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Empirical analysis on relationship between Liquidity risk management and financial performance of microfinance banks in Kenya

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Abstract

Liquidity management is necessary for all commercial Banks and microfinance banks (MFBs). Nevertheless, this is not an effortless task because managers must ensure that the bank is running in an efficient and profitable manner and in most cases there are high possibilities of mismatch of current assets and current liabilities during this process. If this happens and bank's manager failed to manage it properly then it will affect bank's growth and performance which will further lead to financial distress not only to the bank but also to the small enterprises that form the bulk of emerging economies. In Kenya, the microfinance banking subsector has been faced with liquidity risk management among other challenges. This necessitated the adoption of the Risk Based Supervision approach of supervising Microfinance banks in 2010. However, most MFBs are recording negative growth with level of profitability and sustainability of the sector dropping significantly with ROE and ROA reported at 8% and 1% respectively. In terms of solvency position, the microfinance sector shows a decreasing trend of capital adequacy ratio dropping from 22.8% as of Dec 2009 to 18.9% in 2013. Hence the major objective for this study was to establish the relationship between liquidity risk management and financial performance of Microfinance banks in Kenya. Specific objectives were: to establish the relationship between Financial gap ratio (FGR) and performance of MFBs and to determine the relationship between Capital adequacy ratio (CAR) and performance of MFBs. Longitudinal research design utilizing panel data covering the period from 2011 to 2015 was used. Target population comprised 12 licensed MFBs. Purposive sampling was used to obtain a sample of 6 MFBs. Document analysis guide was used to gather secondary quantitative data from the MFBs financial reports. Descriptive statistics were used to show the trend of MFB risk exposure and performance. Pearson correlation was used to determine strength and association among variables. Panel data analysis based on system GMM technique was used to estimate a multiple regression model and test for significance of relationship between Liquidity Risk management and financial performance. The findings were that Liquidity risk management with FGR and CAR parameters had a strong Positive correlation (r=0.45), giving a significant negative relationship with both ROAA and ROAE performance measures as depicted by regression coefficient of 0.3 estimated by GMM. Thus, the study concluded the existence of a significant relationship Liquidity risk management and performance and that liquidity risk management impacts positively on performance of MFBs. The study recommended establishment of a funding strategy that provides effective diversification in the sources and tenor of funding and regularly gauge its capacity to raise funds quickly from each source. Also Finance managers to identify the main factors that affect MFBs ability to raise funds and monitor those factors closely to ensure that estimates of fund raising capacity remain valid.

Keywords: Liquidity risk, Microfinance banks and Performance

1.0 Introduction

The need for Microfinance industry began with one man and one village. Grameen Bank was the first microfinance bank which was established by Muhammad Yunus, a native of Bangladesh. He was motivated by the fact that Bangladeshi business owners were forced to repay much of their profits to loan issuers. In 1976,

Yunus extended his first microfinance loan from his personal account to a group of women in Bangladesh and the concept grew from there Terzo, 2015).

The microfinance banking industry is growing rapidly and gaining importance in the global financial sector. As of December 31, 2010, there were 1,395 Microfinance Institutions globally with an estimated borrower base of 200 million with a total outstanding portfolio of over $44 billion as reported by the MFIs to the Microfinance Information Exchange. From 2003 to 2008, the global microfinance banking industry experienced a growth in borrowers at a Compound Annual Growth Rate (CAGR) of 12% and a portfolio outstanding CAGR of 34%. Inter-regionally, South Asia, East Asia and the Pacific region had the highest growth rates in terms of borrowers. Sub-Saharan Africa, Middle East and North Africa have experienced the slowest growth. Latin America continues to lead in terms of portfolio outstanding with $16 billion or 36% of the total global portfolio; however, South Asia has the lead in terms of borrowers with over 50% of the global borrower base (Rifki, 2010).

However, financial risks mainly with liquidity risks have been cited to be and continue to be an impediment in the performance and growth of this very important sector (Akkizidis & Khandelwal, 2007). Liquidity Risk management in banking and microfinance banking sub sector in particular came to limelight especially after the 2007/2008 turbulence that impacted the very existence of this sector as a viable industry. Not only the bank's, even the various government bodies have recognized the repercussions or impact of not managing the liquidity risks effectively in banks and accordingly enacted several regulations to control liquidity risks that arise in the banking business and operations. This development led to introduction of BASEL Norms by Bank of International Settlement (BIS) Committee. The committee has guided all the central banks of the participating countries and the banks governed by them to adapt and align their risk management practices to the norms over a period in time. The Basel norms are focused on the risks in Liquidity among other areas which in turn help the banks to quantify the risks and standardize their risk management practices in the said areas (Vaidyula &Kavala, 2013).

The global financial crisis, experienced between 2007 and 2008 around the world in which banks, stock markets and large financial institutions collapsed made governments in even the wealthiest nations to come up with rescue packages to bail out their financial systems. The Global risk management survey on 71 financial institutions from around the world and across multiple sectors, representing a total of almost US$18 trillion in aggregate assets revealed concerted risk management effort in action. Based on tidal wave of regulatory developments, in the area of capital adequacy, almost all the banks surveyed that are subject to Basel III requirements are on track to meet the minimum capital ratios. In particular the Federal Reserve has introduced the Enhanced Prudential Standards and the Comprehensive Capital Adequacy Review in the US. In Europe, the European Central Bank assumed responsibility for the prudential supervision of the region's banks, and has conducted its comprehensive assessment asset quality review and stress tests. In addition, the Basel Committee for Banking Supervision is introducing higher standards for capital adequacy and liquidity. The Solvency II capital adequacy regime is due to become effective for European insurers at the beginning of 2016, while the International Association of Insurance Supervisors is developing a global insurance capital standard (Hida, 2015).

A growing literature suggests that risk management is even more challenging for the Microfinance banks compared to the conventional counterpart. This is largely attributed to the fact that the Microfinance banks are faced with additional risks due to the specific features of the financing contracts, liquidity infrastructure, legal requirements, nature of clientele and governance underlying the Microfinance bank operations (Cihak & Hesse, 2008). Moreover, in view of the increasing pressure of globalization, effective and efficient risk management in the Microfinance institutions is particularly important as they endeavor to cope with the challenges of cross border financial flows. Some argued that the microfinance banks performance and profitability are significantly affected due to need to allocate more resources to mitigate these risks. In particular, the greater risk mitigation requirements call for adequate capital and reserves, appropriate pricing and control of risks, strong rules and practices for governance, disclosure, accounting, and auditing rules, and suitable infrastructure that could facilitate liquidity management (Sundararajan & Errico, 2002).

In Kenya, the Central Bank of Kenya (CBK) carried out a risk management survey on the Kenyan banking sector in September 2004. The survey's objective was to determine the needs of the local banking sector with regard to risk management. The survey was necessitated by the drive to fully adopt Risk Based Supervision and to incorporate the international risk management best practices envisioned in the 25 Basel Core Principles for

Effective Banking Supervision. The survey culminated in the issuance of the Risk Management Guidelines (RMGs) in 2005 and the adoption of the Risk Based Supervision approach of supervising financial institutions in 2005. In response to this, commercial banks embarked upon an upgrading of their risk management and control systems (CBK, 2005). This was later extended to Deposit taking Microfinance institutions that transformed into Microfinance Banks (CBK, 2010). However, the Kenya microfinance sector report, 2012 which is a three year survey indicated the sectors asset growth as being less strong and relatively stagnant with Microfinance Banks recording negative growth even with increased number of Microfinance bank licences being granted. The growth rates in terms of borrowers are lower with an average of only 2.8%. In absolute terms, the average disbursed loan dropped from US$1649 to US$464, explaining the low credit access and expansion among the Kenyan entrepreneurs. In terms of solvency position, the microfinance sector shows a decreasing trend of capital adequacy ratio dropping from 22.8% as of Dec 2009 to 18.9% in the last period of analysis 2012, reflecting a high growth of the assets when compared to the sector's total equity account. As a result the sector shows increased leverage as the debt to equity ratio stands at 4.29 with that of Microfinance banks being in the lead at 7.1.The Kenya microfinance sector report, 2013 indicates that the level of profitability and sustainability of the sector dropped significantly with ROE and ROA reported at merely 8% and 1% respectively. Banking is a risky business and liquidity risk has been identified as critical to ensure that the banks position remain intact amid the intense competition in the industry. Therefore the purpose of this study was to establish the relationship between liquidity risk management and financial performance of Microfinance Banks in Kenya.

1.1 Objectives of the Study

The Study sought to empirically establish the relationship between liquidity risk management and financial performance of Microfinance Banks in Kenya. More specifically the study sought to:
The specific objectives of the study were to;

i. Establish the relationship between Financial Gap Ratio (FGR) and financial performance of MFBs in Kenya.
ii. Determine the relationship between Capital Adequacy ratio (CAR) and financial performance of MFBs in Kenya.

1.2 Hypotheses of the Study

$H_{01.1}$: There is no significant relationship between FGR and financial performance of MFBs in Kenya.
$H_{01.2}$: There is no significant relationship between CAR and financial performance of MFBs in Kenya.

2.0 Literature Review

2.1 Liquidity Risk Management

Liquidity risk is the possibility that over a specific time period, a bank will become unable to settle financial obligations with immediacy (Drehmann & Nikolaou, 2009). It is a risk arising from a financial institution's inability to meet its obligations when they come due without incurring unacceptable losses. This risk can adversely affect both MFB's earnings and the capital and therefore it becomes the top priority of a MFB's management to ensure the availability of sufficient funds to meet future demands of providers and borrowers, at reasonable costs. The vulnerability of MfB to liquidity risk is determined by the funding risk and the market risk. Liquidity risk needs to be monitored as part of the enterprise-wide risk management process, taking into account credit risk to ensure stability in the balance sheet and dynamic management of liquidity risk. Liquidity risk not only affects the performance of a MB but also its reputation (Jenkinson, 2008).

Liquidity risk management is an essential component of the overall risk management framework of the financial services industry, concerning all financial institutions (Majid, 2003). Ideally, a well-managed bank should have a well-defined mechanism for the identification, measurement, monitoring and mitigation of liquidity risk. A well-established system helps the MFB in timely recognition of the sources of liquidity risk to avoid losses. The balance sheets of banks are growing in complexity and dependence upon the capital markets, which has made the liquidity risk management more challenging (Guglielmo, 2008). He further argues that the banks having enhanced exposure in the capital markets must have a deep understanding of the risks involved.

Gatev and Strahan (2003), opined that the deposits provide a natural hedge to banks against the liquidity risk. Under the stressed market conditions, the banks are perceived as a haven for investors who do not intend to issue funds against their loan commitments. The cash flows in any bank complement each other. The inflows of funds give a natural hedge to banks for outflows due to loan advancements. Therefore, MFBs use deposits to hedge the liquidity risk. This argument also finds support from the work of Kashyap (2002) who provided a rationale of

risk management to define the features of a commercial bank, commonly labeled as "financial intermediary" combining demand deposits with loan commitments.

One possible counter measure to reduce liquidity pressure is the transformation of illiquid assets into cash. In times of immense funding pressure, securitization techniques are usually employed by the banking system for liquidation of assets like mortgages (Jenkinson, 2008). A bank should respond to funding shortfall by acting on the assets side of the balance sheet if it is facing restrictions on raising liquidity. It will be forced to squeeze the advancement of loans to its customers to reduce funding requirements. However, Ali (2004) has narrated two main drawbacks of the above stated policy. First, this strategy needs a bit longer period to be matured. Many of the lending decisions are taken in advance and hard to be reversed instantly, thereby not generating liquidity drainage quickly. Second, reduced lending affects a large part of the economy. In the non-availability of funds to companies and households, it becomes difficult to support long-term investment and consumption in the economy.

Microfinance banks can also manage their liquidity by some other instruments beside cash reserves. The most important is government securities, which can be used as collateral for borrowing stable liquidity most of the time. Also with marketable securities and inter-bank deposits, which can be sold easily in principle, but they could lose liquidity under adverse conditions. Besides, being aware of the impact of liquidity risk can help to enhance strong prudential measures (Froot and Stein, 1998).

2. 1.1 Sources of Liquidity risk

On the liability side, there is a large uncertainty on the amount of withdrawals of deposits or the renewal of rolled-over inter-MFB loans. This is especially so when the MFB is under suspicion of insolvency, when there is an aggregate liquidity shortage or when the economy suffers from a macroeconomic shock. On the assets side, there is also some uncertainty on the volume of new requests for loans that a MFB will receive in the future. The MFB could refuse to grant these new loans, but it would lead to the loss of profit opportunities. It could also be detrimental to the borrowing firm if it is credit rationed, and more general to the economy as a whole: it needs to be clear that MFBs are unique providers of liquidity to small and medium size enterprises (SMEs), which constitute an important fraction of the private sector. This credit rationing would be especially costly if the firm is forced to close down, possibly resulting in additional losses for the MFB itself. Off-balance sheet operations are a third source of liquidity risk for MFBs and CBs. For example, credit lines and other commitments. Furthermore, the formidable positions taken by banks on derivative markets can generate huge liquidity needs during crisis period (Rochet, 2008).

The last source of liquidity risk comes from large payment of inter-bank, for which Central Bank facilitate the use of Real Time Gross Settlement Systems (RTGSs) over Deferred Net Settlement (DNSs), since they are less liable to systemic risk. However, RTGSs are highly liquid and can only function correctly if bank hold sufficient amount of collateral with its credit lines, either from the Central Bank or other participants. The failure of large sample of participants with a large value from payment system could lead a big disruption to the financial system. Even a liquidity shortage due to a temporary shut off in the payment activity of large bank could have dramatic consequences. This creates a "too big to fail" issue since it is likely that Central Bank would be forced to intervene in such a situation. To avoid or simply to mitigate such problems, ex-ante regulation of the liquidity of large participants in RTGSs seems warranted (Froot and Stein, 1998).

2.1.2 Measures of Liquidity Risk

Ross, Westerfield and Jaffe (2005) point out that liquidity ratios show the ability of bank to match its financial obligations within period to avoid default risk or financial distress in the future. Therefore, ratios are applied to measure banks' ability to meet its short term obligations, keep its cash position and collect interest receivables. With general perspective, the higher the liquidity position is, the greater its ability to cover periodical obligations and guarantee safety for both its customers and depositors.

Erik Banks (2005, p.143,146) observes how financial institutions applies different liquidity ratios that are calibrated to their operations; they are based on slightly different definitions even though they measure liquidity risk as indicated in the Formulae Table 2.2

Table 2.1 :Formulae for Liquidity ratio of financial institutions

Borrowing Ratio 1 = Total Deposits / Total Funds
Borrowing Ratio 2 = Volatile Funds / (Cash+ Marketable Securities)
Borrowing Ratio 3 = (Volatile Funds - Current Assets) / (Total Assets- Current Assets)
Loan to Deposit Ratio = Total Loan / Total Deposits
Loan to Assets = Total Loans / Total Assets
Cash Liquidity Ratio 1 = Cash / Total Assets
Cash Liquidity Ratio 2 = (Cash + Short-term investments +Funds sold) / Total Assets
Cash Liquidity Ratio 3 = Marketable Securities / Surrenderable Liabilities
Cash Liquidity Ratio 4 = 30-day Saleable Assets / Surrenderable Liabilities

Source: Liquidity Risk: Managing Asset and Funding Risk from Erik Banks, (2005, p.146)

2.1.3 Capital Adequacy Ratio

This is the ratio of equity to total assets and considered one of the basic ratios for capital strength.

$$\textit{Capital Adequacy Ratio} = \frac{Equity}{Total\ Assets}$$

It is expected that the higher this ratio, the lower the need for external funding and the higher the profitability of the bank. It shows the ability of bank to absorb losses and handle risk exposure with shareholder. Well-capitalized banks face lower costs of going bankrupt which reduces their costs of funding and risks (Berger, 1995; Bourke, 1989; Hassan and Bashir, 2003). This ratio is also defined as Capital to Risk Weighted Assets Ratio (CRAR) and is expressed as a percentage of a bank's risk weighted credit exposures.

$$CRAR = \frac{Tier\ one\ Capital + Tier\ Two\ Capital}{Risk\ Weighted\ Assets}$$

Two types of capital are measured: tier one capital, which can absorb losses without a bank being required to cease trading, and tier two capital, which can absorb losses in the event of a winding-up and so provides a lesser degree of protection to depositors (Banks, 2005).

2.1.4 Financial Gap Ratio

Financial gap ratio was introduced by Saunders and Cornet (2007). They expressed that liquidity risk criterion is determined based on financial gap. Bank managers mostly assume core deposits as stable source of funds which can permanently finance the supply of banking loans. Generally, core deposits are regarded as loan resources with the least cost. Financial gap is defined as the difference between loan and bank's core deposits. If financial gap is positive, the bank should fill this gap by its cash funds through selling cash assets and borrowing from money market. Therefore, financial gap can be estimated by subtracting the borrowed funds from the cash assets. This financial gap represents financial needs of the bank after selling its cash assets. When the economy is under stagnation and financial market increasingly demands for Cash funds, it is when the banks are more exposed on liquidity risk. For standardization of financial gap, the variable of financial gap is divided by total asset (Chen et al., 2010).

$$\textit{Financial Gap ratio} = \frac{Loans - Deposits\ (Gap)}{Total\ Assets}$$

It is expected that banks with higher FGR uses much of their cash, sell liquid assets and also depend much on non-deposit funding to make up for the financial gap; consequently increasing cost of funding and hence reducing profitability .If markets for deposits is reasonably positive, then greater liquidity will tend to be negatively associated with financial performance measures. (Shen 2010).

2.2 Financial performance.

Birlay and Westheed (2001) view financial performance as an approximation for financial success, which is the rate at which the enterprise is satisfied with the profits and growth levels attained. Financial performance looks at the results of a firm's policies and operations in monetary terms, being a general measure of a firm's overall financial health over a given period of time, and can be used to compare similar firms across the same industry or to compare industries or sectors in aggregation (Hillman & Keim 2001).

There are a number of financial performance measures, however there is little consensus about which instrument to apply. Richard (2009), views organizational performance as encompassing three specific areas of firm outcomes financial performance (profits, return on assets, return on investment); product market performance (sales, market share); and shareholder return (total shareholder return, economic value added).

Many researchers use market measures like Alexander and Buchholz (1978) and Vance (1975) while others put forth financial measures like Cochran and Wood (1984) and Waddock and Graves (1997). Some adopt both of these (McGuire, Sundgren, Schneeweis, 1988) while others use perceptual measures given inaccessibility of accounting measures of performance (Lyles, 1996; Peng, & Luo, 2000). However each has different theoretical implications (Hillman and Keim 2001) and each is subject to particular biases (McGuire, Schneeweis & Hill, 1990).

With a long term stable good performance, earning, efficiency, risk taking and leverage together should be concerned by Microfinance bank's manager. These factors can be presented with stakeholders' overall interest. However, different stakeholders could be interested with different measurements from traditional, economic and market based point of view applied by academics or practitioners. For example, commonly used traditional ROE measure is one of the internal performance measures for shareholders value (return of shareholder investment); on the other hand P/E ratio is the market based measure for analysis financial results of the bank over its share price. Different stakeholders of a bank see its performance from different angles, which depositors are more likely concerned with bank's long term ability to insure their savings, equity holders are more likely looking for bank's profit generation and debt holders will pay more attention to how this bank can repay its obligation (ECB, 2010).The following measures are applicable for financial performance,

2.2.1 Return on Assets and Return on Average Assets

Return on Assets **(**ROA) is a basic and efficient measure of bank's profitability, which concerns with its size relative to others. It also indicates the management ability to perform their job efficiently since it shows the ability to generate profit from bank's assets. From its formula point of view, it measures net income after tax for each shilling invested in the assets of a bank. Basically, the higher ROA means better performance and vice-versa.

$$ROA = \frac{Net\ Income\ after\ Tax}{Total\ Assets}$$

The use of average yearly values of assets expresses the performance more accurate than the end year values;

$$ROAA = \frac{Net\ Income\ after\ Tax}{Average\ Total\ Assets}$$

A Return on Average Assets (ROAA) is an indication of how well Microfinance Bank is managing its asset base to maximize profits. The ratio evaluates the return of the portfolio and other revenue generated from investments and operations. Microfinance bank benchmark for this ratio ranges from >3% (Excellent) to -2 % (very poor).

2.2.2 Return on Equity and Return on Average Equity

Shareholders of bank more concerned with how much bank earns for their investment to equity measured by ROE, which shows the net income after tax per shilling from equity capital.

$$ROE = \frac{Net\ Income\ after\ Tax}{Total\ Shareholders'\ Equity}$$

The use of average yearly values of equity expresses the performance more accurately than the end year values hence;

$$ROAE = \frac{Net\ Income\ after\ Tax}{Average\ of\ Total\ Shareholders'\ Equity}$$

Comparing to ROE, the use of ROA takes into account the risks derived from the leverage and is the key bank profitability ratio (Athanasoglou, Brissimis and Delis, 2005). A possible drawback of ROA is the existence of the off-balance-sheet assets, which represent an important source of profit for banks, but are not considered in computing this measure. Thus, Goddard et al (2004) argue that the use of ROE is more appropriate. Given that use of average yearly values of equity and assets expresses the performance more accurate than the end year values.

2.3.1 Microfinance bank Size

Size is introduced to account for existing economies or diseconomies of scale in the market. Short (1979) argues that size is closely associated with capital adequacy of a bank since relatively large banks tend to raise less expensive capital and consequently appear more profitable. Alexiou and Sofoklis (2009) find that the coefficient of the size variable as measured by the logarithm of assets is positive and highly significant, reflecting the

advantages of being a large company in the financial services sector. The estimated coefficient shows that the effect of bank size on profitability is positive, a fact that is in line with the economies of scale theory. Similarly, Flamini, McDonald, and Schumacher (2009) studied the determinants of bank profitability for the sub-Saharan African countries. Their findings show that higher returns on assets are associated with larger bank size

In contrast, Ben Naceur (2003) notices that bank size have a negative impact on profitability. Hence, the bigger the banks, the more they face diseconomies of scale beyond a certain level, and the smaller the banks, the more they achieve economies of scale up to a specific level (Pasiouras & Kosmidou, 2007). In addition, Ben Naceur and Goaied (2008) reveal that size is negatively related to bank profitability. Sufian and Habibullah (2009) obtained similar results.

2.3.2 Gross Domestic Product Growth rate

The macroeconomic conditions influence the bank profitability. The economic growth, expressed by the Gross Domestic Product (GDP) growth, has multiple consequences among which is the increase of bank activity. Both the increase of customer deposits and loans granted and of the interest margins has a positive impact on bank profitability. When the economic activity decreases, the demand for loans and deposits decreases and negatively affects the profit margins (Sufian and Chong, 2008).

By employing a direct measure of the business cycle, Athanasoglou, et al., (2005) found a positive, albeit asymmetric, effect on bank profitability in the Greek banking industry, with the cyclical output being significant only in the upper phase of the cycle. In addition, the rate of GDP growth reflects the state of the economic cycle and is expected to have an impact on the demand for banks loans. The positive impact of GDP supports the argument of the positive association between growth and financial sector performance (Kosmidou, Tanna & Pasiouras, 2006).

2.3.3 Annual Inflation Rate

Annual inflation rate measures the overall percentage increase in Consumer Price Index (CPI) for all goods and services. Inflation affects the real value of costs and revenues. Perry (1992), states that the extent to which inflation affects bank performance depends on whether inflation expectations are fully anticipated or not. An inflation rate fully anticipated by banks management implies that banks can appropriately adjust interest rates in order to increase their revenues faster than their costs, thus, acquiring higher economic profits.

Bourke (1989) has shown a positive relationship between inflation rate and profitability. Similarly, by replicating Bourke's methodology and examining the determinants of bank performances across eighteen European countries between 1986 and 1989, Molyneux and Thornton (1992) have also shown a positive relationship between inflation rate and profitability. However, Kunt and Huizinga (1999) conclude that banks in developing countries tend to be less profitable in inflationary environments, particularly when they have a high capital ratio. In these countries, bank costs actually increase faster than bank revenues. Additionally, the study of Abreu and Mendes (2000) reports a negative coefficient for the inflation variable in European countries.

2.3.4 Financial Regulation

The Microfinance bank regulations have defined the following prudential ratios; capital adequacy ratios including a core capital of 10% of total risk adjusted assets plus risk adjusted off balance sheet items, core capital of 8% of total deposit liabilities, total capital of 12% of total risk adjusted assets plus risk adjusted off balance sheet items; a minimum liquidity ratio of 20%; a limit on insider loans which should not exceed 2% of core capital and should be contained on aggregate within a ceiling of 20% of core capital. In terms of reporting requirements MFBs must submit the following periodic reports and other disclosures to the CBK: biweekly liquidity information, monthly reports on capital to risk weighted assets, quarterly unaudited financial statements and annual audited financial statements. With regard to protection of depositors, although not included in the MB regulations, the Microfinance Act states that all institutions should contribute to the Deposit Protection Fund. The Fund would prescribe the level of the contribution, and disclose the maximum balance per customer protected in case of insolvency. Sanctions detailed and tough administration sanctions are listed in case of non-compliance with the capital adequacy standards without indicating the sequence of these sanctions. All the other offences are left to the appreciation and the discretionary power of the CBK.

2.4 Theoretical Literature Review

This study was guided by Portfolio theory. Portfolio theory is a theory of finance which attempts to maximize portfolio expected return for a given amount of portfolio risk, or equivalently minimize risk for a given level of

expected return, by carefully choosing the proportions of various assets. Modern Portfolio theory was introduced by Harry Markowitz in his paper "Portfolio Selection," which appeared in the 1952 Journal of Finance. The portfolio theory integrates the process of efficient portfolio formation to the pricing of individual assets. It explains that some sources of risk associated with individual assets can be eliminated or diversified away, by holding a proper combination of assets (Bodie & Marcus, 1999).

Portfolio theory was extended to portfolio management in the banking sector by Fischer Black and Myron Scholes in 1973. This model provided banks with a strategy on how to diversify their loans and investments. Before this, banks had no real investment strategy and their only option was to obtain as much collateral as possible and make default an unattractive option. Portfolio Theory allows companies or investors to diversify their investment so to minimize risk and maximize gain. The principle behind the Black – Scholes model is to diversify equity so that the lowest risk bond produces the same risk as the highest risk investment. When investments have reached this equilibrium, then risk minimization is said to have been achieved. This theory is applicable to Microfinance banks in regard to Liquidity risk management. Micro finance banks get the capital to purchase debt from other institutions within the bank, such as what it takes in from deposits, fees on the various services it renders, and even from outside sources. The Microfinance bank must manage this portfolio in such a way that return is high, while risk is kept to a minimum. The debt the bank acquires has value. The value contributed by the rest of the bank should be equal to the excess of the market value of its assets over the market value of its borrowings. The objective of this fund management is to maximize the value of the money invested into the fund. Two other objectives that are necessary for a successful portfolio and should be complementary are to get maximum diversification and get capital adequacy. Capital adequacy means that the bank has enough equity to support its debt with low levels of risk. If the bank's debt is greater than its equity value the probability is that default will occur. So with these tools a microfinance bank may minimize its exposure to risk and maximize the returns acquired from lending.

Although Portfolio theory is an integral part of today's financial industry and has provided banks with a very important tool in combating defaults and profit losses, it's unfortunate that these tools are not perfect and the elimination of risk is impossibility in this ever changing world**.**

2.5 Empirical literature review

In their study, Toutou and Xiaodong (2011) investigated the Relationship between Liquidity Risk and Performance of Banks in Europe. They selected a sample of 12 banks from the EUROSTOXX index based on their market capitalization from different countries in the Eurozone. Data on Half a year financial reports from 2005-2010 for the 12 banks were obtained from their website. The study used loan to assets, loan to deposit and cash position as liquidity risk ratios. Bank performance was measured by Return on Assets, Return on Equity, Net Profit Margin and Net Interest Margin as profitability ratios while Debt to Asset and Debt Leverage were used as stability (Risk & Solvency) ratios. The findings of the study showed that ROA, ROE and NPM seemed to have a positive and significant relationship with liquidity risk variables before the financial crisis, but during and after the financial crisis, the results seemed to have changed to a significant negative relationship. Equally, the Debt Leverage had a negative and significant relationship with liquidity risk variables, but this relationship changed to a positively significant relationship during and after financial crisis. Based on this mixed effect relationship, the study did not firmly conclude that there exist a relationship between liquidity risk indicators and bank performance measures and thus recommended further research in a different setting to firmly conclude the relationship between liquidity risk and bank performance. This study sought to fill this knowledge gap by establishing the relationship between liquidity risk management and financial performance of Microfinance banks in Kenya.

Dietrich & Wanzenried (2011), studied determinants of bank profitability before and during the crisis of banks in Switzerland and found that banks with a relatively high loan rate have higher net interest margin which explains a positive effect of liquidity on profitability, while increase in net funding cost lower bank profitability. Also, the Net interest Income share also affect bank profitability positively given that banks that heavily depend on interest income are less profitable than banks whose income interest are diversified. The empirical results of their study also shows that larger banks have a significantly lower interest margin during the crisis than medium and small size banks. Using interest margin only as a measure of bank performance in this study is limiting in the sense that it accounts for returns on the bank lending activities only. There are other sources of income and investments for the banks that generate returns. Therefore, in addressing this limitation, the current study used both Returns on average assets and returns on average equity as measures of performance to accounts for returns from all sources of income and investments of microfinance banks in Kenya.

In his study, Bank Liquidity Risk and Performance: An Empirical Study of the banking system in Jordan, Alzorqan (2014), investigated the causes of liquidity risk and the relationship between bank liquidity risk and performance for 2 banks over the period 2008-2012. The model was estimated through fixed effects regression. Current ratio (CR) and loan to total Deposit (LTD) were used as proxies for liquidity risk management while ROE and ROI were used as measures of Bank performance. The study found that there is statistically significant effect of LTD and CR on the rate of ROE and ROI in Jordanian banks and that the relationship is direct or a positive relationship. The liquidity risk management parameters used in this study have their shortcomings. The loan to total deposit (LTD) ratio shows the degree of a bank can support its lending through deposits. Under certain economic conditions in which there is increased demand for funds/loans from banks, and that the deposits cannot support these demands, supplementary external sources need to be factored as a liquidity precaution. Financial gap ratio (FGR) expressed as the difference between loans and deposits over total assets is used in the current study to take care of this shortcoming. Similarly, current ratio (given as Current asset over current liabilities) as used in this study shows how a bank is prepared to meet it short term (within a year) financial obligations. Medium and long term financial obligation that is critical for a robust banking system is not catered for. Thus the current study used Capital adequacy ratio (CAR) that relates equity to total assets, as the second parameter for liquidity risk management. The equity component is the shareholding of investors in the bank that guarantees medium and long term liquidity.

In contrast to the aforementioned studies, Molyneux & Thornton (1992) in their study on determinants of European banking profitability showed a significant negative effect between liquidity ratios and bank profitability. Their study revealed a weak inverse relationship between liquidity ratios and profitability as liquidity particularly those imposed by regulatory authorities represent a cost to the bank. Similarly, Ail and Tabari (2013) studied the effect of liquidity risk on the Performance of 15 Commercial Banks in Iran during the years 2003-2010. Some Bank- specific and economic factors were used as control variables. Findings of research showed that bank's size, bank's capital, gross domestic product and inflation resulted to increase in the profitability of bank, while liquidity risk resulted to decrease in the bank's profitability. To assure the robustness of the obtained results, estimated model was once more tested by replacing return on equity as the criterion of the bank's performance and almost the same results of the previous model (return on assets) were obtained. Therefore, regarding to the goal of research, the results generally showed that liquidity risk leads to a decrease in the performance of bank. Moerover, in another study of determinants of bank profitability in Greece during the periods of financial integration, Kosmidou (2008) found that when considering banks internal characteristics such as liquidity risk, there is a significantly negative association between liquidity and Return on Assets. This do however become positive and insignificant when macroeconomics and others financial structure are taken into consideration. These studies however concentrated on large listed commercial banks in highly developed countries as opposed to small sized banks especially in developing countries that are faced with technological and management challenges to mitigate bank risks. Therefore, the current study focused on microfinance banks in Kenya as an emerging economy.

Lartey, Antwi and Boadi (2013), investigated the relationship between the liquidity and the profitability of banks listed on the Ghana Stock Exchange. Seven out of the nine listed banks were involved in the study. The study was descriptive in nature and adopted the longitudinal time dimension panel method. Document analysis was the main research procedure adopted to collect secondary data for the study. The financial reports of the seven listed banks were studied and relevant liquidity and profitability ratios computed. The trend in liquidity and profitability were determined by the use of time series analysis. The main liquidity ratio (Temporary Investment Ratio -TIR) was regressed on the profitability ratio (Return on Equity-ROE). It was found that for the period 2005-2010, both the liquidity and the profitability of the listed banks were declining. The study also found that there was a very weak positive relationship between the liquidity and the profitability of the listed banks in Ghana. The temporary investment ratio (expressed as the sum of cash, short term investments and funds sold ; over total assets) used in this study as a proxy for liquidity risk management takes care of short term liquidity obligations. The current study utilized capital adequacy ratio expressed as equity over total assets in addressing this limitation.

In order to identify the determinants of profitability of Islamic banks operating in Malaysia, Muda, Shaharuddin and Embaya (2013) conducted research that also aimed at examining the effect of the global financial crisis on the profitability of these banks. Panel data estimation was employed with unbalanced data on seventeen Islamic banks, using quarterly data for the period of 2007 to 2010. The random effect model was specifically used to achieve the study objectives. The empirical results indicated that loans ratio, deposits ratio, technical efficiency and bank size have a positive significant effect in determining banks' profitability (measured by ROA). Meanwhile, the inflation rate had a negative significant effect in determining banks' profitability. The findings of

study indicated that banks' age, gross domestic product growth rate, Gross domestic product per capita and concentration ratio are not able to explain the variability of profitability of Islamic banks. The study also revealed that the profitability of Islamic banks was negatively affected by the global financial crisis. The unbalanced panel data for 17 Islamic banks used in this study may give skewed results given the missing data of some banks for given time periods. Consequently, the adoption of a balanced panel data for six microfinance banks for a period from 2011 to 2015 for the current study was aimed at addressing this limitation. Furthermore, the Islamic banks operate within different closed regulatory framework highly characterized by shaaria laws that may limit the generalization of findings. Hence, the current study used microfinance banks in Kenya operating in an open regulatory framework.

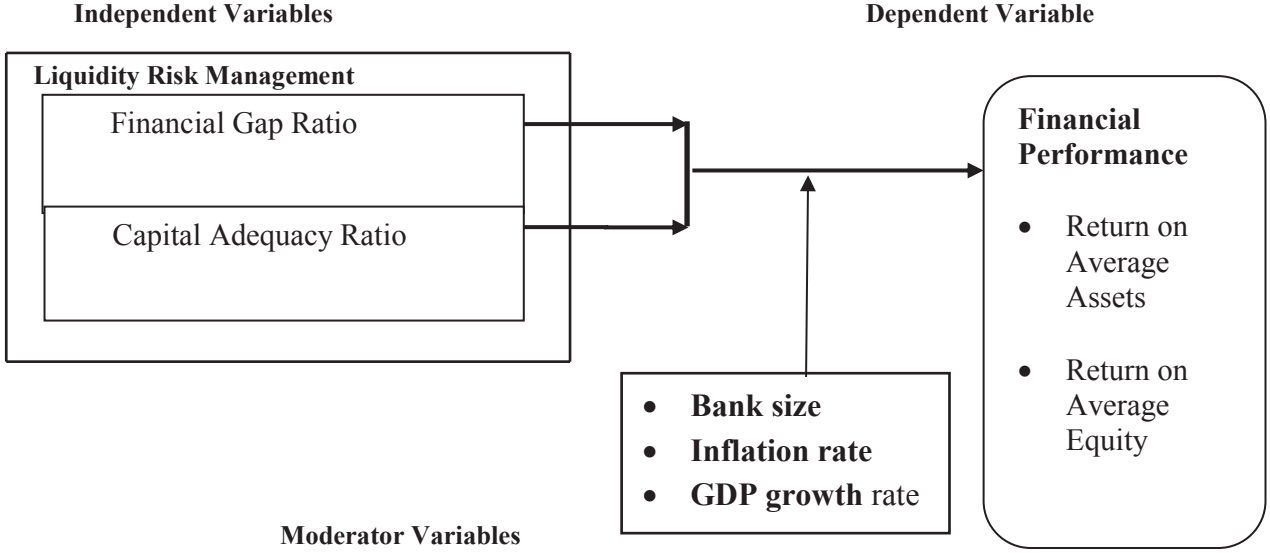
Jenyo and Adebayo (2014) in their study "Performance Appraisal of Microfinance Banks in Nigeria: A Case Study of selected Microfinance Banks in Kwara State", assessed the performance of Microfinance banks (MFBs) over time with a view to evaluate their objectives, structure, and practicability as it affects their operations. The study findings highlighted misuse of funds by manager & board members, poor asset management, liquidity problem, poor internal control measures, under capitalization and lack of adequately trained staff as causes of failures of MFBs. The study also revealed that generally the liquidity position of MFBs was weak as it was about 0.96 in 2007 and 0.88 in 2008 against 2.00 (i.e. standard recommended for the industry). Similarly, the debt equity ratio revealed that these banks rely heavily on borrowed capital; hence if for any reason the creditors withdraw their funds, the banks would be faced with a situation of imminent collapse. Similarly, there are strong relationships between their capital base, liquidity stability and relative income. It was concluded that there was need for greater cooperation between the central bank of Nigeria (CBN) and Nigeria Deposit Insurance Cooperation (NDIC). In as much as this study established the existence of relationship between capital base, liquidity stability and income, it did not demonstrate how statistically significant is the relationship. Additionally, the use of a statistical tool for establishing the direction and strength of association among variables is not quite clear. This study intended to fill this knowledge gap by establishing the relationship between Capital Adequacy Ratio (CAR), liquidity gap ratio and financial performance measured by ROAA and ROAE by using Pearson correlation and system GMM estimation techniques.

Mathuva (2009), examined Capital Adequacy, Cost Income Ratio and the Performance of Commercial Banks in Kenya. Using the return on assets and the return on equity as proxies for bank profitability for the period 1998 to 2007, the study found that bank profitability is positively related to the core capital ratio and the tier 1 risk-based capital ratio. This implies that an increase in capital may raise expected earnings by reducing the expected costs of financial distress, including bankruptcy. This study however concentrated on large listed commercial banks at the exclusion of small sized banks. Therefore, the current study used microfinance banks whose operations are unique as units of study.

Using a two -step GMM estimator based on a fixed effect model Mohammad, Ali and Mahshid (2014), in their study inspecting the effectiveness of liquidity risk on bank profitability in Iran established an inverse significant relationship between financial gap and performance measures- ROA and ROE. The current study adopted a one -step system GMM estimator based on a random effects model to establish the relationship between financial gap ratio and financial performance.

However, Samuel (2013) in his study liquidity risk and bank profitability in Ghana established a positive significant relationship between FGR, CAR and ROA, implying that increasing the exposure to liquidity risk by loaning out much of their deposits are able to maximize their profitability due to higher net interest income as a result of the higher interests charged on loans but very little on deposits and other short term funds subject to other risks like credit risk. This current study intended to use ROAE in addition to ROAA as a measure of performance and examine the relationship between FGR and ROAE.

2.6 Conceptual Framework



Source: *Self conceptualization (2015)*

Fig 2.1: Conceptual Framework

The conceptual framework of the study consisted of independent variables; Liquidityt risk management (measured by Financial gap ratio and Capital adequacy ratio), while financial performance (measured by Return on average assets and return on average equity) as the dependent variable. Bank size, Inflation rate and GDP growth rate constituted control variables. The interplay among these study variables is depicted in figure 2.1

3.0 Research methodology

This study was conducted in Kenya given that the units of study are Microfinance banks that are geographically spread all over the country. The study employed a longitudinal research design and utilized panel data covering the period from 2011 to 2015. The target population for this study comprised 12 licensed microfinance banks operating in Kenya. The units of study were sampled purposively to ensure the availability of financial data during the 2011-2015 study period. Therefore, six Microfinance banks that were in operation during this study period formed the sample size. Document analysis Guide was used to gather secondary quantitative data on risk management and financial performance from the Microfinance banks (MFBs) published financial reports (the balance sheets and income statements) obtained from the MFBs and CBKs' website and publication from the MFBs head offices. The panel data analysis for this study was executed by using both descriptive and inferential statistical techniques. STATA version 12 software was used to generate descriptive and inferential statistics and the estimation of a multiple regression model using General Methods of Moments (GMM).

3.1 Model Estimation

This study utilized a model built on the one proposed by Athanasoglou et al., (2006), Flamini et al., (2009), Ommeren (2011), and Dietrich and Wanzenried (2011), as in equation 3.2.

$$y_{it} = \alpha_i + \beta_i \sum_{i=1}^{t} x_{it}^{i} + \beta_j \sum_{i=1}^{t} x_{it}^{j} + u_{it} \quad \text{..... 3..1}$$

Where: $u_{it} = \mu_i + v_{it}$

y_{it} **:** represents the dependent variable and measures bank financial performance, estimated by ROAE and ROAA, for Microfinance bank *i* at time *t*, with *i* = 1, …N=6 and *t* = 1,…T= *5*.

N: represents the number of cross-sectional observations and T the length of the sample period.

α_i : denotes the constant term.

β_i : refers to a vector of *k* parameters that estimate the sign and the slope of parameters for all explanatory variables.

$\sum_{i=1}^{t} x_{it}^{i}$: denotes a vector of Liquidity Risk management variables (FGR and CAR)

$\sum_{i=1}^{t} x_{it}^{j}$: denotes a vector of control variables (Bank Size, Inflation rate and GDP growth rate)

u_{it} : refers to the disturbance error.
μ_i : refers to the unobserved heterogeneity (the fixed effect).
v_{it} : refers to the idiosyncratic error.

This model is a one-way error component regression, where (μ_i) is IIN (0, $\sigma^2_{\mu i}$) and independent of (v_i) which is IIN (0, σ_{vij}. A banks' financial performance shows a tendency to persist over time, reflecting barriers to market competition (Berger, Bonime, Covitz, & Hancock, 2000). Therefore, the study adopted a dynamic characteristic of the model by including a one-period lagged dependent variable ($y_{i,t-1}$) of Microfinance bank (i) at time (t-1) among the regressors. Accordingly, equation (2) is expanded with the lagged financial performance to become:

$$y_{it} = \alpha_i + \delta y_{i,t-1} + \beta_i \sum_{i=1}^{t} x_{it}^{i} + \beta_j \sum_{i=1}^{t} x_{it}^{j} + \mu_i + v_{it} \quad \text{..... 3.2}$$

Where:
($y_{i,t-1}$): represents the one-period lagged dependent variable.
(δ): represents the coefficient of the one-period lagged dependent variable, which measures the speed of adjustment of Microfinance bank financial performance to equilibrium.

3.7.6 Empirical Model

Based on equation 3.1, the Microfinance banks' financial performance (FP) was modeled as a function of credit risk management as:

$ROAA=\alpha+\beta_1 FGR+\beta_2 CAR+\beta_3 logS+\beta_4 GDP+\beta_5 IF+\varepsilon$ 3.3a
$ROAE=\alpha+\beta_1 FGR+\beta_2 CAR+\beta_3 logS+\beta_4 GDP+\beta_5 IF+\varepsilon$ 3.3b

4.0 Results and Discussion

4.1 Descriptive Statistics Analysis

Descriptive statistical variables are summarized and presented in Table 4.1, which shows the mean value for each variable, as well as minimum, maximum and standard deviation. It indicates that the micro finance banks in Kenya, on average, had a positive financial performance throughout the period 2011-2015. For the total sample, the mean for ROAA and ROAE equals 16.86% and 97.30%. Their median is 18.29% and 95.70% with a minimum of -4.94% and -21.20%, and a maximum of 30.77%, and 273.30% respectively. This suggests low usage of assets to generate wealth in the sample Micro finance banks, even though there is moderate utilization of shareholders' funds to generate wealth. There is also substantial variation in financial performance reflected in a standard deviation of 9.24% and 84.30% for ROAA and ROAE respectively.

The liquidity risk management component has FGR variable whose mean and median is 18.07% and 13.41% respectively with a minimum of -3.86% and a maximum of 51.33%. There is relatively less variation in the financial gap ratio reflected in the standard deviation of 14.71%. The other variable is CAR that has a mean and a median of 31.14% and 20.98% respectively with a minimum of 6.42% and a maximum of 80.65%. There is however, moderate variation in the financial gap ratio reflected in the standard deviation of 24.19%. The mean value of CAR of 31.14% is within the recommended industry ratio, but the FGR mean value of 18.07% is slightly lower than the recommended liquidity of 20%.

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The mean and median of Log S equals to 9.223 and 9.368 respectively with a minimum of 7.771 and a maximum of 10.431. There is less variation in size of microfinance banks indicated by log of assets reflected in the standard deviation of 8.79%. On the other hand, the mean and median of the GDP equals to 5.45% and 5.60% respectively with a minimum of 4.4% and a maximum of 6.2%. Therefore, we can observe that there is minimal variation in real gross domestic product growth rate reflected in the standard deviation of 0.683%. Moreover, the

mean and median of IF variable equals 8.708% and 7.496% respectively with a minimum of 5.563% and a maximum of 14.278%. There is also less variation in inflation reflected in the standard deviation of 3.401%.

Table 4.1: Descriptive Statistics for the Dependent and Independent Variables

Variable	Total Count	Mean	St. Dev	Minimum	Median	Maximum	Skewness	Kurtosis
ROAA	30	0.1686	0.0924	-0.0494	0.1829	0.3077	-0.26	0.18
ROAE	30	0.973	0.843	-0.212	0.957	2.733	0.11	-0.91
FGR	30	0.1807	0.1471	-0.0386	0.1341	0.5133	0.10	-0.11
CAR	30	0.3114	0.2419	0.0642	0.2098	0.8065	0.01	-0.53
Log S	30	9.223	0.879	7.771	9.368	10.431	-0.23	-1.34
GDP	30	5.450	0.683	4.400	5.600	6.200	-0.42	-1.03
IF	30	8.708	3.401	5.563	7.496	14.278	0.29	-0.73

Source: Researcher (2015)

4.2 Collinearity

To check whether the independent variables are collinear, variance inflation factor (VIF) test for each variable entering the regression model was performed. Table 4.2 represents the VIF for ROAA and ROAE as measures of dependent variable. As shown in tables 4.2 all VIF are less than 10 and tolerance are greater than 0.05, suggesting that multi collinearity is not a problem in this study (Gujarati, 2004).

Table 4.2 Variance Inflation Factor (VIF)

Dependent Variable ROAA, ROAE

Model	Collinearity Statistics	
	Tolerance	VIF
FGR	0.276	3.630
CAR	0.232	4.310
Log S	0.238	4.202
GDP	0.355	2.814
IF	0.451	2.002

Source: Research data 2015

4.3 Unit root test

In order to determine the stationarity of the panel data series for ROAA and ROAE, panel unit tests were performed. The Fisher type test of Augmented Dickey-Fuller (ADF) is presented in Table 4.3 and 4.4. Unlike Levin Lin Chun (LLC) test, this test consider the parameter ρi for the autoregressive equation to vary across panels and therefore panel specific. In ADF tests for ROAA and ROAE series, all the two tests strongly reject the null hypothesis that all the panels contain unit roots at 5% level of significance, and conclude that both series are stationary. Choi's (2001) simulation results suggest that the inverse normal Z statistic offers the best trade-off between size and power, and he recommends using it in applications. It is observed that the inverse logit L* test typically agrees with the Z test. Under the null hypothesis, Z has a standard normal distribution and L* has a t distribution with 5N + 4 degrees of freedom. Low values of Z and L* cast doubt on the null hypothesis. When the number of panels is finite, the inverse chi-squared P test is applicable; this statistic has a chi-square distribution with 2N degrees of freedom, and large values are cause to reject the null hypothesis. For large panels, Choi (2001) proposes the modified inverse chi-square Pm test which converges to a standard normal distribution; a large value of Pm casts doubt on the null hypothesis.

Table 4.3 Fisher-type unit-root test for ROAA based on augmented Dickey-Fuller tests

xtunitroot fisher ROAA, dfuller trend demean lags(2)

Ho: All panels contain unit roots	Number of panels = 6
Ha: At least one panel is stationary	Number of periods = 5
AR parameter: Panel-specific	Asymptotics: T -> Infinity
Panel means: Included	
Time trend: Included	Cross-sectional means removed
Drift term: not included	ADF regressions: 2 lags

Statistic			p-value
Inverse chi-squared (12)	P	29.2093	0.0136
Inverse normal	Z	-1.7306	0.0168
Inverse logit t (34)	L*	-1.6366	0.0155
Modified inv. chi-squared	Pm	5.4716	0.0026

P statistic requires number of panels to be finite.
Other statistics are suitable for finite or infinite number of panels.

Source: Research data 2015

Table 4.4 Fisher-type unit-root test for ROAE based on augmented Dickey-Fuller tests

xtunitroot fisher ROAE, dfuller trend demean lags(2)

Ho: All panels contain unit roots	Number of panels = 6
Ha: At least one panel is stationary	Number of periods = 5
AR parameter: Panel-specific	Asymptotics: T -> Infinity
Panel means: Included	
Time trend: Included	Cross-sectional means removed
Drift term: not included	ADF regressions: 2 lags

Statistic			p-value
Inverse chi-squared (12)	P	25.9804	0.0108
Inverse normal	Z	-2.9170	0.0018
Inverse logit t (34)	L*	-2.7895	0.0043
Modified inv. chi-squared	Pm	2.8537	0.0022

P statistic requires number of panels to be finite.
Other statistics are suitable for finite or infinite number of panels.

Source: Research data 2015

4.4 Correlation Matrix

Table 4.5 depicts the correlations between the explanatory variables and the dependent variable. It is observed that financial gap Ratio (FGR) is positively and significantly correlated to ROAA and ROAE with correlation coefficients of 0.3902 and 0.4352 respectively. This is a moderate correlation and suggests that higher financial gap (difference between loans and deposits) relative to total assets is associated with enhanced financial performance of MFBs as measured by RAOA and ROAE. Even though bank managers mostly assume core deposits as stable and cheap source of funds which can permanently finance the supply of banking loans, if the financial gap is positive, the bank should fill this gap by its cash funds through selling cash assets and borrowing from money market as a way of ensuring it liquidity (Chen, 2010).

Similarly Capital adequacy ratio (CAR) is positively and significantly correlated to ROAA and ROAE with correlation coefficients of 0.4519 and 0.5008 respectively. This is a moderate correlation and suggests that liquidity risk management practices that maintains high levels of equity relative to total assets of MFB results in moderate increase in Returns on average assets and owners' equity or shareholders wealth. Therefore a capital structure with a higher proportion of equity component as opposed to external funding is favourable for enhanced financial performance of MFBs.

Table 4.5: Correlation Matrix of Dependent and Independent Variables

	ROAA	ROAE	FGR	CAR
ROAA	1.0000			
ROAE	0.5254*	1.0000		
FGR	0.3902*	0.4352*	1.0000	
CAR	0.4519*	0.5008*	0.2605	1.0000

Notes: * indicate significance at 5% level for the Pearson correlation coefficients
Source: Research data (2015)

4.5 Model Estimation and Hypothesis Testing

Tables 4.6 and 4.7 reports the regression outcomes of ROAA and ROAE series respectively as measures of Microfinance banks financial performance using one-step GMM System dynamic panel-data estimation.

4.5.1 Model Fitness

The model test of fitness was performed using the Wald test. As depicted in table 4.6 and 4.7, the Wald chi^2 test statistic is significant at 5% level. This statistic has the null hypothesis; Ho: all coefficients are zero. Wald chi^2 p-value of 0.0000 which is < 0.05 leads to the rejection of Ho and conclude that all predictor regression coefficients are significantly different from zero at 5% level of significance. Also, The GMM-in-System specifications seem to fit the panel data reasonably well since the Sargan (or Sargan-Hansen test) shows no evidence of over-identifying restrictions and the second-order autocorrelation was absent as depicted in Arellano-Bond test in tables 4.6 and 4.7. Further, the null hypothesis for Breusch-Pagan/Cook-Weisberg test for heteroscedasticity is not rejected implying that heteroscedasticity is not a problem in this study.

The lagged dependent variables (ROAA L1 and ROAE L1) measure the degree of persistence in the financial performance of MFBs. In table 4.6, the lagged dependent variable ROAA L1 has a significant coefficient equals to 39.72% (significant at 5%). Similarly, table 4.7 shows that coefficient of the lagged ROAE L1 at 22.68% is significant at the 5% level. These significant coefficients representing (δ) in this study as per equation 3.4 indicates a small degree of persistence characterizing performance of MFBs and justifying the use of the dynamic model. Besides, this persistence performance means the forces of competition are not sufficiently strong to cause all abnormal profits to dissipate within a one-year time span (Al-Jafari and Alchami, 2014). In this study the estimates on lagged financial performance ratios ranging between 22.68% to 39.72% is slightly lower compared to the estimate reported by Naceur and Magda (2008) at 42.5% to 57.9% for Egyptian banks, Al-Jafari and Alchami (2014) at -13.3% to 50% for Syrian banks and more or less similar to Athanasoglou et al., (2008) at 26% to 35% but contrast with the finding by Goddard et al. (2004) indicating lack of profit persistence in European banks.

Table 4.6: GMM System dynamic panel-data estimation, one-step results: ROAA series

Independent variable: ROAA — Number of obs = 30
Group variable: MFB — Number of groups = 6
Time variable: YEAR: 2011-2015
Obs per group: min= 5
Avg= 5
Max= 5
Number of instruments = 16 — Wald chi^2 (5) = 47.49
Prob > chi^2 = 0.0000

ROAA	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
ROAA						
L1.	.3971684	.1902969	2.09	0.037	.0241932	.7701435
FGR	.1565035	.2053449	0.76	0.014	-.2689721	.1859651
CAR	.2044961	.1109559	1.84	0.004	-.0959736	.3389657
_cons	.6286722	.3467343	1.81	0.010	-.0509146	1.308259

Sargan test of over id restrictions: H_0: over identifying restrictions are valid
Chi^2 (25) = 13.6592 Pr > Chi^2 = 0.9674
Arellano-Bond test for AR (1) in first differences: z = -1.80 Pr > z = 0.073
Arellano-Bond test for AR (2) in first differences: z = -0.87 Pr > z = 0.383
H_0: no autocorrelation
Breusch-Pagan/Cook-Weisberg test for heteroscedasticity:
H_0: constant variance
Chi^2 (6) = 5.65 Pr > Chi^2 = 0.2624

Source: Research data 2015

Table 4.7: GMM System dynamic panel-data estimation, one-step results: ROAE series

Independent variable: ROAE — Number of obs. = 30
Group variable: MFB — Number of groups = 6
Time variable: YEAR: 2011-2015
Obs. per group: min = 5
avg = 5
max = 5
Number of instruments = 16 — Wald chi^2 (5) = 13.02
Prob. > chi^2 = 0.0232

ROAE	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
ROAE						
L1.	.2268584	.0707126	3.21	0.001	.0882643	.3654525
FGR	.3177435	.1867838	1.00	0.017	-2.004215	.6487284
CAR	.2589121	.2729335	0.95	0.014	-.2440169	1.561841
_cons	.3909013	.4721605	0.83	0.008	-.5345162	1.316319

Sargan test of over id restrictions: H_0: over identifying restrictions are valid
Chi^2 (25) = 13.91734 Pr > chi^2 = 0.9632
Arellano-Bond test for AR (1) in first differences: z = -1.80 Pr > z = 0.073
Arellano-Bond test for AR (2) in first differences: z = -0.87 Pr > z = 0.383
H_0: no autocorrelation
Breusch-Pagan/Cook-Weisberg test for heteroscedasticity: H_0: constant variance
Chi^2 (6) = 4.21 Pr > chi^2 = 0.3112

Source: Research data 2015

4.5.2 Test of Hypotheses

Based on the study objectives, the hypotheses of the study were tested at 5% level of significance as follows:
$H_{01.1}$: There is no significant relationship between FGR and financial performance of MFBs in Kenya.
Tables 4.6 and 4.7 depict a positive relationship between FGR both financial performance measures. The regression coefficient FGR equals 0.1565035 and .3177435 when the performance measures are ROAA and ROAE, respectively, although the relative effect of the FGR is about two times bigger for ROAE than for ROAA (15.6% versus 31.7%). It can also be observed that the z-statistic of GAP is significant, and therefore reject the null hypothesis and conclude that FGR has a significant positive relationship with both ROAA and ROAE performance measures. The Financial gap ration (FGR) expressed as the difference between loans and deposit to total assets has a positive relationship to both performance measures. This implies the higher this ration, the enhanced performance. This can be attributed to the fact that even though core deposits are regarded as loan resources with the least cost, when the demand for funds exceeds deposits, the bank can fill this gap by its cash funds through selling cash assets and borrowing from money market and still realize better returns on both assets and shareholders wealth, due to higher net interest charges on loans than on deposits. This finding concurs with that of Samuel (2013) who posted a positive significant relationship between FGR and ROA for banks in Ghana. On the contrary Mohammad, Ali and Mahshid established a negative relationship between FGR and both ROA and ROE for banks in Iran. This could be attributed to different estimation models used in estimation.

$H_{01.2}$: There is no significant relationship between CAR and financial performance of MFBs in Kenya.
Similarly, for CAR component of liquidity risk, a positive relationship with both financial performance measures is depicted in table 4.6 and 4.7. The coefficient of FGR equals 0.2044961 and 0.2589121 when the dependent variable is measured by ROAA and ROAE, respectively. This implies that a one unit increase in CAR results in an increase of 0.2 in ROAA and 0.25 in ROAE. This may be explained by the fact that high capital adequacy may reduce the risks of the bank, and at the same time, the shareholders benefit more from the leverage effect. Both table 4.6 and 4.7 have z-statistic of CAR as positively significant at 5% level. Hence the null hypothesis is rejected and concludes that CAR has a positive significant relationship with both ROAA and ROAE performance measures.

This result (positive effect of CAR) is similar to the findings of Samuel (2013), Al-Jafari and Alchami (2014), Toutou and Xiaodong (2011), Dietrich and Wanzenried (2011), Mathuva (2009), Berger (1987), Bourke (1989), Kosmidou et al., (2006), Pasiouras and Kosmidou (2007), Naceur and Goaied (2008), Naceur and Omran (2008), and Ommeren (2011), Demirguc-Kunt and Huizinga (1999) providing support to the argument that well capitalized banks face lower costs of going bankrupt and reduce the cost of funding, resulting in higher profitability. Further, as Berger (1995) points out, high capital ratio lowers the cost of insured debt. However, contrast to the results of this study, Molyneux and Thornton, Ail and Tabari (2013) found that the coefficient of equity-to-asset ratio is significant and negative. Even though similar methodology was used by these studies, the contrasting results could be attributed to economic conditions of global financial crisis experienced during the study period.

4.6 Effect of Moderator Variables

The Moderator variables used in this study are growth rate in GDP, inflation rate (IF) and bank size measured as log of assets (log S). The first two are external macroeconomic factors while the latter is an internal factor. The system GMM model was estimated incorporating these variables and the results presented in table 4.8 and 4.9.

Table 4.8: GMM System dynamic panel-data estimation, one-step results: ROAA series with moderator variables included

Independent variable: ROAA Number of obs = 30
Group variable: MFB Number of groups = 6
Time variable: YEAR: 2011-2015
Obs per group: min = 5
avg = 5
max = 5
Number of instruments = 19 Wald chi^2 (5) = 49.55
Prob > chi^2 = 0.0000

ROAA	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
ROAA						
L1.	.4171684	.1912959	2.18	0.037	.0242932	.7701455
LogS	-.0359129	.0460656	0.78	0.436	-.1261999	.0543741
GDP	.3857781	.3888507	0.99	0.021	-.3763552	1.147911
IF	.0773016	.0700583	1.10	0.270	-.0600102	.2146133
FGR	.2505000	.2300435	1.08	0.015	-.2689721	.1859651
CAR	.2013905	.1109453	1.82	0.004	-.0959735	.3389656
_cons	.6406730	.3557342	1.80	0.010	-.0509146	1.308259

Sargan test of overid. restrictions: H_0: over identifying restrictions are valid
chi^2 (25) = 13.6471 Pr > chi2 = 0.9688
Arellano-Bond test for AR (1) in first differences: z = -1.80 Pr > z = 0.072
Arellano-Bond test for AR (2) in first differences: z = -0.88 Pr > z = 0.391
H_0: no autocorrelation

Source: Research data 2015

Table 4.9: GMM System dynamic panel-data estimation, one-step results: ROAE series with moderator variables included

Independent variable: ROAE Number of obs. = 30
Group variable: MFB Number of groups = 6
Time variable: YEAR: 2011-2015
Obs per group: min = 5
avg = 5
max = 5
Number of instruments = 19 Wald chi^2 (5) = 16.04
Prob > chi^2 = 0.0211

ROAE	Coef.	Robust Std. Err.	z	P>|z|	[95% Conf.	Interval]
ROAE						
L1.	.2061184	.0607135	3.39	0.002	.0882645	.3654536
LogS	-.0273131	.1226287	-0.22	0.824	-.2676609	.2130347
GDP	0.653349	.6653754	0.98	0.003	.6492369	3.257461
IF	.4148027	.1326936	3.13	0.002	.1547280	.6748774
FGR	.5165430	.2867003	1.80	0.019	-2.004215	.7487284
CAR	.2589121	.2729335	0.95	0.014	-.2440169	1.561841
_cons	.4109015 .	`4822603	0.85	0.009	-.5345245	1.316326

Sargan test of over id. restrictions: H_0: over identifying restrictions are valid
chi^2 (25) = 13.91734 Pr > chi2 = 0.9632
Arellano-Bond test for AR (1) in first differences: z = -1.80 Pr > z = 0.073
Arellano-Bond test for AR (2) in first differences: z = -0.87 Pr > z = 0.383
H_0: no autocorrelation

Source: Research data 2015

The Log S which represents size variable of the MFB presents a negative effect on ROAA and ROAE with a coefficient of -.0359129 and -.0273131 respectively. Interestingly both effects are insignificant as shown in table 4.12 and 4.13. Greater size may generate economies of scale, thus an increase of performance, but at the same time, the large organizations are often affected by rigidities, inertia, bureaucracy, that may decrease the performance (Kosmidou, 2008; Athanasoglou et al., 2006). Using ROAE as a measure of performance, the finding of this study concur with that of Naceur (2003), Sufian and Habibullah (2009) and Pasiouras & Kosmidou, 2007) who reported that bank size have a negative impact on profitability and observed that the bigger the banks, the more they face diseconomies of scale beyond a certain level, and the smaller the banks, the more they achieve economies of scale up to a specific level. However, using ROAA, the result is similar to that of Alexiou and Sofoklis (2009) and Flamini, McDonald, & Schumacher (2009) whose finding show that the coefficient of the size variable as measured by the logarithm of assets is positive but significant, reflecting the advantages of being a large company in the financial services sector.

As for GDP growth rate has a positive significant relationship with both ROAA and ROAE with regression coefficients 0.3857781and 0.653349 respectively. This suggests that the GDP growth rate has a strong positive effect on financial performance of the microfinance banking sector. The economic growth, expressed by the GDP (per capita) growth which averaged a moderate 5.45% during the study period is expected to have had multiple consequences among which is the increase of bank activity. Both the increase of customer deposits and loans granted and of the interest margins had a positive impact on MFB performance. When the economic activity increases, the demand for loans and deposits increases and positively affect the profit margins (Sufian and Chong, 2008). In addition, the rate of GDP growth reflects the state of the economic cycle and is expected to have an impact on the demand for banks loans. The positive impact of GDP supports the argument of the positive association between growth and financial sector performance (Kosmidou, Tanna & Pasiouras, 2006).

The effect of inflation (IF) rate based on consumer price index is positive and significant on ROAE (regression coefficient of 0.4148027, z=3.13 , p>0.002) but the effect is insignificant for ROAA. The positive relationship between inflation and profitability supports the theory that inflation provides banks opportunity to adjust interest rate change which may result in revenue generation and increases bank profitability. Moreover, projecting the effect of inflation expectations in operational costs of MFBs enhances returns on average equity. Therefore, correct forecast of inflation could impact positively on MFB's returns on shareholders wealth. This finding is consistent with that of Bourk (1989) and Thornton (1992). On the contrary, Kunt and Huizinga (1999) conclude that banks in developing countries tend to be less profitable in inflationary environments, particularly when they have a high capital ratio. In these countries, bank costs actually increase faster than bank revenues. Additionally, the study of Abreu and Mendes (2000) reports a negative coefficient for the inflation variable in European countries.

Similarly, Table 4.8 and 4.9 report FGRs regression coefficient of 0.1565035 for ROAA and 0.3177435 for ROAE respectively. With moderator variables included in the model, Table 4.12 and 4.13 reports FGRs regression coefficient of 0.250500 for ROAA and 0.5165430 for ROAE respectively. This indicates significant increase of 0.10 unit and 0.20 units respectively. Thus the moderator variables accounts for the increase of FGR by 0.1 to 0.2 units. This can be attributed to a modest average inflation (IF) rate of 8.708% and average GDP of 5.45% during the study period. These macro-economic factors could have favoured increased economic activity that could have resulted in increased demand for loans and deposits. Hence, increased financial gap against MFB assets, translating into increased FGR that impacts positively on performance.

4.7 Empirical Regression Model

The regression model was based on the two equations:

$ROAA=\alpha+\beta_1 FGR+\beta_2 CAR+\beta_3 logS+\beta_4 GDP+\beta_5 IF+\varepsilon$

$ROAE=\alpha+\beta_1 FGR+\beta_2 CAR+\beta_3 logS+\beta_4 GDP+\beta_5 IF+\varepsilon$

These were modeled empirically to:

$ROAA=0.64070.2515FGR+0.2014CAR+0.0359logS+0.3858GDP+0.0773IF$ ……4.7a

$ROAE=0.4109+0.5165FGR+0.2589CAR+0.0273logS+0.6533GDP+0.4148IF$ ……..4.7b

5.0 Conclusions

The findings indicate a moderate correlation and a significant positive relationship between both FGR and CAR and financial performance measures. The implication of this is that with increase in financial gap and capital adequacy, ROAA and ROAE also increases to a moderate extent. Thus, the reported ROAE of a modest 67.3%

can be concluded to The CAR of 31.14% reported for the MFBs which is within the prudential capital adequacy ratio of 30% and FGR of 18.07% that is slightly less than the recommended prudential liquidity ratio of 20%. Therefore it can be concluded that bank managers can maintain higher financial gap and hold higher equity to total assets as a way of reducing the liquidity risks of the MFB, and at the same time, the shareholders benefit more from the leverage effect.

5.1 Recommendations

Given that maintaining a prudential capital adequacy and liquidity and that greater finance gap enhances performance, it is recommended that:

1. The MFB finance manager should institute a robust framework for comprehensively projecting cash flows arising from assets, liabilities and off-balance sheet items over an appropriate set of time horizons. This should be followed by establishing a funding strategy that provides effective diversification in the sources and tenor of funding and regularly gauge its capacity to raise funds quickly from each source. It should identify the main factors that affect its ability to raise funds and monitor those factors closely to ensure that estimates of fund raising capacity remain valid. A formal contingency funding plan that clearly sets out the strategies for addressing liquidity shortfalls in emergency situations should be in place.

2. The regulator-CBK should supplement their regular assessments of a bank's liquidity risk management framework and liquidity position by monitoring a combination of internal reports, prudential reports and market information.

5.2 Suggestions for further research

For future research, this study can be extended to cover longer time periods and larger sample size. Other econometric techniques can be applied to verify the relationship.

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