 2 18.2 | 3 27.3 | 5 45.5 | 4.09 |
| Liquidity Stress testing final metric include Cash flow timing and magnitude, Liquidity gap relative to tolerance, Profitability and Solvency | F % | 1 9.1 | 1 9.1 | 1 9.1 | 4 36.4 | 4 36.4 | 3.82 |
| Liquidity stress test provides insight in the liquidity risks of the bank under different situations | F % | 1 9.1 | 1 9.1 | 2 18.2 | 5 45.5 | 2 18.2 | 3.55 |

Table 6 shows that 4(36.4%) respondents strongly agreed with the statement that liquidity Stress testing inputs involved macro variables, capital controls and withdrawal of funding, 3(27.3%) respondents agreed with the statement, 2(18.2%) respondents disagreed, 1(9.1%) were undecided on the statement and another 1(9.1%) respondents were in a strong disagreement with the statement. The study findings suggested that the respondents tended to agree (Mean=3.64) that liquidity Stress testing inputs involved macro variables, capital controls and withdrawal of funding.

Similarly, 5(45.5%) respondents strongly agreed with the statement that liquidity Stress testing included prepayments obligations, bid-ask spreads and collateral demands, 3(27.3%) respondents agreed with the statement, 2(18.2%) respondents were undecided on the statement and 1(9.1%) respondents disagreed while no 0(0%) respondents were in a strongly

disagreement with the statement. It emerged from the study that the respondents agreed (Mean=4.09) that liquidity Stress testing included prepayments obligations, bid-ask spreads and collateral demands.

In addition, 4(36.4%) respondents strongly agreed and another 4(36.4%) agreed with the statement that liquidity Stress testing final metric included Cash flow timing and magnitude, liquidity gap relative to tolerance, Profitability and Solvency, the rest were undecided, disagreed and strongly disagreed at 1(9.1%) each. The study findings suggested that the respondents tended to agree (Mean=3.82) that liquidity Stress testing final metric included Cash flow timing and magnitude, liquidity gap relative to tolerance, Profitability and Solvency.

Finally, 5(45.5%) respondents agreed with the statement that liquidity stress test provided insight in the liquidity risks of the bank under different situations, 2(18.2%) respondents strongly agreed and another 2(18.2%) respondents were undecided on the statement. Besides, 1(9.1%) respondents strongly disagreed and another 1(9.1%) disagreed with the statement. It emerged from the study that the respondents tended to agree (Mean=4.05) that liquidity stress test provided insight in the liquidity risks of the bank under different situations.

Inferential statistics for liquidity stress testing and liquidity risk management

The linear regression coefficient test at significance level of $p \leq 0.05$ illustrating statistically significant effect of Liquidity stress testing on liquidity risk of Microfinance banks in Kenya is as summarized in Table 4.10. Therefore, Table 4.10 presents the linear regression coefficient test that was conducted to determine whether Liquidity stress testing significantly influence liquidity risk of Microfinance banks in Kenya. To achieve this, the hypothesis below was tested;

Ho₁: Liquidity stress testing does not have a statistical significant effect on liquidity risk of microfinance banks in Kenya.

Therefore, the analysis starts with Pearson correlation analysis in Table 7 to test for assumption of linearity, Summary model in Table 8 and ANOVA in Table 9 to test whether the regression model $y = \beta_0 + \beta_1 X_1 + \epsilon$ was viable.

Table 7: Pearson correlation analysis (Liquidity stress testing)

| | | Liquidity risk management | Liquidity stress testing |
|---------------------------|---------------------|---------------------------|--------------------------|
| Liquidity risk management | Pearson Correlation | 1 | |
| Liquidity stress testing | Pearson Correlation | .913** | 1 |

** . Correlation is significant at the 0.05 level (2-tailed).

From the results in Table 7, Pearson correlation coefficient ($r=0.913$) between Liquidity stress testing and Liquidity risk management was positive and above 0.5. Therefore, Liquidity stress testing has a strong positive relationship ($r=0.913$) with Liquidity risk management. This implies that the linearity assumption was achieved. This was followed by Model summary to show the explained variation. The results are presented in the table 8 below

Table 4.8: Summary of output

Model Summary

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1 | .913 ^a | .834 | .816 | .511 |

a. Predictors: (Constant), Liquidity stress testing

From the above results in table 8, the multiple correlation (R) is .913 which means that there is a perfect correlation between the variables. The coefficient of determination Adjusted R Squared is 81.6%; it explains the variability in the dependent variable (liquidity risk management) that is explained by the independent variables (Liquidity stress testing).

Besides, regression model results can be said as fit if they are supported by empirical data, where only fit model that can explain results. To establish whether a model was fit or not required, ANOVA was used. The model; $y = \beta_0 + \beta_1 X_1 + \epsilon$ was tested whether fit and the results shown in table 9. Where;

Y is the Liquidity risk management

X_1 is the Liquidity stress testing

β_1 is the variables coefficients

Table 9: ANOVA (Liquidity stress testing)

ANOVA^a

| Model | | Sum of Squares | df | Mean Square | F | Sig. |
|-------|------------|----------------|----|-------------|--------|-------------------|
| | Regression | 11.830 | 1 | 11.830 | 45.266 | .000 ^b |
| 1 | Residual | 2.352 | 9 | .261 | | |
| | Total | 14.182 | 10 | | | |

a. Dependent Variable: Liquidity risk management

b. Predictors: (Constant), Liquidity stress testing

The ANOVA output was examined to check whether the proposed models were viable. Results shown in Table 9 reveal that the F-statistic and p value for the " $y = \beta_0 + \beta_1 X_1 + \epsilon$ " is 45.266 and

.000^brespectively. Since the p-value (.000^b) was less than 0.05, it means that the model was valid. This was followed by regression variable coefficient as shown in Table 10 below.

Table 10: Variables coefficient (Liquidity stress testing)

| Model | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|--------------------------|-----------------------------|------------|---------------------------|-------|------|
| | Beta | Std. Error | Beta | | |
| (Constant) | -.029 | .579 | | -.051 | .961 |
| Liquidity stress testing | .996 | .148 | .913 | 6.728 | .000 |

Table 10 revealed standardized regression coefficient for liquidity stress testing ($\beta = .913$) and a p-value ($p = .000$). This means that an increase of 1 standard deviation in liquidity stress testing is likely to result in a 0.913 standard deviations increase in Liquidity risk. In addition, the p value ($p = 0.000$) for liquidity stress testing was less than 0.05. Therefore the hypothesis, “liquidity stress testing does not have a statistical significant effect on liquidity risk of Microfinance banks in Kenya”, was rejected. This implies that there is statistically significant effect of liquidity stress testing on liquidity risk of microfinance banks in Kenya.

Effect of Loan to deposit ratio on Liquidity risk management

For the analysis of objective two, secondary sources of data were used. Thereafter, the researcher employed both descriptive and inferential statistics. This statistic helped to determine the effect of loan to deposit ratio on liquidity risk of Microfinance banks in Kenya. The analysis therefore starts with the descriptive statistics.

Descriptive statistics for loan to deposit ratio and liquidity risk management

Table 11: Descriptive statistics for Loan to deposit ratio

| Micro financial institutions | Loan to deposit ratio |
|------------------------------|-----------------------|
| Kenya Women | 63.65 |
| Faulu | 37.26 |
| Choice | 43.39 |
| SMEP | 35.56 |
| Remu | 32.5 |
| Rafiki | 56.65 |
| Uwezo | 44.26 |
| Century | 40.39 |

| | |
|-------------|---------------|
| Sumac | 39.56 |
| U&I | 33.5 |
| Daraja | 34.56 |
| Caritas | 31.5 |
| Mean | 41.065 |

From the above results in Table 11, was found that the average Loan to deposit ratio, for the microfinance institutions was 41.065. This implies that the micro-financial institution has a good financial performance. This implies that the financial risk of the business is 41% which is within the acceptable limit. These descriptive statistics was then followed by linear regression test to; determine the effect of loan to deposit ratio on liquidity risk of microfinance banks in Kenya. This was analyzed under the following sub-section.

Inferential statistics for loan to deposit ratio on liquidity risk

The linear regression coefficient test at significance level of $p \leq 0.05$ illustrating statistically significant effect of loan to deposit ratio on liquidity risk of Microfinance banks in Kenya is as summarized in Table below which presents the linear regression coefficient test that was conducted to determine whether loan to deposit ratio significantly influence liquidity risk of Microfinance banks in Kenya. To achieve this, the hypothesis below was tested;

Ho₂: loan to deposit ratio does not have a statistical significant effect on liquidity risk of Microfinance banks in Kenya

Therefore, the analysis starts with Pearson correlation analysis in Table 4.12 to test for assumption of linearity, Model summary model in Table 4.13 and ANOVA in Table 4.14 to test whether the regression model $y = \beta_0 + \beta_2 X_2 + \epsilon$ was viable.

Table 12: Pearson correlation analysis (Loan to deposit ratio)

Correlations

| | | Liquidity risks | Loan to deposit ratio |
|-----------------------|---------------------|-----------------|-----------------------|
| Liquidity risks | Pearson Correlation | 1 | |
| Loan to deposit ratio | Pearson Correlation | -.708** | 1 |

** . Correlation is significant at the 0.05 level (2-tailed).

From the results in Table 12, Pearson correlation coefficient ($r = -.708$) between Loan to deposit ratio and Liquidity risk management was negative and above -0.5. Therefore, Loan to deposit ratio has a strong negative relationship ($r = -.708$) with Liquidity risk management. This implies

that the linearity assumption was achieved. This was followed by Model summary to show the explained variation. The results are presented in the table 13 below:

Table 13: Summary of output

| Model Summary | | | | | | |
|----------------------|-------------------|----------|-------------------|----------------------------|--|--|
| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | | |
| 1 | .708 ^a | .502 | .452 | 1.35780 | | |

a. Predictors: (Constant), Loan to deposit ratio

From the above results in table 13, the multiple correlation (R) is .708 which means that there is a perfect correlation between the variables. The coefficient of determination Adjusted R Squared is 45.2%; it explains the variability in the dependent variable (liquidity risk management) that is explained by the independent variables (Loan to deposit ratio).

Besides, regression model results can be said as fit if they are supported by empirical data, where only fit model that can explain results. To establish whether a model was fit or not required, ANOVA was used. The model; $y = \beta_0 + \beta_2 X_2 + \epsilon$ was tested whether fit and the results shown in table 13.

Where;

Y is the Liquidity risk management

X_2 is the Loan to deposit ratio

β_2 is the variables coefficients

Table 14: ANOVA (Loan to deposit ratio)

| ANOVA^a | | | | | | |
|--------------------------|------------|----------------|----|-------------|--------|-------------------|
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| | Regression | 18.569 | 1 | 18.569 | 10.072 | .010 ^b |
| 1 | Residual | 18.436 | 10 | 1.844 | | |
| | Total | 37.006 | 11 | | | |

a. Dependent Variable: Liquidity risks

b. Predictors: (Constant), Loan to deposit ratio

The ANOVA output was examined to check whether the proposed models were viable. Results shown in Table 14 reveal that the F-statistic and p value for the " $y = \beta_0 + \beta_2 X_2 + \epsilon$ " is 10.072 and .010^b respectively. Since the p-value (.010^b) was less than 0.05, it means that the model was valid. This was followed by regression variable coefficient as shown in Table 15 below.

Table 15: Variables coefficient (Loan to deposit ratio)

| Coefficients^a | | | | | | |
|---------------------------------|-----------------------|-----------------------------|------------|--------------|--------|------|
| Model | | Unstandardized Coefficients | | Standardized | t | Sig. |
| | | B | Std. Error | Coefficients | | |
| 1 | (Constant) | 40.061 | 1.741 | | 23.011 | .000 |
| | Loan to deposit ratio | -.131 | .041 | -.708 | -3.174 | .010 |

a. Dependent Variable: Liquidity risks

Table 15 revealed standardized regression coefficient for loan to deposit ratio ($\beta = -.708$) and a p-value ($p = .010$). This means that an increase of 1 standard deviation in loan to deposit ratio is likely to result in a .708 standard deviations decrease in Liquidity. In addition, the p value ($p = 0.010$) for loan to deposit was less than 0.05. Therefore the hypothesis, “loan to deposit ratio does not have a statistical significant effect on liquidity risk of microfinance banks in Kenya”, was rejected. This implies that there is statistically significant effect of loan to deposit ratio on liquidity risk of microfinance banks in Kenya.

Effect of Return on Asset on Liquidity risk management

For the analysis of objective three, secondary sources of data were used. Thereafter, the researcher employed both descriptive and inferential statistics. This statistic helped to determine the effect of Return on Asset on liquidity risk of Microfinance banks in Kenya. The analysis therefore starts with the descriptive statistics.

Descriptive statistics for Return on Asset and liquidity risk management

Table 16: Descriptive statistics for Return on Asset

| Micro financial institutions | Return on Asset |
|-------------------------------------|------------------------|
| Kenya Women | -1.26 |
| Faulu | -2.09 |
| Choice | -2.37 |
| SMEP | -4.06 |
| Remu | -2.1 |
| Rafiki | -1.16 |
| Uwezo | -2.19 |
| Century | -1.27 |
| Sumac | -4.16 |

| | |
|-------------|-----------------|
| U&I | -2.07 |
| Daraja | -3.06 |
| Caritas | -1.08 |
| Mean | -2.23917 |

From the above results in Table 16, was found that the average Return on Asset for the microfinance institutions was -2.23917. This implies that the ratio of losses after interest and tax to net asset is 2.2%, thus, most microfinance banks gave out high amount of loans and advances which contributed to high levels of non-performing loans.

Inferential statistics for Return on Asset on liquidity risk

The linear regression coefficient test at significance level of $p \leq 0.05$ illustrating statistically significant effect of Return on Asset on liquidity risk of Microfinance banks in Kenya is as summarized in Table 17. Therefore, Table presents the linear regression coefficient test that was conducted to determine whether Return on Asset significantly influence liquidity risk of Microfinance banks in Kenya. To achieve this, the hypothesis below was tested;

H₀₃: Return on Asset does not have a statistical significant effect on liquidity risk of microfinance banks in Kenya

Therefore, the analysis starts with Pearson correlation analysis in Table 17 to test for assumption of linearity, Model summary in Table 18 and ANOVA in Table 19 to test whether the regression model $y = \beta_0 + \beta_3 X_3 + \epsilon$ was viable.

Table 17: Pearson correlation analysis (Return on Asset)

| Correlations | | Liquidity risks | Return on Asset |
|---------------------|---------------------|-----------------|-----------------|
| Liquidity risks | Pearson Correlation | 1 | |
| Return on Asset | Pearson Correlation | -.600* | 1 |

*. Correlation is significant at the 0.05 level (2-tailed).

From the results in Table 17, Pearson correlation coefficient ($r = -.600$) between Return on Asset and Liquidity risk management was negative and above-0.5 Therefore, Return on Asset has a strong negative relationship ($r = -.600$) with Liquidity risk management. This implies that the linearity assumption was achieved. This was followed by Model summary to show the explained variation. The results are presented in the table 18 below:

Table 18: Summary of output

Model Summary

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1 | .600 ^a | .360 | .296 | 1.53911 |

a. Predictors: (Constant), Return on Asset

From the above results in table 18, the multiple correlation (R) is .600 which means that there is a perfect correlation between the variables. The coefficient of determination Adjusted R Squared is 29.6%; it explains the variability in the dependent variable (liquidity risk management) that is explained by the independent variables (Return on Asset). Besides, regression model results can be said as fit if they are supported by empirical data, where only fit model that can explain results. To determine whether a model was fit or not required, ANOVA was used. The model; $y = \beta_0 + \beta_3 X_3 + \infty$ was tested whether fit and the results shown in table 19. Where;

Y is the Liquidity risk management

X_2 is the Return on Asset

β_3 is the variables coefficients

Table 19: ANOVA (Return on Asset)

| ANOVA^a | | | | | | |
|--------------------------|------------|----------------|----|-------------|-------|-------------------|
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| 1 | Regression | 13.317 | 1 | 13.317 | 5.622 | .039 ^b |
| | Residual | 23.689 | 10 | 2.369 | | |
| | Total | 37.006 | 11 | | | |

a. Dependent Variable: Liquidity risks

b. Predictors: (Constant), Return on Asset

The ANOVA output was examined to check whether the proposed models were viable. Results shown in Table 19 reveal that the F-statistic and p value for the " $y = \beta_0 + \beta_3 X_3 + \infty$ " is 5.622 and .039^b respectively. Since the p-value (.039^b) was less than 0.05, it means that the model was valid. This was followed by regression variable coefficient as shown in Table 20 below.

Table 20: Variables coefficient (Return on Asset)

| Coefficients | | | | | | |
|---------------------|-----------------|-----------------------------|------------|--------------|--------|------|
| Model | | Unstandardized Coefficients | | Standardized | t | Sig. |
| | | B | Std. Error | Coefficients | | |
| 1 | (Constant) | 32.336 | 1.083 | | 29.859 | .000 |
| | Return on Asset | -1.047 | .442 | -.600 | -2.371 | .039 |

a. Dependent Variable: Liquidity risks

Table 20 revealed standardized regression coefficient for liquidity stress testing ($\beta = -.600$) and a p-value ($p = .039$). This means that an increase of 1 standard deviation in Return on Asset is likely to result in a .600 standard deviations decrease in Liquidity. In addition, the p value ($p = 0.039$) for Return on Asset was less than 0.05. Therefore the hypothesis, "Return on Asset does not have a statistical significant effect on liquidity risk of microfinance banks in Kenya", was rejected. This implies that there is statistically significant effect of Return on Asset on liquidity risk of microfinance banks in Kenya.

Effect of Return on Equity on Liquidity risk

For the analysis of objective four, secondary sources of data were used. Thereafter, the researcher employed both descriptive and inferential statistics. This statistic helped to determine the effect of Return on Equity on liquidity risk of Microfinance banks in Kenya. The analysis therefore starts with the descriptive statistics.

Descriptive statistics for Return on Equity and liquidity risk management

Table 21: Descriptive statistics for Return on Equity

| Micro financial institutions | Return on Equity |
|-------------------------------------|-------------------------|
| Kenya Women | 1.71 |
| Faulu | 2.6 |
| Choice | -5.1 |
| SMEP | -2.12 |
| Remu | -3 |
| Rafiki | 2.51 |
| Uwezo | 2.8 |
| Century | -4.1 |
| Sumac | -2.12 |

| | |
|-------------|-----------------|
| U&I | -2 |
| Daraja | 2.12 |
| Caritas | -4 |
| Mean | -0.89167 |

From the above results in Table 21, was found that the average Return on Equity for the microfinance institutions was -0.89167. This implies that, the ratio of interest and tax to owners' equity (deposit) is 0.9%, thus, not able to make profits from capital employed in the business by the owner.

Inferential statistics for Return on Equity on liquidity risk

The linear regression coefficient test at significance level of $p \leq 0.05$ illustrating statistically significant effect of Return on Equity on liquidity risk of Microfinance banks in Kenya is as summarized in Table 22. Therefore, Table 22 presents the linear regression coefficient test that was conducted to determine whether return on Equity significantly influence liquidity risk of Microfinance banks in Kenya. To achieve this, the hypothesis below was tested;

Ho₄: Return on Equity does not have a statistical significant effect on liquidity risk of microfinance banks in Kenya

Therefore, the analysis starts with Pearson correlation analysis in Table 22 to test for assumption of linearity, Summary model in Table 23 and ANOVA in Table 24 to test whether the regression model $y = \beta_0 + \beta_1 X_1 + \dots + \beta_n X_n + \epsilon$ was viable.

Table 22: Pearson correlation analysis (Return on Equity)

| Correlations | | Liquidity risks | Return on Equity |
|---------------------|---------------------|-----------------|------------------|
| Liquidity risks | Pearson Correlation | 1 | |
| Return on Equity | Pearson Correlation | -.589* | 1 |

*. Correlation is significant at the 0.05 level (2-tailed).

From the results in Table 22, Pearson correlation coefficient ($r = -.589$) between Return on Equity and Liquidity risk management was negative and above -0.5 Therefore, Return on Equity has a strong negative relationship ($r = -.589$) with Liquidity risk management. This implies that the linearity assumption was achieved. This was followed by Model summary to show the explained variation. The results are presented in the table 23 below:

Table 23: Summary of output

Model Summary

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate |
|-------|-------------------|----------|-------------------|----------------------------|
| 1 | .535 ^a | .286 | .215 | 1.62505 |

a. Predictors: (Constant), Return on Equity

From the above results in Table 23, the multiple correlations (R) is .535 which means that there is a perfect correlation between the variables. The coefficient of determination Adjusted R Squared is 21.5%; it explains the variability in the dependent variable (liquidity risk management) that is explained by the independent variable (Return on Equity).

Besides, regression model results can be said as fit if they are supported by empirical data, where only fit model that can explain results. To determine whether a model was fit or not required, ANOVA was used. The model; $y = \beta_0 + \beta_4 X_4 + \infty$ was tested whether fit and the results shown in table 24.

Where;

Y is the Liquidity risk management

X_2 is the Return on Equity

β_3 is the variables coefficients

Table 4. 24: ANOVA (Return on Equity)

| ANOVA ^a | | | | | | |
|--------------------|------------|----------------|----|-------------|-------|-------------------|
| Model | | Sum of Squares | Df | Mean Square | F | Sig. |
| | Regression | 12.825 | 1 | 12.825 | 5.304 | .044 ^b |
| 1 | Residual | 24.180 | 10 | 2.418 | | |
| | Total | 37.006 | 11 | | | |

a. Dependent Variable: Liquidity risks

b. Predictors: (Constant), Return on Equity

The ANOVA output was examined to check whether the proposed models were viable. Results shown in Table 24 reveal that the F-statistic and p value for the " $y = \beta_4 X_4 + \infty$ " is 5.304 and .044^b respectively. Since the p-value (.044^b) was less than 0.05, it means that the model was valid. This was followed by regression variable coefficient as shown in Table 25 below.

Table 25: Variables coefficient (Return on Equity)

| Model | | Unstandardized Coefficients | | Standardized Coefficients | t | Sig. |
|-------|------------------|-----------------------------|------------|---------------------------|--------|------|
| | | B | Std. Error | Beta | | |
| 1 | (Constant) | 34.396 | .465 | | 73.932 | .000 |
| | Return on Equity | -.348 | .151 | -.589 | -2.303 | .044 |

a. Dependent Variable: Liquidity risks

Table 25 revealed standardized regression coefficient for liquidity stress testing ($\beta = -.589$) and a p-value ($p = .044$). This means that an increase of 1 standard deviation in loan to Return on Equity is likely to result in a .589 standard deviations decrease in Liquidity. In addition, the p value ($p = 0.044$) for Return on Equity was less than 0.05. Therefore the hypothesis, "Return on Equity does not have a statistical significant effect on liquidity risk of microfinance banks in Kenya", was rejected. This implies that there is statistically significant effect of Return on Equity on liquidity risk of microfinance banks in Kenya.

Overall Analysis

For the overall analysis of objective two, three and four, data was obtained from the secondary sources. Descriptive statistics using means, variance and standard deviation was the most preferred statistic technique for objective two, three and four and this is because the item scale was interval scale. This statistic helped to determine; the effect of loan to deposit ratio on liquidity risk of microfinance banks in Kenya, effect of Return on Assets on liquidity risk of microfinance banks in Kenya and determine the effect of return on equity on liquidity risk of microfinance banks in Kenya. The researcher began with descriptive statistics.

Descriptive statistics

Table 26: Descriptive statistics (Loan to deposit ratio, Return on Asset, Return on Equity and Liquidity risks)

| Descriptive Statistics | | | | | |
|------------------------|----|---------|---------|---------|----------------|
| | N | Minimum | Maximum | Mean | Std. Deviation |
| Loan to deposit ratio | 12 | 31.50 | 63.65 | 41.0650 | 9.91090 |
| Return on Asset | 12 | -4.16 | -1.08 | -2.2366 | 1.05093 |
| Return on Equity | 12 | -5.10 | 2.80 | -.8917 | 3.00887 |
| Liquidity risks | 12 | 30.34 | 36.63 | 34.6778 | 1.83416 |

From the above results in Table 26, liquidity risk was found to have a mean value of 34.6778. In addition, Loan to deposit ratio, Return on Asset and Return on Equity was found to have a mean of 41.0650, which implies that the financial risk of the business is 41% which is within the acceptable limits-2.2366, this implies that the ratio of losses after interest and tax to net assets is 2.2% thus most micro finance banks gave out high amount of loans and advances which contributed to high levels of non performing loans and -.8917 this implies that the ratio of interest and tax to owners equity(deposit) is 0.9% thus, not able to make profits from capital employed in the business by the owner respectively.

Inferential statistics

For multiple regression analysis, linearity test should be achieved. Therefore, Pearson correlation analysis in Table 27 to test for assumption of linearity, Model summary for explained variation in Table 28 and ANOVA in Table 29 to test whether the regression model $y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon$ was viable was adopted.

Table 27: Pearson correlation coefficient (Asset Liability Management and Liquidity risks)

| Correlations | | Liquidity risks | Loan to deposit ratio | Return on Asset | Return on Equity | Liquidity risk testing |
|--------------------------|---------------------|-----------------|-----------------------|-----------------|------------------|------------------------|
| Liquidity risks | Pearson Correlation | 1 | | | | |
| Loan to deposit ratio | Pearson Correlation | -.708** | 1 | | | |
| Return on Asset | Pearson Correlation | -.600* | .367 | 1 | | |
| Return on Equity | Pearson Correlation | -.535 | .451 | .067 | 1 | |
| Liquidity stress testing | Pearson Correlation | -.167 | -.075 | .079 | -.434 | 1 |

** . Correlation is significant at the 0.01 level (2-tailed).

* . Correlation is significant at the 0.05 level (2-tailed).

From the results in Table 27, Pearson correlation coefficient ($r = -.167$) between liquidity stress testing and Liquidity risk was negative and below -0.3. Therefore, Liquidity risk testing has a weak negative relationship ($r = -.167$) with Liquidity risk management. In addition, Pearson correlation coefficient ($r = -.708$) between loan to deposit ratio and Liquidity risk management

was negative and above -0.5. Therefore, loan to deposit ratio has a strong negative relationship ($r=-.708$) with Liquidity risk. Similarly, Pearson correlation coefficient ($r=-.600$) between Return on Asset and Liquidity risk was negative and above -0.5. Therefore, Return on Asset has a strong negative relationship ($r=-.600$) with Liquidity risk management. Lastly, Pearson correlation coefficient ($r=-.535$) between Return on Equity and Liquidity risk was negative and above -0.5. Therefore, Return on Equity has a strong negative relationship ($r=-.535$) with Liquidity risk. This implies that the linearity assumption was achieved.

In addition, regression analysis was used to confirm the hypothesis of this study which had predicted a positive relationship between asset liability management and liquidity of risk management of micro financial institutions in Kenya. The results are presented in the table 28 below:

Table 28: Summary of output

Model Summary ^b

| Model | R | R Square | Adjusted R Square | Std. Error of the Estimate | Durbin-Watson |
|-------|-------------------|----------|-------------------|----------------------------|---------------|
| 1 | .914 ^a | .835 | .725 | 1.00789 | 1.947 |

a. Predictors: (Constant), Return on Equity, Return on Asset, Liquidity risk testing, Loan to deposit ratio

b. Dependent Variable: Liquidity risks

From the above results in table 28, the multiple correlation (R) is .914 which means that there is a perfect correlation between the variables. The coefficient of determination Adjusted R Squared is 72.5%; it explains the variability in the dependent variable (liquidity risk management) that is explained by the independent variables (Liquidity risk testing, loan to deposit ratio, Return on Asset and Return on Equity). This was then followed by ANOVA to test the viability of the model. The model; $y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon$ was tested whether fit and the results shown in table 29.

Where;

Y is the Liquidity risk

X_1 is the Liquidity risk testing

X_2 is the Loan to deposit ratio

X_3 is the Return on Asset

X_4 is the Return on Equity

$\beta_1, \beta_2, \beta_3$ and β_4 are the variables coefficients

Table 29: Analysis of Variance

| ANOVA ^a | | | | | | |
|--------------------|------------|----------------|----|-------------|-------|-------------------|
| Model | | Sum of Squares | df | Mean Square | F | Sig. |
| | Regression | 30.797 | 4 | 7.699 | 7.579 | .016 ^b |
| 1 | Residual | 6.095 | 6 | 1.016 | | |
| | Total | 36.892 | 10 | | | |

a. Dependent Variable: Liquidity risks

b. Predictors: (Constant), Return on Equity, Return on Asset, Liquidity risk testing, Loan to deposit ratio

The ANOVA output was examined to check whether the proposed models were viable. Results shown in Table 29 reveal that the F-statistic and p value for the $y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \epsilon$ is 7.579 and .016^b respectively. Since the p-value (.016^b) was less than 0.05, it means that the model was valid. This was followed by regression variable coefficient as shown in Table 30 below.

Table 30: Variables coefficient (Asset Liability Management and Liquidity risks)

| Coefficients ^a | | | | | | | |
|---------------------------|----------------|------------|--------------|--------|------|--------------|-------|
| Model | Unstandardized | | Standardized | t | Sig. | Collinearity | |
| | Coefficients | | Coefficients | | | Statistics | |
| | B | Std. Error | Beta | | | Tolerance | VIF |
| (Constant) | 38.788 | 2.628 | | 14.759 | .000 | | |
| Liquidity stress testing | -.680 | .330 | -.387 | -2.060 | .085 | .782 | 1.279 |
| Loan to deposit ratio | -.076 | .040 | -.391 | -1.877 | .110 | .636 | 1.573 |
| Return on Asset | -.601 | .368 | -.323 | -1.633 | .154 | .703 | 1.423 |
| Return on Equity | -.320 | .130 | -.497 | -2.472 | .048 | .680 | 1.471 |

a. Dependent Variable: Liquidity risks

Results of the regression coefficients presented in Table 30 shows that the estimates of β values and give an individual contribution of each predictor to the model. The β value tells us about the relationship between liquidity risk management with each predictor. The positive β values indicate the positive relationship between the predictors and the outcome. The β value for loan to deposit ratio (-.387), β value for loan to deposit ratio(-.391), Return on Asset (-.323)

and Return on Equity (-.497) were negative. The negative β values indicate the direction of relationship between predictors and outcome. From the results the model was then specified as:
 $y=38.788-0.387X_1 -0.391X_2+-0.323X_3 +-0.497X_4+ 2.628$

The coefficients for each of the variables indicates the amount of change one could expect in Liquidity risk given a one-unit change in the value of that variable, given that all the variables in the model are standardized basing on the standardized coefficients. Results revealed standardized regression coefficient for liquidity stress testing ($\beta=-.387$), implies that an increase of 1 standard deviation in liquidity risk testing is likely to result in a 0.387 standard deviations decrease in Liquidity risk management. Standardized regression coefficient for loan to deposit ratio ($\beta=-.391$), implies that an increase of 1 standard deviation in loan to deposit ratio is likely to result in a 0.391 standard deviations decrease in Liquidity risk management. Standardized regression coefficient for Return on Asset ($\beta=-.323$), implies that an increase of 1 standard deviation in Return on Asset is likely to result in a 0.323 standard deviations decrease in Liquidity risk management. Standardized regression coefficient for Return on Asset ($\beta=0.497$), implies that an increase of 1 standard deviation in Return on Asset is likely to result in a 0.497 standard deviations decrease in Liquidity risk management.

T-test was used to identify whether the predictors were making a significant contribution to the model. When the t-test associated with β value is significant then the predictor is making a significant contribution to the model. The smaller the value of significance (the larger the value of t) meaning greater is the contributor of that predictor. The results show that when Multiple Regression was used, Liquidity stress testing ($t =-2.060$, $P=.085$), Loan to deposit ratio ($t =-1.877$, $P=.110$), Return on Asset ($t =-1.633$, $P=.0154$) and Return on Equity ($t =-2.472$, $P =.048$). These findings indicate that Return on Equity has a significantly effect on liquidity risk management of micro financial institutions. However, Liquidity stress testing, Loan to deposit and Return on Asset as predictors have no significant effect on liquidity risk management of micro financial institutions. Return on Equity had the highest t value ($t = 2.472$), therefore indicating that it was the most important predictor for liquidity risk management in Micro financial institution. This implies that adoption of all the component of Asset Liability Management at once reduces their effectiveness on liquidity risk management of micro financial institutions

DISCUSSION OF FINDINGS

In objective, one primary data was used to determine the effect of liquidity stress testing on liquidity risk. It was found that liquidity Stresse testing inputs involved macro variables, capital controls and withdrawal of funding, liquidity Stress testing included prepayments obligations,

bid-ask spreads and collateral demands, liquidity Stress testing final metric included Cash flow timing and magnitude, liquidity gap relative to tolerance, Profitability and Solvency and finally, liquidity stress test provided insight in the liquidity risks of the bank under different situations respectively. The findings of the study concurs with Vossen (2010) finding in which the author observes that banks must change how to balance their liquidity risk and their role as liquidity providers by restructuring their liquidity management strategies which include liquidity stress testing which is an important instrument of asset liquidity risk management. In addition, the result also revealed that, there was a positive strong relationship ($r = .913$) between liquidity stress testing and liquidity on risk management. Lastly, regression analysis indicated that an increase of 1 standard deviation in liquidity stress testing is likely to result in a 0.913 standard deviations increase in Liquidity risk management. The findings agree with Guthua (2014) that liquidity who found that liquidity stress testing positively affects liquidity risk management.

In addition, objective two established the effect of loan to deposit ratio on liquidity risk management. The study findings revealed standardized regression coefficient for loan to deposit ratio ($\beta = -.708$) and a p-value ($p = .010$). This means that an increase of 1 standard deviation in loan to deposit ratio is likely to result in a .708 standard deviations decrease in Liquidity. In addition, the p value ($p = 0.010$) for loan to deposit was less than 0.05. Therefore the hypothesis, “loan to deposit ratio does not have a statistical significant effect on liquidity risk of microfinance banks in Kenya”, was rejected. This supports the findings of Bonfim & Kim (2011) and Horvath et al. (2012) that there is a relationship between liquidity risk and the ratio between loans and deposits. However, this contradicted the findings of Guthua (2012) that loan to deposit ratio positively affects liquidity risk management. The difference in findings could be due to the fact that Guthua carried a study on commercial banks while this study was conducted in micro financial institution which always has a smaller loan to deposit ratio. This implies that an increase an increase in loan to deposit ration leads to a decrease in liquidity risks while a decrease in loan to deposit ratio increases the liquidity risks.

Similarly, objective three assessed the influence of Return on Asset on liquidity risk management. The study findings revealed standardized regression coefficient for liquidity stress testing ($\beta = -.600$) and a p-value ($p = .039$). This means that an increase of 1 standard deviation in Return on Asset is likely to result in a .600 standard deviations decrease in Liquidity. In addition, the p value ($p = 0.039$) for Return on Asset was less than 0.05. Therefore the hypothesis, “Return on Asset does not have a statistical significant effect on liquidity risk of microfinance banks in Kenya”, was rejected. This is in line with the findings of Thuku (2015) and Anjili (2014) that Return on assets negatively affect liquidity risk management. This implies that an increase in

Return on Asset leads to decrease in liquidity risks while a decrease in Return on Asset result into an increase in liquidity risks.

Finally, objective four examined the effect of Return on Equity on liquidity risk management. The study findings revealed standardized regression coefficient for liquidity stress testing ($\beta = -.589$) and a p-value ($p = .044$). This means that an increase of 1 standard deviation in loan to Return on Equity is likely to result in a .589 standard deviations decrease in Liquidity. In addition, the p value ($p = 0.044$) for Return on Equity was less than 0.05. Therefore the hypothesis, "Return on Equity does not have a statistical significant effect on liquidity risk of microfinance banks in Kenya", was rejected. This is in line with the findings of Thuku (2015), Kamau (2013) and Anjili (2014) that Return on Equity negatively affect liquidity risk management. This implies that an increase in Return on Equity leads to decrease in liquidity risks while a decrease in Return on Equity result into an increase in liquidity risks.

CONCLUSION

From the findings, the study concluded that; asset liability management affects the liquidity risk of micro-finance banks in Kenya. Therefore, liquidity stress testing as a measure of asset liability management had a strong positive effect on liquidity risk management. That is, an increase of in liquidity stress testing is likely to result in increase in Liquidity risk management. On contrary, loan to deposit ratio as a measure of asset liability management had a negative effect on liquidity risk management. That is a decrease in loan to deposit ratio is likely to result into increase in Liquidity risk management while an increase in loan to deposit ratio is likely to result into a decrease in Liquidity risk management. Similarly, Return on Asset as a measure of asset liability management had a negative effect on liquidity risk management. That is a decrease in Return on Asset is likely to result into increase in Liquidity risk management while an increase in Return on Asset is likely to result into decrease in Liquidity risk management. Finally, Return on Equity as a measure of asset liability management had a negative effect on liquidity risk management. That is a decrease in Return on Equity is likely to result into increase in Liquidity risk management while an increase in Return on Equity is likely to result into decrease in Liquidity risk management.

RECOMMENDATIONS

In reference to the findings, conclusions and the guidance from the literature review, it was obvious that asset liability management was an important element to affect liquidity risk management. Therefore; The micro financial institution stakeholders should consider the

elements of asset liability management such as' liquidity stress testing, loan to deposit ratio, return on asset and return on equity to ensure liquidity risk management

There is need for bank treasuries, risk managers and asset liability committees to implement a robust and comprehensive balance sheet management solution to meet the evolving financial needs of the micro financial institution while taking into consideration the emerging liquidity risks arising from the micro financial institution expansion and technology. The study also recommends that other factors for example government regulations, policies or any other factors either as independent or moderating variables that can influence a proper match between assets and liabilities management and liquidity risk management should be investigated in order to obtain reliable results. A comparative study should be conducted to determine the extent to which asset and liability management affects liquidity risk management in other sectors other than micro-finance industry.

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APPENDICES

Appendix I: Questionnaire for Micro Finance Banks Management

My name is Moses Mamati from Kisii University; I am a postgraduate student in the school of business and economics. I am carrying out a research on the **“Effect of Asset Liability Management on liquidity risk of micro finance banks”** The objective of this questionnaire is for academic work only and whatever information provided shall be cared for confidentially. Please, answer the questions as objectively as possible to assist the researcher to ascertain the effect of asset liability management and liquidity risk of micro finance banks.

PART I: Background Information

1. Name of the bank
2. Location of bank.....
3. Gender Male Female
4. Age [20-29] [30-39] [40-49] [50-59]
5. What is your highest level of education? Diploma [] Undergraduate [] Post Graduate []
6. How long have you been working in the micro-finance industry?
1-2 Years [] 3-5 Years [] 6-8 Years [] 9-11 Years [] 12 and above []
7. How long has your microfinance been operating in Kenya 5- 10 years [] 11 -15 years [] 15+ years []
8. Does the microfinance has a lay down procedures for management of its assets and liabilities?
YES..... NO.....
9. Has it been helping in the running of the microfinance in terms of asset liability and liquidity risk?
YES..... NO.....
10. Who designs the policy for the running of the microfinance?
.....

PART 2: Asset Liability Management (ALM)

11. Which department is responsible for the Asset liability management in your micro-finance?
 - i. Treasury
 - ii. Finance
 - iii. Risk

12. Please tick the numeric value corresponding to your personal opinion for each statement

| Questions | Strongly Agree | Agree | Neutral | Disagree | Don't Disagree |
|--|----------------|-------|---------|----------|----------------|
| Asset liability management comprises of managing effectively both the assets and liabilities sides of the bank balance sheet | | | | | |
| Asset liability management comprises of managing liquidity risk and market risks in an effective manner | | | | | |
| Asset liability management consists of managing maturity gaps and mismatches | | | | | |
| Asset liability management involves managing structural , static and dynamic gap | | | | | |

13. Please tick the numeric value corresponding to your personal opinion for each statement

| Questions | Strongly Agree | Agree | Neutral | Disagree | Don't Disagree |
|---|----------------|-------|---------|----------|----------------|
| Liquidity Stressed testing inputs involve macro variables, capital controls and withdrawal of funding | | | | | |
| Liquidity Stress testing include prepayments obligations, bid-ask spreads and collateral demands | | | | | |
| Liquidity Stress testing final metric include Cash flow timing and magnitude, Liquidity gap relative to tolerance, Profitability and Solvency | | | | | |
| Liquidity stress test provides insight in the liquidity risks of the bank under different situations | | | | | |

14. Indicate the extent in which you agree or disagree with the following statement concerning liquidity risk in you micro microfinance bank.

| LIQUIDITY RISK | SA | A | U | SD | D |
|---|----|---|---|----|---|
| Liquidity risk management involves managing inputs macro variables, capital controls and withdrawal of funding | | | | | |
| Liquidity risk management involves proper management of advances obligations, bid-ask spreads and security demands | | | | | |
| Proper liquidity risk management involves managing final metric include Cash flow timing and magnitude, Liquidity gap relative to tolerance, Profitability and Solvency | | | | | |
| Liquidity risk provides insight in the liquidity position of the bank under different situations | | | | | |

Appendix II: List of Microfinance Banks in Kenya (Source: CBK 2016)

- 1) Choice Microfinance Bank Limited
- 2) Faulu Microfinance Bank Ltd
- 3) Kenya Women Microfinance Bank Ltd
- 4) SMEP Microfinance Bank Ltd
- 5) Remu Microfinance Bank Ltd
- 6) Rafiki Microfinance Bank Ltd
- 7) Uwezo Microfinance Bank Ltd
- 8) Century Microfinance Bank Ltd
- 9) Sumac Microfinance Bank Ltd
- 10) U&I Microfinance Bank Ltd
- 11) Daraja Microfinance Bank Ltd
- 12) Caritas Microfinance bank Kenya ltd

Appendix III: Audited Financial Statements of Microfinance Banks in Kenya

| Micro finance banks | Loan to deposit ratio | Return on Asset | Return on Equity | Liquidity risks |
|----------------------------|------------------------------|------------------------|-------------------------|------------------------|
| Kenya Women | 63.65 | -1.26 | 1.71 | 30.34 |
| Faulu | 37.26 | -2.09 | 2.6 | 32.42 |
| Choice | 43.39 | -2.37 | -5.1 | 35.5 |
| SMEP | 35.56 | -4.06 | -2.12 | 36.63 |
| Remu | 32.5 | -2.1 | -3 | 35 |
| Rafiki | 56.65 | -1.16 | 2.51 | 33.34 |
| Uwezo | 44.26 | -2.19 | 2.8 | 34.52 |
| Century | 40.39 | -1.27 | -4.1 | 35.7 |
| Sumac | 39.56 | -4.16 | -2.12 | 36.33 |
| U&I | 33.5 | -2.07 | -2 | 35 |
| Daraja | 34.56 | -3.06 | 2.12 | 36.33 |
| Caritas | 31.5 | -1.08 | -4 | 35 |