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**The Effect of Credit Risk Management on Financial Sustainability of Microfinance
Institutions in Kenya**

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DEDICATION

To the Almighty God who gave me strength, insight, good health and sound mind to do and complete this thesis, glory is, to His name.

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ABSTRACT

Microfinance has been considered to be a powerful tool to fight poverty through the provision of basic financial services such as credit, savings, insurance, and transfer of funds. However, the credit support granted to such micro businesses usually lacks collateral, it is imperative that the management of such credit services be sound in order to mitigate the credit risks involved. Credit risk management determines the success and survival of the MFIs. The performance of the MFI is crucial because it boils down to the long term survival. The purpose of this research was to find out the effect of credit risk management indicators on financial sustainability of MFIs in Kenya.

Data was analyzed from 37 MFIs who were registered with AMFI by 2012 in Kenya. A linear regression model was used where financial self-sufficiency was the dependent variable while predictor variables were portfolio at risk, risk cover ratio, loan loss provision, number of borrowers and total assets both as control variables for breadth of outreach and size of the organization respectively.

The study found out that portfolio at risk and loan loss provision both had a significant negative effect on financial sustainability meaning increase in portfolio at risk and loan loss provision will reduce financial sustainability of the microfinance institution. Risk coverage ratio and number of borrowers had a positive impact on financial sustainability but not statistically significant. However total assets had a significant positive impact meaning increase in total asset would increase financial sustainability. The study therefore established that credit risk management affect financial sustainability of microfinance institutions in Kenya. Meaning that in order to increase financial sustainability of MFIs there is need to properly manage credit risk because according to the study, credit risk management significantly affects financial sustainability of microfinance institutions.

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LIST OF ABBREVIATIONS

MFIs	Microfinance Institutions
PAR	Portfolio at Risk
RCR	Risk Coverage Ratio
LRR	Loan Repayment Rate
LLP	Loan Loss Provision
AMFI	Association of Microfinance
DTMs	Deposit Taking Microfinance
MIX	Microfinance Information eXchange
FSS	Financial Self-Sufficiency
OSS	Operating Self-Sufficiency
CGAP	Consultative Group Assisting the Poor

CHAPTER ONE

INTRODUCTION

1.1 Background to the study

Credit risk management is essential to optimizing the performance of financial institutions, however lending is a risky venture as it is not easy to fully secure all the money that has been given to the borrowers by the financial institutions (Sharma & Zeller, 1997). It has been found out that in order to minimize loan losses and hence improve the financial performance, it is critical for financial institutions to have a sound credit risk management in place (Basel, 2006). Sharma & Zeller (1997) established that many state-sponsored agricultural development banks failed due to, among other things, their inability to minimize default amongst their borrowers. Additionally, Raj & Sindhu, (2013) observed that financial institutions are faced with a number of risks which threatens their performance and the long term sustainability. These risks include credit risk, operational risk and strategic risk (Richard, Chijoriga, & Kaijage, 2008). Given the asymmetric information that exists between lenders and borrowers, financial institutions must have a mechanism to ensure that they not only evaluate default risk that is unknown to them ex ante in order to avoid adverse selection, but also that can evolve ex post in order to avoid moral hazards (Ayayi & Sene, 2010).

Aemiro & Mekonnen, (2012) pointed out that for an MFI to continue providing financial services to the poor on a sustaining basis, they themselves must be viable and sustainable. According to Haq, Skully, & Pathan, (2010) MFIs have two operational goals which are used to evaluate their performance. These are outreach and sustainability. Ejigu (2009) defines sustainability as the ability of the MFI to cover its costs with earned revenue. According to Ejigu the common measures of financial sustainability includes, Return on Assets (ROA), Operational Self Sustainability (OSS) and Financial Self Sufficiency (FSS). From Khalily, (2004) we find that one of the ways of achieving financial sustainability of microfinance institutions is through effective management of loans. Chowdhury, (2007) stated that microfinance institutions need to identify clients who have a high potential to repay the loans by using the principle of sequential loans to reduce their credit risks. Richard et al., (2008) argues that an institution should therefore

put in place effective credit risk management in order to optimize their performance and attain sustainability.

Weak credit risk management has been cited by Richard et al., (2008) as a major reason associated with lending difficulties and hiccups in financial institutions . In fact the 2007 global financial crisis witnessed all over the world was because of problems occasioned by poor credit risk management. A study carried out by Pezzuto, (2008) revealed that one of the causes of the deterioration and fall of some banks and mortgage institutions during this period was as a result of loss of control in their portfolio risk management. He pointed out that the loan portfolio of the institutions became worse suddenly and unexpectedly, but the whole industry underestimated the blast; the end result was collapsing of some financial institutions.

Moti, Masinde, Mugenda, & Sindani (2012) observed that in order for any lending institutions to have good repayment rate they require good credit risk management practices. Thus credit risk management should be a vigorous mechanism which enables financial institutions to actively manage their portfolios in order to minimize losses and earn a good return for the investors (Raj & Sindhu, 2013). In this regard, Richard et al., (2008) has defined credit risk management as a strategy of coming up with sound policies and procedures to ensure effective and efficient lending all the way to collection of repayments. They argue that sound credit risk management ensures continued profitability and stability in the financial institution, while a weak one results to poor financial performance. However, putting in place risk-proof systems is yet to be achieved by financial institutions; credit risk especially, has become a challenge to institutional sustainability and growth, especially MFIs (*Central Bank of Kenya supervision annual report*, 2012). Credit risk management debate has been in vicinity of not only the financial institutions but also in the business circles because the risks of a trading party not fulfilling his obligations in full on due date can seriously jeopardize the affairs of the other party (Achou & Tenguh, 2008).

To maintain good portfolio quality, microfinance institutions must understand what causes arrears and how arrears can be reduced (Norell, 2001) because MFIs obtain financial revenue from loans and other financial services in the form of interest, penalties and commissions (Ayayi & Sene, 2010). Ayayi & Sene (2010) further argues that a gateway to achieving scale, operational and financial self sufficiency is to reduce the percentage of loans in arrears. Norell,

(2001) also argues that arrears or non performing loans are part of portfolio at risk (PAR) and the institution stands to lose this money. Nonperforming loans are costly to the institution because they result to loan losses and high loan provisions which reduces profits and by extension eroding the capital base of the institution (Schreiner, 2000). Schreiner, (2000) also noted that the terms of the loan contract affect risk and for that matter performance of loan and that a loan repaid monthly is riskier than a loan repaid weekly.

Ayayi, (2012) shows us that Loan repayment performance and interest rates charged plays a big role in financial performance of the MFIs. Krauss & Walter, (2009) argues further that the quality of the loan portfolio is crucial to maintaining the liquidity of the MFI which is key to operations and by extension performance, because loans form the largest portion of the MFI's assets. Baklouti (2013) warns that, to avoid being caught in the impasse of low sustainability, the MFI should maximize their repayment performance to preserve stability. He further argues that high repayment rate, reduces the dependence on subsidies and gifts from governments and donors, and helps to improve the chances of success in achieving self-sustainability because it minimizes credit risk.

1.1.1 Credit Risk and Credit Risk Management

Credit risk is the uncertainty in a given counterparty's ability to meet its obligations (Fatemi, 2006). In other words, credit risk is the risk of defaulting. Treacy & Carey, (2000) further asserts that credit risk of a loan involves both the probability of default and the portion of that loan value that may be lost in case the loan is not paid. Credit risk management is a structured approach to managing uncertainties through risk assessment, developing strategies to manage it, and mitigation of risk using managerial skills (Khan & Ashta, 2013). In an endeavor to manage credit risk, Treacy & Carey (2000) says that many banks including other financial institutions have developed structured or formal systems for approving loans, monitoring portfolio, analysis of adequacy of loan loss reserves, profitability and loan pricing. Various factors are outlined by Raj & Sindhu (2013), as being responsible for credit risk which intern adversely affects the profitability of the financial institution. According to them discrepancies and inconsistencies during loan appraisal, lack of clarity in lending policies and procedures, poor risk management strategies and lack of proper organization structure with respect to responsibility and authority are some of the factors which can result to credit risk.

In the context of microfinance institutions Khan & Ashta, (2013) define risk management as the process of controlling the likelihood of occurrence and potential severity of an undesirable event; It involves identification, measuring, limiting, and monitoring risks faced by an institution. Miller(2008) on the other hand explains that, management of credit risk involves well-rounded assessment and analysis of borrowers before lending. In order to achieve this, Moti et al., (2012) maintains that financial institutions use the 5 C's, character, capacity, collateral, condition and capital model to evaluate and determine risk of their customers. Even Ahmed, (2009) maintains that in order to best serve the financial needs of the poor, institutions needs to provide efficient and receptive lending, savings, insurance and other financial services that poor people need to build their business, increase income and assets but on the other hand reduce their risks. Pike & Cheng, (2001) also asserted that an effective credit risk management determines the quality of a portfolio of any institution.

Rosch and Scheule, (2007) described the financial distress that shock the strong asset-backed institutions which created an outcry in the banking sector as one caused by ineffective risk models. They argued that these risk models needed to be redesigned in order to strictly manage the financial depression. This financial crises of the twentieth century created serious clumsiness and legislative rapacity of old risk modeling and distressed large portfolio investments of American, European and Middle East financial institutions (Gourinchas & Obstfeld, 2012).

According to Arvelo, Bell, Novak, Rose, & Venugopa (2008) and Vijender, Rachna, & Parul (2012) there are quantitative and qualitative credit risk analysis factors that are used by MFIs. The quantitative risk factors includes (1) Loan portfolio, (2) profitability, sustainability, and operating efficiency and (3) asset-liability management while the Qualitative risk factors on the other hand are (1) management and strategy, (2) systems and reporting; (3) operating procedures and internal controls and (4) growth potential. A summarized table with details of all the factors is in the appendix 1. This study focused on quantitative factors in this case loan portfolio and sustainability. Loan portfolio risk indicators includes portfolio at risk and mostly loans that are 30 past days due (i.e. PAR30), loan loss provision, risk coverage ratio, non-performing loans, (Arvelo et al., 2008). Loans are the primary assets of microfinance institutions that enhance sustainability, and therefore a thorough understanding of an MFI's loan portfolio is essential to conducting an effective credit management. As outlined earlier, sustainability entails the ability

of an institution to cover the operational and finance costs by revenues (Hudon & Traça, 2008) and the indicators for sustainability are operational self-sufficiency and financial self-sufficiency (Ayayi & Sene, 2010). In this case, a comprehensive management of MFIs requires rigorous assessment, measurement, monitoring, and management of the credit risks through close supervision and performance evaluation (Khan & Ashta, 2013).

1.1.2 Sustainability in microfinance institutions

Mustafa & Saat, (2013) point out that in the field of microfinance the performance of MFIs is evaluated in terms of sustainability (financial) and outreach (social). Sustainability can broadly be defined as coverage of the operational and finance costs by revenues (Hudon & Traça, 2008). Financial sustainability is where the operational costs of lending programs are covered by a combination of earned income and external sources of funding such as grants, subsidies, and donations (Doshi, 2010). However, a more clear definition of financial sustainability is given by Baklouti, (2013) as: “to be financially sustainable, a project or institution must receive a flow of profits, from interest and commission, that cover operating costs, inflation costs, costs related to the portfolio devaluation, financial costs, a risk premium and the return on capital brought by project investors or MFI shareholders”. In this case to ensure long term survival Doshi argues that microfinance institutions should strive to achieve self-sufficiency.

Financial sustainability is measured in terms of operational sustainability and financial self-sufficiency as outlined by (Kinde, 2012). Operational sustainability refers to the ability of the MFI to cover its operational costs from its operating income with or without subsidies or donations (Ayayi & Sene, 2010) while Financial self sufficiency (FSS) is defined as the ability of the institution to cover costs and to continue operations without resorting to gifts, subsidies and debt relief or without keeping depositors savings illiquid (Crombrugghe, Tinukue, & Sureda, 2008). Tucker & Miles, (2004) observed that very few microfinance institutions have achieved financial self-sufficiency citing that majority are weak and still cannot stand alone without subsidies from donors. It is in this light that Hermes & Lensink, (2011) reveal that more focus has been on financial self sufficiency with MFIs shifting from subsidies.

1.1.3 The concept of microfinance

In the late 1970s, when the “Jobra” experiment was underway under Professor Muhammad Yunus, several other pilot schemes were started by the Bangladesh Bank in collaboration with a

handful of the NGOs which were active then (Ahmed, 2009). At that time, it was difficult to conceive that these initiatives would lead to a major microfinance movement, which would make Bangladesh known to the rest of the world. Mohammad Yunus wrote in his autobiography that he was moved by the inability of the villagers in Jobra to access small loans due to their poor conditions and as such he gave out his own money which they paid back (Yunus, 1999). Due to the increased number of the poor people who needed more small loans, Yunus says he could not meet this demand and as such he went to the bank and requested the bank to give these poor people loan directly, unfortunately the bank refused and he took the loan under his name which he distributed to these poor people. They paid back very well and he replicated the same thing to other villages and that is how the Grameen Bank was born in 1983 as a village bank in Bengali (Yunus, 1999). This Grameen bank model has since been dispersed globally to counterbalance the insufficiency in savings and credit institutions and elude expensive lenders (Cull, Demirgüç-kunt, & Morduch, 2009). The Grameen bank has more than 95% of its borrowers as women with a payment rate of 98% (Karim, 2008).

According to Cull et al., (2009) lending in microfinance institutions usually takes two dimensions. There is the group lending methodology and the individual. Cull *et al* explains that the group lending methodology was the innovation by the Grameen bank and it is a model that is widely used by the microfinance institutions where the entire group is held responsible for the loan repayment. Individual lending refers to the traditional lending relationship between the bank and the individual customer (Cull et al., 2009). In Group-lending contracts members co-guarantee each other, mitigating problems created by informational asymmetries between lender and borrower (Morduch, 1999). Most of the institutions use both indicators because the clientele differs in both risk and other features; however the majority of microfinance borrowers have access to loans through group lending programmes (Hermes & Lensink, 2007a).

A well defined loan application process minimizes credit losses in the future as pointed out by Pollinger, Outhwaite, & Cordero-Guzmán, (2007). They further argue that all else being equal, a greater investment in the credit application process leads to lower subsequent rates of delinquency and default; conversely, a less stringent process would result in greater rates of credit loss in the future. Pollinger et al., (2007) outlined three steps involved in loan application process of the MFIs as part of credit risk management strategies used by MFIs. First one is the

Preliminary screening where the applicant is asked a set of short questions to ascertain his eligibility of the loan amount requested for. Second step is interviewing the applicant. Here due diligence is taken to ensure that the loan purpose and the borrower's ability to repay the loan are ascertained. Lastly, if the loan is recommended by the credit officer, the application is then stressed-tested by an underwriter who performs an auxiliary analysis to the cash flows and then approves it.

In order for MFIs to sustainably alleviate poverty, the microfinance institutions themselves should be profitable and sustainable (Aemiro & Mekonnen, 2012). According to Mustafa & Saat (2013) microfinance institutions have two primary goals namely, financial goal and social goal. Social goal pertains the external impact the MFI will make in alleviating poverty of their borrowers, and financial goal refers to the efficient and effective use of resources by the MFI while alleviating poverty (Nanayakkara & Mia, 2012).

The World Bank declared year 2005 as the year of microfinance with the aim to expand their poverty eradication campaign (Rahman, 2010). In its campaign it called for building of inclusive financial sectors to achieve the Millennium Development Goals and strengthen the powerful, often untapped, entrepreneurial spirit existing in communities around the world (Daher & Saout, 2013). Considerable evidence now shows that unconventional lenders like Grameen Bank can lend money to poor people whom no commercial bank cannot dare and achieve a good repayment (Ghatak & Guinnane, 1999). A key defining feature of a microfinance loan is the ability to secure credit without collateral due to poor economic conditions where members form groups which they use as social guarantees to obtain loans (Kamukama & Natamba, 2013). Microfinance can therefore be defined as the provision of thrift credit and other financial services and products of very little amounts to the underprivileged (mostly women) to enable them to raise their income and improve their living standards (Hudon, 2008). Littlefield, Murdugh, & Hashemi, (2003) argue that the beauty of microfinance is that, as programs approach financial sustainability, they can reach far beyond the limits of scarce donor resources.

1.1.4 Microfinance sector in Kenya

The Microfinance industry in Kenya has experienced major transformation over the past twenty years, growing from a hatchling concern dominated by a few donor and church-based NGOs to a vivacious industry increasingly driven by commercial sustainability. The brisk expansion of

microfinance institutions has helped improve credit access for the poor in Kenya. Association of Microfinance Institutions (AMFI) is the apex for the microfinance institutions in Kenya. According to AMFI website there were 62 MFIs as at 2013, spread as follows: 4 Microfinance banks, 8 deposit-taking MFIs, 4 wholesale MFIs, 41 retail MFIs, 3 insurance companies, 1 SACCO and 1 Development institution.

The Annual report given by Association of Microfinance Institutions (AMFI) for 2012 showed that the microfinance sector had a staggering average growth in total assets of 30.4% and are worth over KES 220bn (USD 2.59bn) as of Dec 2011, up from KES 129bn (USD 1.71bn) as of December 2009. The sector serves a clientele of nearly 12million, with nearly 1.5 million borrowers whose value of the outstanding loan book was KES 138.4bn as of Dec 2011 (USD 1.6 bn), and showed positive growth trends. In aggregate terms, the sector has disbursed KES 296bn over the three years. According to AMFI report (2012) risk coverage for the whole sector stands at 46.2% compared to the figure for the African region which is 56.2%. This shows that the sector has a high risk exposure and the credit risk management is still an issue in our Kenyan microfinance sector. Without adequate risk cover the portfolio which is the biggest asset for any lending institution is under siege and the institutional performance is at jeopardy. However the commercial banks and DTMs are believed to have stronger collateralization of the portfolio. The risk coverage ratio dropped further to 45.4% in 2011 when commercial banks are excluded, suggesting that among unregulated credit-only institutions provisioning policies are weak and not adequate to cover for present and future exposure to credit risk.

As MFIs continue to grow and expand rapidly, serving more customers and attracting more mainstream investment capital and funds, they need to strengthen their capacity to identify and manage potential risks to avoid unexpected losses and surprises. MFIs have developed methodologies to deal with credit risk associated with lending; however factors like portfolio diversification, issuing larger individual loans, and limiting exposure to certain sectors (agricultural or seasonal loans) have fueled the deficiencies in credit risk management (Drzik, J. 1995)

1.2 Statement of the problem

MFIs have increasingly become a central source of credit for the poor in many countries (Field & Pande, 2008). However, Sheremeko, Escalante, & Florkowski, (2012) show three major costs

for MFIs connected with the provision of loans as the cost of borrowed funds, the cost of loan default provision, and the transactional cost, which include client identification and screening cost, loan application processing cost, loan disbursement cost, repayment collection cost, and the cost, associated with following up on non-payment. Lending therefore has a cost to the institution and as such due diligence should be exercised when giving out loans to borrowers.

Growing commercialization and competition in microfinance has driven the focus of micro lenders from outreach per se to achieving financial sustainability in serving the poor (Abate, Borzaga, & Getnet, 2013). Such a goal has conflicted with the traditional social mission of microfinance – outreach to the poor (Hermes, Lensink, & Meesters, 2008). In fact Roy & Goswami, (2013) argue that MFIs are faced with the dilemma of balancing the sustainability and outreach goals. In an attempt to grow their lending by increasing outreach to the poor and also to curb the rising competition, microfinance institutions have ended up increasing their risks and repayment problems (Vanroose & D’Espallier, 2013). The success of lending depends on the methodology applied to give out credit (Moti et al., 2012) which requires a thorough evaluation of the risk conditions and the characteristics of the borrower (Schreiner, 2000). Schreiner, (2000) observed that delinquency has become a huge challenge to MFIs for it is a big threat to financial sustainability. The officers in MFIs have targets in terms of the monthly amount they need to lend. This has an underpinning problem because as they work towards meeting their targets they end up not carrying out adequate client screening and consequently compromising the credit risk management which results to delinquencies (Dixon, Ritchie, & Siwale, 2007).

Weak credit risk management has been cited by Richard et al., (2008) as a major reason associated with lending difficulties and hiccups in financial institutions. In Zambia for instance, microfinance performance has been found to be a challenge because MFIs are particularly confronted with the problem of default which threatens their sustainability and further provision of financial services to the poor (Dixon et al., 2007). The 2007 global financial crisis that was witnessed all over the world was because of problems occasioned by poor credit risk management. A study carried out by Pezzuto, (2008) revealed that one of the causes of the deterioration and fall of some banks and mortgage institutions during this period was as a result of loss of control in their portfolio risk management. He pointed out that the loan portfolio of the

institutions became worse suddenly and unexpectedly, but the whole industry underestimated the blast; the end result was collapsing of some financial institutions.

Central Bank of Kenya supervision annual report, (2012) indicated high incidence of credit risk reflected in the rising levels of non- performing loans by the financial institutions, a situation that has negatively impacted on their profitability. This is because delinquency has varied consequences to any lending institution which includes financial loss where interest income and even the principal may be lost or loss and / erosion of capital where the net loss incurred from the income statement due to high loan loss provisions and write-offs is deducted from the capital and lastly it can lead to bankruptcy in case of insolvency due to poor loan performance as established by Ayayi & Sene, (2010).

From the above scenarios, it is evident that credit risk management is a menace to lending institutions and as such it cannot be underestimated neither ignored because it a threat that could jeopardize the long term survival of microfinance institutions. The aim of this research is to find out the effect of credit risk management on financial sustainability of MFIs in Kenya.

1.3 Research objectives

1.3.1 General objective

The aim of this study is to find out the effect of credit risk management on financial sustainability of MFIs in Kenya.

1.3.2 Specific objectives

- i. To evaluate credit risk management in microfinance institutions in Kenya
- ii. To evaluate financial sustainability of microfinance institutions in Kenya
- iii. To establish the relationship between credit risk management and financial sustainability of microfinance institutions in Kenya.

1.4 Research questions

- i. What are some of the credit risk management parameters in microfinance institutions in Kenya?
- ii. Are microfinance institutions in Kenya financially sustainable?
- iii. What is the relationship between credit risk management and financial sustainability of microfinance institutions in Kenya?

1.5 Scope of the study

The study was based on the microfinance institutions in Kenya registered with AMFI by 2012. These institutions are regulated and it was anticipated that they have structures and records plus any other information required for this study. The study covered duration of 6 years from 2007 to 2012. The study chose to deal with microfinance institutions that are registered with Association of Microfinance Institutions (AMFI) because they are supervised and they submit their data with microfinance information exchange (MIX) and AMFI. They also have structures in place and this enhances reporting, good governance and other guiding principles and policies required by the Microfinance Act. Six year duration gave enough data to make valid conclusion as most of the microfinance loan durations are from one year to 6 years (72 months).

1.6 Significance of the study

Microfinance Institutions

This research will benefit the Microfinance institutions and other interested parties like AMFI. The results will give more insight as pertains to how credit risk management affects financial sustainability of MFIs. This will help the MFIs and the whole sector to put more emphasis, time and resources on the development of sound credit risk management strategies and best practices in order to achieve better results.

Researchers

Finally, the study will contribute to the broader realm of business and academic research. In academia, the study will be significant to academic research in the broader area of credit risk management practices and provide a foundation for future studies.

It is also anticipated that more researchers will be encouraged to do more studies on this sector because microfinance is still evolving and more researches will help the sector to have a better realization of the direction to maturity.

Government

The study will benefit the government through AMFI as one of its regulatory agencies as it will help in designing policy pertaining to the lending of microfinance institutions in Kenya. In business, through its recommendations, the study will add value to better credit management practices in businesses and service quality.

CHAPTER TWO

LITERATURE REVIEW

2.1 Introduction

The chapter covers the theoretical frameworks which are related to credit risk management and financial sustainability of MFIs. These include moral hazard, adverse selection, joint lending liability hypothesis and transaction cost theory. The next section that follows covers the empirical review on works related to credit risk management and financial sustainability of microfinance institutions. The last section covers conceptual framework, operationalization of variables and the model estimation.

2.2 Theoretical Review

2.2.1 Moral hazard

In credit markets, borrowers typically have more information in regard to their investment opportunities, their own character and their past indebtedness than lenders. This lop-sidedness of information gives rise to selection problems for lenders and potential moral hazard of borrowers, (Brown & Zehnder, 2007) which may lead to rationing of credit. Dusuki, (2008) concurs with this when he points out that credit markets are infested with high information asymmetry, notably, the existence of moral hazard and adverse selection problems. They argue that this has led to severe distortion and sometimes complete collapse of the formal credit market. Adverse selection and moral hazard increases the percentage of borrowers who cannot repay their loans on time (Godquin, 2004).

Mersland & Strøm (2009) defines moral hazard as a problem of the borrower not putting necessary effort to repay the loan, even when the bank is unable to monitor. It arises because an individual or institution does not take the full consequences and responsibilities of its actions, and therefore has a tendency to act less carefully than it otherwise would, leaving another party to hold some responsibility for the consequences of those actions (Laffont, 2003).

Sinn, (2013) argues that when a client has taken a loan, the project's payoff depends in part on his/ her actions, including levels of labor and other inputs. In normal circumstances, Sinn points out that the borrower is expected to take his actions wisely but this does not happen always especially with the case of asymmetrical information between the lender and the borrower. In

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this case, in the absence of collateral, the lender and the borrower have varied objectives because the borrower does not internalize the adverse effects of the project failure (Ghatak and Guinnane, 1999), and the lender cannot lay down a perfect strategy on how the borrower should run the business, in part, because some of the borrower's actions have a cost to monitor (Cason, Gangadharan, & Maitra, 2012). This theory postulates that the lender due to lack of information has the risk of giving out money to a borrower who does not have the capacity to meet his loan obligations. The moral hazard therefore poses a credit risk to the lender in that the negligence from the side of the borrower may render the loan delinquent and this affects the financial sustainability of the MFI.

2.2.2 Adverse selection

Adverse selection arises when borrowers have characteristics that are unobservable to the lender but affect the likelihood of being able to repay the loan (Ghatak & Guinnane, 1999). The microfinance lenders are faced with borrowers whom they do not personally know, who do not keep records, and have no business plans but want to borrow small and uneconomic sums (Dusuki, 2008); thus exposing them to very lofty risks due to the inherent screening problems faced by the lenders at the same time make the project appraisal too expensive (Dusuki, 2008). In fact, majority of the clients for MFIs do not offer substantial guarantees or information when they go to apply for microcredit loans. This results to information asymmetry which leads to adverse selection (Ayayi & Sene, 2010) exposing the lender to a risk of giving out bad loans from the start. Ayayi & Sene, (2010) further argues that the clients may end up having strong constraints in repayment of their loans and consequently the institution's performance is jeopardized because loans are the biggest asset of the lending institutions. It is evident here that adverse selection has the risk of landing the lender into selecting the wrong person for lending who does not have the capability of repaying the loan and hence resulting into bad repayment which increases credit risk for the institutions. In Bolivia for example, Schreiner (2000), tells of how information about past repayment helps to predict future trends of repayment for the borrower. According to him any arrears in the past shows a high probability of the same in future loans. He points out that, compared with borrowers with no arrears in the previous loan; borrowers with arrears of more than 15 days in the previous loan are 2.8 percentage points more likely to have a spell of at least 15 days in the current loan. However, in the absence of such information the lender may not be able to predict the credit risk associated with such borrowers.

2.2.2 Joint Liability Lending

Joint Liability Lending (JLL) is celebrated as an innovation that has made previously insolvent individuals solvent by creating social collateral to replace the missing physical collateral which could not be afforded generally by the poor (Simtowe, Zeller, & Phiri, 2006). It is the most distinctive feature of the standard microfinance contract in which each member of a group of borrowers is liable for the loans of the others. Kamukama & Natamba, (2013), explains that members come together and stand in for each other and thus they create social capital through networks, norms and trust that facilitates cooperation for mutual benefit. Dusuki, (2008) also asserts that social capital creates an “information asset” which acts as a communal endorsement of character from each group member to the other which is acceptable by the MFI in lieu of other assets.

In joint liability lending members group themselves according to the way they know each other and the degree of risk each one bears. It ends up that the risky ones will group themselves together and the less risky will go together. This mechanism of discrimination of questionable micro-entrepreneurs from good ones can avert the phenomenon of headstrong contagion spreading among low risk borrowers who may find that it is pointless to repay their credit when others are not doing so (Ayayi & Sene, 2010). They further state that this attitude consequently accelerates the deterioration of the portfolio quality because of domino effect which contributes to the erosion of the financial sustainability of MFIs.

2.2.3 Transaction cost theory

According to the transaction cost argument, it is less expensive to monitor group loans than individual loans (Ghatak & Guinnane, 1999). Both financial institutions and poor clients face high transaction costs due to asymmetric information problems, which naturally appear in the financial transactions (Dusuki, 2008). These costs are related to vetting, screening and monitoring which are inherent mostly in the rural markets and even urban set up (Dusuki, 2008). The uncertainty regarding the ability of borrowers to meet future loan obligations, coupled with the incapability to monitor the use of funds and demand for these small sum of loans further underpins the higher units of transaction costs, which is characterized by fixed costs Dusuki argues.

When the loans given are similar in terms of their characteristics, time path of the returns and also the borrowers are in the same geographical location, then it will be less costly for the lender to coordinate them Ghatak & Guinnane, (1999) argues. The institution can avoid the cost of performing a costly audit every time an individual borrower claims she has low output by inducing her partner to undertake liability for her and audit only when the whole group declares inability to repay (Ghatak & Guinnane, 1999). This reduces the operating costs for the institution and hence better performance of the organization. Therefore according to transaction cost theory, financial performance of the institution can be enhanced by having group loans which are able to be monitored together because the repayments dates are similar, repayment schedule identical and the meeting place is central. This means one credit officer can effectively manage several groups saving on costs.

2.3 Empirical studies

2.3.1 Credit risk management in microfinance institutions

An article by Sengupta & Aubuchon, (2008) which focused on the growth and development of microcredit and microfinance affirms that given a joint liability clause embraced in group lending, safe customers are more likely to group together with other safe customers, leaving the risky types to form groups by themselves. The risky ones will therefore have a bigger burden while the safe group will have a less burden to shoulder in case of default. They explained that this mechanism of discrimination of questionable micro-entrepreneurs from good ones is called “assortative matching” and it highly mitigates the problem of adverse selection which reduces credit risk of the microfinance institutions. Sengupta & Aubuchon, (2008) argued that every category will be vigilant according to the degree of the risk each carries and bearing in mind the probability of non-repayment thereby reducing the risk for MFI because the efforts and motivation in screening and monitoring each member by their counterparts, is high. This reduces defaults because every member is put under pressure by the other members in the group in case of failure to repay.

Karlan and Zinman, (2008) in their studies revealed that MFIs in developing economies use incentives as part of managing credit risk. They observed that despite high interest rates, borrowers had several incentives to repay. The carrots (rewards) included decreasing prices and increasing future loan sizes following good repayment behavior and the sticks (punishment)

included reporting to credit bureaus, frequent phone calls from collection agents, court summons etc . Karlan and Zinman, (2008) argue that with the use of such repayment incentives, MFIs achieves good repayments and thus reducing credit risks which emanate from poor repayments, and the end results is overall good performance of the institution.

In an empirical review paper on credit markets, Banerjee & Duflo, (2010) reveal some facts and theoretical explanations about developing economies. They contemplate that in group lending, default in one member makes it harder for the rest to get new loans, therefore the group members have to screen and monitor each other well in advance. This ensures the group members repay their loans well and as a result credit risk is minimized and financial performance of the MFI is enhanced because the loan loss provision is negligible. Brau & Woller, (2004) supports the same argument of by Banerjee & Duflo, where they argue that social collateral works through reputational effects. A group member will keep up his repayments to avoid having a 'bad name' in the village and rather maintain their social standing in the community. By doing so their loan repayment is well kept and as such the credit risk becomes very low because defaults minimal.

A study carried out by Ayayi, (2012) on 13 sampled MFIs in Vietnam using data from MIX website, found out that credit risk management has a direct consequence on implementation of good governance practices and the sustainable financial performance of microfinance institution. He used portfolio at risk as one of the indicators of credit risk management and he found a statistical significant correlation of credit risk management and sustainability in microfinance institutions. The results showed that raising operational financial sustainability was associated with improved portfolio quality indicating that the sampled institutions to have a good control of their credit collection. A similar study by Hussain & Al-ajmi (2012), on risk management practices in conventional and Islamic banks of Bahrain found out that credit, liquidity and operational risks widely affect performance of both Islamic and conventional banks in Bahrain.

Another study carried out by Fredrick (2012) on 42 commercial banks in Kenya, on the impact of credit risk management on financial performance, found out that there is a very strong relationship between credit risk management and financial performance in commercial banks. He used Capital Adequacy, Asset Quality, Management Quality, Earnings and Liquidity (CAMEL) as the proxy to measure credit risk management and Return on Assets to measure financial performance. The study concluded that CAMEL had a very strong impact on financial

performance in banks and therefore can be used as reliable technique to manage credit risks in financial institutions.

In Nigeria a study was done by Rufai (2013) to establish the efficacy of credit risk management on the performance of union banks. The study used loan performance in terms of non-performing loans and bad loans write-offs to measure credit risk (the predictor variable), while the dependent variable was the performance indicator where he used return on equity (ROE) and return on asset (ROA). According to the study there was a significance relationship between credit risk management and bank financial performance as evidenced by Pearson's of 60.4%. As such the study concluded that better credit risk management results to better performance and hence sustainability of the institution. The study also revealed that banks with good or sound credit risk management policies have lower loan default ratios (bad loans) and higher interest income (profitability).

Another study covering 64 microfinance institutions of the Middle East and North Africa (MENA) region by Bassem, (2012) on financial performance of MFIs, revealed that portfolio at risk had a strong influence on the financial performance of MFIs with a negative correlation coefficient which was statistically significant. The study concluded that this negative relationship confirms that a higher credit risk would block good financial results. MFIs can therefore be concerned to improve credit risk management to ensure their financial sustainability.

Baklouti, (2013) in his study on determinants of microcredit repayments, observed that in order to reduce default risk and improve repayment rates, microfinance institutions have implemented various mechanisms in an attempt to deal with problems of information asymmetry and improve performance. A similar study carried out by Moti et al., (2012) on credit risk management and loan performance in microfinance institution in Kenya, where they looked specifically at the effect of credit terms, client appraisal, credit risk control measures and credit collection policies on loan performance, found out that collection policy had a higher effect on loan repayment in MFIs and the overall performance of the MFI.

2.3.2 Financial Sustainability in Microfinance institutions

The creeping effect of financial crisis and economic turmoil on African economies potentially queries the sustainability of microfinance institutions, in view of the heavy investment received

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both from development partners and government. A study by Dlamini (2012) on 92 MFIs in sub-Saharan Africa revealed that sustainability in MFIs is far from being attained. The study which was on the effect of subsidies on the performance and sustainability of microfinance institutions in sub-Saharan Africa found out that 90.22% of the MFIs were not sustainable with a financial self-sufficiency ratio of 74.32% and shows that MFIs in sub-Saharan Africa depended heavily on subsidies for their survival.

Another study by Aveh, Krah, & Dadzie (2013) also revealed that microfinance institutions in Ghana have not yet attained financial sustainability. According to their study the microfinance institutions in Ghana still have high dependency on subsidy. Their study which was based on initial exploratory study by analyzing data on 14 executive directors in qualitative interviews and 116 relationship executives in research questionnaires revealed that sustainability in microfinance institutions in Ghana is far from the reality. The results from their study shows a very low declining rate of dependency index of 1.9% which they say that it depicts a worrying situation for MFIs because they will take a long time to achieve long term sustainability which is crucial for the survival of the MFIs.

A similar study done by Annim (2012) on 16 microfinance institutions support the above findings by Avel et.al (2013) where they found out financial sustainability in MFIs in Ghana is still a problem. The main findings of their study on sustainability and external funding in terms of grants and subsidies upholds the skeptics' view of a trade-off and reveals the effect of source of funds and other institutional characteristics in targeting poor clients. The quantitative explanation clearly shows institutional inability to mutually operate competitively and reach poorer clients because they have not yet been stable to achieve sustainability.

A different study by Bogan (2012) focusing on sustainability of MFIs revealed that dependence on grants and subsidies drives down operational self-sufficiency of the MFIs and this reinforces the view that the long-term use of grants may be related to inefficient operations due to lack of competitive pressures associated with attracting market funding. The study involved MFIs in Africa, East Asia, Eastern Europe, Latin America, the Middle East, and South Asia for the years 2003 and 2006 using data from MIX website where he focused on outreach, efficiency, and financial sustainability. The result findings from the study revealed that Africa has the highest percentage of unsustainable MFIs (38.02%), the highest percentage of portfolio at risk (7.03%)

and the lowest average return on assets¹² (0.38%). On the other hand he found out that East Asia and Pacific region has the lowest percentage of unsustainable MFIs (6.67%). This clearly shows that MFIs in Eastern Europe and Central Asia regions are performing better than their counterparts in Africa in general, because 93.33% of MFIs in Eastern Europe and Central Asia have already achieved sustainability levels while only 61.98% of MFIs in Africa are sustainable, meaning majority of MFIs in Africa are still dependent on subsidies and grants. However, Bogan argues that many development and donor organizations already believe that only by weaning off donor dependency and adopting a commercial orientation can these MFIs truly attract the capital and savings base they need to scale up their microloan portfolios, increase sustainability, lower lending rates, increase outreach, and start meeting the demand.

From all these studies it is evident that credit risk management in MFIs is a touchy issue that needs to be closely looked into in Kenyan microfinance institutions. Therefore this study was aimed at finding out the effect of credit risk management on financial sustainability in microfinance institutions in Kenya.

2.4 Previous Models used in credit risk

Rufai, (2013) observed that various credit scoring models used data on observed borrower characteristics either to calculate the probability of default or to assess default risk by the borrowers.

Altman's Z-score model

The Z-score formula for predicting insolvency by (Altman, 1968) is a multivariate formula for measuring the financial health of a company and a powerful diagnostic tool that forecast the probability of a company entering insolvency. The Altman's Z-score model ($Z = 1.2X_1 + 1.4X_2 + 3.3X_3 + 0.6X_4 + 1.0X_5$) denotes that the higher the Z value the lower the risk of the borrower. According to this model, any firm with a Z-Score less than 1.81 should be considered a high default risk, between 1.81-2.99 an indeterminate default risk, and greater than 2.99 a low default risk. However the model was found to have weaknesses for example the weights were not constant throughout.

Kmv Credit Monitor Model4

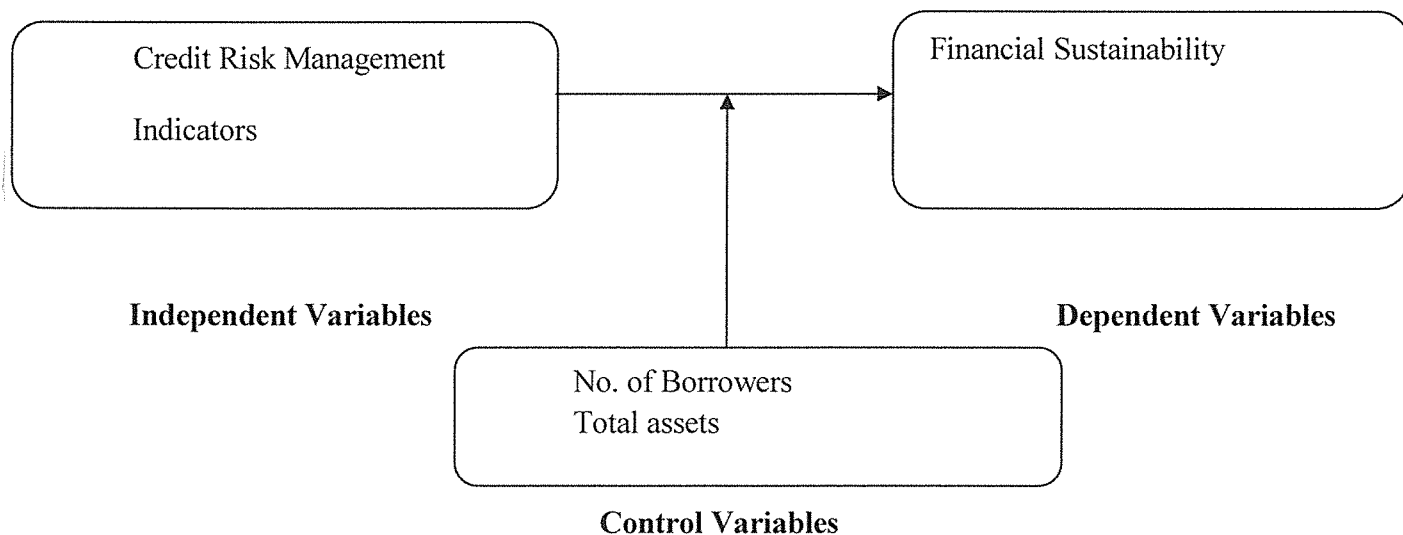
The KMV Model is a credit monitor model that helps to solve the lending problems of financial institutions and further look at the repayment incentive problem (Gilbert, 2004). It is a model used to find probability of default but it was realized it didn't give very accurate results (Kealhofer, 2003) .

$$\text{Distant to Default} = \frac{(\text{Market Value of Assets})}{(\text{Asset Volatility})} - \frac{(\text{Market Value of Assets})}{(\text{Default Point})}$$

VAR Model

Value at Risk (VAR) is a model used to estimate the probability of portfolio losses based on the statistical analysis of historical price trends and volatilities (Rufai , 2013). For financial institutions, risk is about the odds of losing money given out as loans, and VAR is based on that common-sense fact. By assuming financial institutions care about the odds of a really big loss on loans, VAR answers the question, "What is my worst case scenario?" or "How much could I lose in a really bad month?"

Figure 2.1 Conceptual framework



2.5 Operationalization of variables

2.5.1 Financial Sustainability

For purposes of analyses, sustainable financial performance is the dependent variable measured by Financial Self-Sufficiency (FSS) ratio. Financial self-sufficiency has been defined by Woller & Schreiner, (2002) as where an MFI's inflation-adjusted operating revenues, exceeds the risk adjusted operating expenses. This means that in measuring FSS the figures should be adjusted for inflation. When $FSS > 100\%$, it can be construed that the MFI can do without subsidies and turn to financial markets if necessary and if the FSS is below 100% it means the MFI will require subsidies to support its operations (Ayayi & Sene, 2010). A more detailed definition has been provided by Cull, Demirgu-Kunt, & Morduch, (2007) where financial self-sufficiency ratio is the adjusted financial revenue divided by the sum of adjusted financial expenses, loan loss provision expenses, and operating expenses. Operational Self-Sufficiency (OSS) ratio was also used for robustness check (Cull et al. 2007) .

Thus

Financial Self-Sufficiency = $\frac{\text{Adjusted operating revenue}}{\text{Adjusted (financial expense + loan loss provision expense + operating expense)}}$

$$\begin{aligned} \text{FSS} &= \frac{\text{Adj. Operev}}{\text{Adj. (FinExp + LLP + Operex)}} \end{aligned}$$

For robustness check operational self-sufficiency was used (Cull et al. 2007)

Operational Self-Sufficiency == $\frac{\text{Operating revenue}}{\text{(Financial expense + loan loss provision expense + operating expense)}}$

$$\begin{aligned} \text{OSS} &= \frac{\text{Operev}}{\text{(FinExp + LLP + Operex)}} \end{aligned}$$

The study therefore had two regression models to statistically measure financial sustainability in microfinance institutions in Kenya although the main independent variable was financial self – sustainability (FSS). According to Cull, Demirguc-Kunt and Morduch (2007) financial self-sufficiency is the best measure of financial sustainability because it offers a more complete

summary of inputs and outputs than standard financial ratios such as return on assets or equity. It is also a better measure than OSS because it takes care of inflation.

2.5.2 Credit risk management parameters

According to Rufai, (2013) Credit risk consists of primarily two components which are; Quantity of risk, (the outstanding loan balance as on the date of default) and the Quality of risk (the severity of loss defined by Probability of Default as reduced by the recoveries that could be made in the event of default). Thus credit risk is a combined outcome of Default Risk and Exposure Risk. In this study credit risk was measured through portfolio at risk (PAR 30), risk coverage ratio (RCR), and loan loss provision.

2.5.2.1 Portfolio at Risk (PAR) >30

According to Daher & Saout, (2013) Portfolio at Risk (PAR) measures the value of all loans outstanding that have one or more installments of principal overdue more than a certain number of days .The ratio gives the percentage of loans outstanding that are at substantial risk of default, as signaled by difficulties that have already emerged. Thus PAR> 30 is a key performance indicator for the MFI because it reflects the risk associated with non-repayment of loans and determine future revenues and thus the ability of an institution to maintain and expand its services (Bassem, 2012). According to Khan & Ashta, (2013) PAR has been the preferred measure of credit risk by researchers such as Mersland & Strøm (2009). In fact Gonzalez, (2007) points out that the allowance ratios and write-off ratios measure defaults, while PAR captures risk of default. The lower the PAR, the lower the risk and the better the sustainability of the MFI (Khan & Ashta, 2013). Portfolio at risk variable reflects the true risk of a delinquency problem because it considers the full amount of the loan at risk particularly when the loan payments are small (Ayayi, 2012). In this study therefore, PAR was one of the parameters to measure credit risk and according to Arvelo et al., (2008) PAR is calculated as follows:

$$\text{Portfolio at Risk} = \frac{\text{Portfolio in arrears}}{\text{Outstanding Loan}}$$

2.5.2.2 Risk Coverage Ratio (RCR)

RCR is the ratio between the Impairment Allowance booked by the MFI and its PAR; it indicator of how prepared an institution is to absorb loan losses in the worst case scenario. (Khan & Ashta, 2013) . According to Khan & Ashta, (2013) the International Financial Reporting Standards

(IFRS) recommends that the term reserve be used only for allocations of retained earnings in the equity account, and that Impairment Allowance be used in place of Loan Loss Allowance/Provision. The RCR has a positive ratio and therefore, the higher the RCR, the better the risk mitigation measures of an MFI. If an MFI has its entire PAR as part of the RCR, investors know that they will not be distressed and that they can trust the profit numbers indicated in the annual report. Thus, Khan & Ashta, (2013) argues that a conservative firm would create a high impairment loss allowance to cover most of its PAR of default whereas a riskier MFI would not make high allowances.

2.5.2.3 Loan Loss provision

When a loan has fallen due and is not collected or paid back, it results to delinquency and as such the repayment is negatively affected. CGAP recommends that loans that are not being repaid in time and in this case delinquent loans should be provided for to cushion the organization against financial losses that may occur due to non-repayment of such loans (Khan & Ashta, 2013). As a matter of fact, the higher the loan arrears, the higher the loan loss provision. This clearly shows that loan loss provision is directly related to delinquency which is as a result of poor loan repayment. The recommended Loan Loss Provision by CGAP (Khan & Ashta, 2013) is shown in table 1 below.

Table 2.1 Recommended LLP

<i>Portfolio Status</i>	<i>Recommended Allowance</i>
Current	1 %
1-30 days late	25 %
31-90 days late	50 %
Over 90 days late	100 %

Source: Khan & Ashta (2013)

2.5.3 Control Variables

There are many other factors that affect sustainable financial performance of the MFIs apart from credit risk management. However because it was not practical to capture all of them, in addition to the error term (e) included in the model, this study controlled for firm size. According to Ayayi (2012) the most appropriate measure was total asset and, breadth of outreach which was proxied by the number of clients who have received credit from the MFI. This provided valuable

insight into the institution's stability, experience and future growth potential and breadth of penetration (Arvelo et al., 2008).

2.5.3.1 Total Assets

Total asset was used as a measure for the size of microfinance institutions and it measures whether they are large enough to be operationally as well as financially sustainable and cover their operational and financial costs or not (P. R. Sharma, 2008).

2.5.3.2 Number of borrowers

The number of borrowers is an indicator of both breadth of outreach and scale (Woller & Schreiner, 2002). The breadth of outreach refers to the number of clients served by a microfinance institution (Kinde, 2012). Various studies have used the number of borrowers as a measure of microfinance breadth of outreach (Mersland and Strom, 2009; Hermes, Lensink, & Meesters, 2008). Convention holds that scale is inversely related to costs and positively related to profitability, because the fixed costs of production are amortized across a larger number and value of outputs. The number of borrowers is thus hypothesized to be positively associated with financial self-sufficiency (Woller & Schreiner, 2002).

CHAPTER THREE

RESEARCH METHODOLOGY

3.1 Introduction

This chapter outlines the procedures and methods employed in this study and this includes the Research design, Population sampling, Data collection methods, Analysis and model estimation. This study was aimed at finding out the effect of credit risk management on financial sustainability of microfinance institutions in Kenya.

3.2 Research Design

Research design refers to the way the study is designed, that is, the method used to carry out a research. This research is quantitative in its nature in which the research design used is the longitudinal design. The type of longitudinal design that has been used, in this research, is the panel one. The descriptive research design approach has been credited due to the fact that it allows analysis the relations of variables under study using linear regression as long as the sampling units for the study are many.

The study adopted descriptive research design where quantitative was used since financial data from financial statements can be quantified. The study employed Panel data to estimate the regression models. Panel data was appropriate because it has the capacity to deal with heteroscedasticity and autocorrelation common in time series data. The use of panel data also enhances tracking changes in constructs (measured variables) and relationships overtime.

3.3 Population and sampling design

The population for the study was 54 microfinance institutions registered with AMFI by 2012. The study chose to deal with microfinance institutions that are registered with Association of Microfinance Institutions (AMFI) because they are supervised and they submit their data with microfinance information exchange (MIX) and AMFI. They also have structures in place and this enhances reporting, good governance and other guiding principles and policies required by the Microfinance Act. The sample size for this study consisted of 37 MFIs which are affiliates of AMFI Kenya but are retail lenders and DTMs only. This translates to over 60% sample size.

3.4 Data collection methods

Secondary data for this study included financial statements, reports and bulletins. Sources for the secondary data included Microfinance Information eXchange (MIX) website, financial reports of the respective MFIs and Central Bank of Kenya. This study used secondary data for the analysis which included operating revenue, operating expense, total assets, loan loss provisions, gross loan portfolio, portfolio at risk and number of borrowers

3.5 Data Analysis Methods

Data was analyzed using statistical techniques which were mean and regression models through OLS using E-views 5 software. Tables were used to present the data collated for ease of understanding and analysis. Multiple regression was used to measure the quantitative data in this study. The estimation was first made using the pooled regression approach. But the random effect model has been chosen. The reason is according to Brooks, (2008) the random effects model is more appropriate when the entities in the sample can be thought of as having been randomly selected from the population, but a fixed effect model is more plausible when the entities in the sample in actual fact constitute the entire population. In this case, since the researcher used samples in the study, random effect model was used because it was more appropriate.

3.6 Model Estimation

Multiple regressions is a flexible method of data analysis that may be appropriate whenever quantitative variables (the dependent) is to be examined in relationship to any other factors (expressed as independent or predictor variable). Relationships may be linear or non-linear, independent variables may be quantitative or qualitative and one can examine the effects of a single variable or multiple variables with or without the effects of other variables taken into account (Cohen, Cohen, West, & Aiken, 2005). In this study the researcher was interested in measuring the effect of credit risk management on the financial sustainability of MFIs in Kenya. The parameters for credit risk management in this study were portfolio at risk 30 days, loan loss provision, risk coverage ratio, number of borrowers and total assets. Financial sustainability was measured by operational self-sufficiency ratio and financial self-sufficiency ratio.

The following was the general functional model that was used in this study as per variables

$$OSS = f(PAR_{30}, LLP, RCR, \text{No of BORROWERS}, TA,)$$

$$FSS = f(PAR_{30}, LLP, RCR, \text{No of BORROWERS}, TA_i)$$

For purposes of estimation, the equations of the model were reduced to:

$$OSS_{it} = \beta_0 + \beta_1 PAR_{30it} + \beta_2 RCR_i + \beta_3 LLP_{it} + \beta_5 \text{NO. of BOW}_{it} + \beta_4 TA_{it} + e_{it}$$

$$FSS_{it} = \beta_0 + \beta_1 PAR_{30it} + \beta_2 RCR_i + \beta_3 LLP_{it} + \beta_5 \text{NO. of BOW}_{it} + \beta_4 TA_{it} + e_{it}$$

$$Y_1 = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + e_{it}$$

$$Y_2 = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + e_{it}$$

Where:

Y_1 : Operational Self-Sufficiency (OSS) measured as: Operating revenue / (financial expense + loan loss provision expense + operating expense)

Y_2 : Financial Self-Sufficiency (FSS) measured as: Adjusted operating revenue /
Adjusted (financial expense + loan loss provision expense + operating expense)

X_1 : Portfolio at risk 30 days (PAR_{30})

X_2 : Risk Cover Ratio (RCR)

X_3 : Loan Loss Provision (LLP)

X_4 : No of Borrowers

X_5 : Total Asset (TA)

e : error term / disturbance term

i : takes care of cross-sectional differentials

t : time variation

B_0 is the Y intercept while $B_1, B_2, B_3, B_4,$ and B_5 are the slopes of the regression equation.

3.7 Research quality

Research quality entails reliability and validity of the data collected. In this study the data collected was from reliable sources which were from Microfinance information exchange (MIX) website, AMFI annual publication and central bank website. As such the conclusions reached by the study can be generalized to the whole microfinance sector in Kenya.

CHAPTER FOUR

DATA PRESENTATION

4.1. Introduction

This chapter presents the data there-to on the study to investigate the effect of credit risk management on financial sustainability of MFIs in Kenya. Frequencies, percentages, standard deviation and mean were used to display the results which were presented in tables and graphs.

4.2 Credit risk management in Microfinance institutions

The researcher conducted descriptive statistics for the 37 sampled MFIs which were affiliates of AMFI but who were DTMS and retail lenders only. The aim of this test was to understand the performance level of microfinance institutions in Kenya in order to establish the effect of credit risk management on financial sustainability. The parameters that were used in this study as indicators of credit risk management were loan loss provision (LL_PROV), portfolio at risk 30 days (PAR₃₀) and risk coverage ratio (RCR). Number of borrowers and total assets (TA) were used as control variables in this study.

Table 4.2 Descriptive statistics for the independent variables

	Observations	Mean	Maximum	Minimum	Std. Dev.
NO. of BORROWERS	180	2.446791	5.615992	0.00000	2.041993
LL_PROV	180	4.323757	8.865739	0.00000	3.561216
PAR₃₀	180	0.056100	0.417143	0.00000	0.070727
RCR	180	1.157559	106.2317	-0.48052	7.944412
TA	180	5.955781	10.3093	0.00000	4.058548

Source: researcher

Based on the results obtained above, the following statistical inferences have been reached for the above variables used in this study.

Number of borrowers

Table 4.2 shows the mean value for the sampled 37 microfinance institution is 2.446791 in its natural logarithm for number of borrowers for the period under study (2007-2012). This is equivalent to 21,654 in real terms while the maximum number of borrowers was 413,040. It is normally assumed that the higher the number of borrowers the higher the sustainability of the microfinance institution. From the results of this study the average number of borrowers per MFI is 21, 634 from the sampled institutions meaning that on average, number of borrowers as per the sampled MFI was 21,654. This shows clearly the number of people borrowing loans from microfinance institutions is low compared to the total population of over 40million people in Kenya meaning the breadth of outreach in microfinance institutions is still low.

Loan loss provision (LL_PROV)

The mean for the 37 sampled microfinance institutions is 4.323757 in its natural logarithm and the maximum stands at 8.865739 in table 4.2 above. In real terms the mean value of loan loss provision is 38,482,709 while the maximum and the minimum were 734,000,000 and 2,849,207 respectively. This means the average provision for bad loans in the microfinance industry in Kenya is relatively low because it is approximately 3.302%. The higher the loan loss provision, the higher the number of loans that are not paid as scheduled, meaning that the repayment rate is low. On the other hand, high loan repayment rate means few loans or none have to be provided for. This means that if the repayment rate is high, the institution is performing well financially because the core business of microfinance institutions is giving loans. From this study therefore, it can be seen that the average loan loss provision for the sampled microfinance institution is 3.3% which is low compared to the maximum provision of 25% required by CGAP meaning the loan repayments are fairly good which implies that default rate is low.

Portfolio at Risk 30 days (PAR₃₀)

Portfolio at risk for the 37 sampled Kenyan microfinance institutions in table 4.2 above shows a mean value of 0.0561; meaning the average default rate in the microfinance industry is 5.61%. The maximum PAR>30 ratio in the microfinance institutions was 0.417143 whereas the minimum was 0.0000, meaning the worst case scenario from the sample was a default rate of 41.7%. The higher the portfolio at risk ratio, the worse it is for the lending institution, and the

lower the portfolio at risk ratio the better for the institution because this ratio shows the exposure of the institution to credit risk (the risk of default). The default rate for the sampled MFIs in this was relatively low. However, the benchmark provided for PAR>30 by CGAP is 3%. This shows that credit risk in MFIs in Kenya is still higher and needs to be managed closely.

Risk Coverage Ratio (RCR)

Table 4.2 also shows the risk coverage ratio for the 37 sampled microfinance institutions has a mean value of 1.158 with a maximum of 106.23 and a minimum of -0.4805. This means that on average the MFIs in the sample have a risk cover ratio of 115.8 % with the best cover hitting 1062.3% and the worst case scenario being negative 48.05%. The higher the risk coverage ratio, the better for the organization as it denotes a higher cover of loan losses and hence a good cushion for the institution from losses emanating from defaults as the organization has made enough provision to adequately cover the portfolio at risk.

Total assets (TA)

The mean value of the total assets is 5.9558 in its natural logarithm value, and the maximum value is 10.3093 respectively in table 4.2 above. The real values are Kshs 1.19bn for mean and the maximum value is Kshs 20.4bn. Total assets show the size of the institution and the higher the value of total assets, the better for the organization.

4.3 Financial sustainability of microfinance institutions in Kenya

The following descriptive analysis was done to assess the level of financial sustainability in Kenyan microfinance sector. Operational sustainability and financial sufficiency were the two parameters that were used to assess the extent of financial sustainability in microfinance institutions in Kenya. However the main parameter in this study was the financial self-sufficiency.

Table 4.3 : Descriptive statistics for Operational self-sufficiency (OSS) and financial self-sufficiency (FSS)

Variable	Obs	Mean	Std. Dev.	Max	Min
OSS	180	0.721745	0.663646	3.047100	0.00000
FSS	180	0.649956	0.601602	2.647350	0.00000

Source: Researcher

From the above table 4.3, the mean value for operational self-sufficiency is 0.721745 (72.17%) for the sampled microfinance institutions. This is below the 100 % that depicts a condition of self-sufficiency. The same is evidenced by the key dependent variable, financial self-sufficiency which is still below 100% with a mean value of 65%. This shows that the microfinance sector in Kenya is still heavily dependent on external support such as subsidies and grants. This is opposed to the findings by Cull et al., (2007) from the study involving 124 microfinance institutions in 49 developing countries where the mean for operational self-sufficiency was 1.165 (116.5%) and financial self-sufficiency was 1.035 (103.5%). This shows that the Kenyan microfinance sector is not yet operationally or financially stable.

4.4 Relationship between credit risk management and financial sustainability

In order to establish the relationship between credit risk management and financial sustainability a regression model was employed in this study.

4.4.1 Regression Diagnostic tests

An implicit assumption that is made when using the OLS estimation method is that the assumptions of the linear regression model should hold. Therefore before running the regression to find out the effect of credit risk management on financial sustainability, the researcher carried out the following diagnostic tests to check if the assumptions of linear regression hold.

Multicollinearity test

The researcher carried out multicollinearity test to check whether there was any correlation between the explanatory variables which were: portfolio at risk, number of borrowers, loan loss provision, risk coverage ratio and total assets. The assumption that is made when using the OLS estimation method is that the explanatory variables are not correlated with one another; however, mostly the correlation between the explanation variables is relatively small but not likely to be

zero. A problem occurs when the explanatory variables are highly correlated with each other, and this problem is known as *multicollinearity*. This assumption has been tested for the explanatory variables in this study and the results are as here under; the hypothesis for multicollinearity in this study has been summarized as follows

H_0 : No Multicollinearity

H_1 : Multicollinearity

Table 4.4 Correlation of independent variables

	BORROWERS	LL PROV	PAR	RCR	TA
BORROWERS	1.00000				
LL_PROV	0.07305	1.00000			
PAR	0.09262	0.46744	1.00000		
RCR	0.11859	0.11580	-0.05711	1.00000	
TA	0.08124	0.05135	0.43508	0.10135	1.00000

Source: Author

The highest observed value was 0.47 between loan loss provision and portfolio at risk in table 4.4 above. This is tolerable compared to the acceptable limit of 0.9 as per the range of 0.8-0.9 provided by Farrar & Glauber, (2007) and as such we fail to reject the null hypothesis that there is no multicollinearity.

Test for serial correlation or autocorrelation

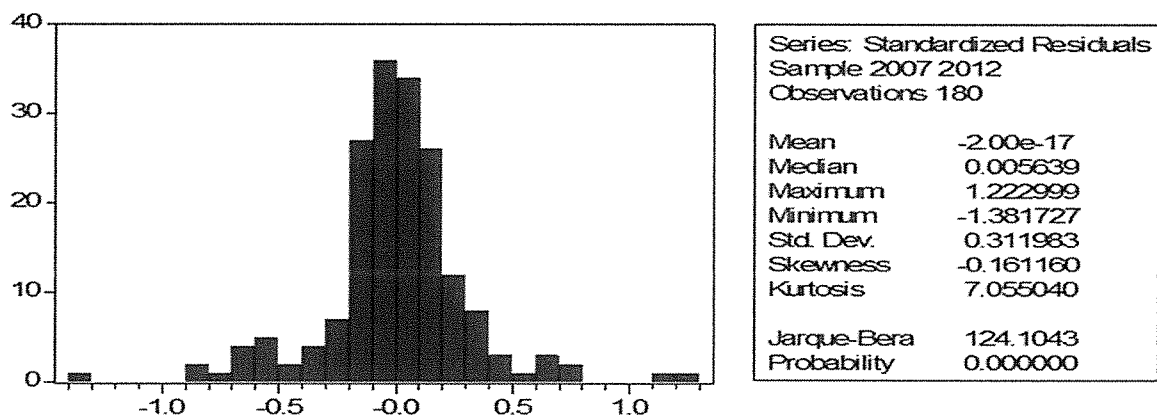
The researcher carried out autocorrelation test to check whether the covariant between the error terms is zero i.e no serial correlation among the disturbances entering the population regression function. This is tested by Durbin Watson (DW) test, where, if the $DW=2$ then there is no autocorrelation, but if it is zero it indicates existence of a perfect positive autocorrelation and if $DW=4$ it denotes a perfect negative autocorrelation (Brooks, 2008). From the regression results obtained in table 4.8, the DW test was 1.7 which is close to 2, the acceptance region of the null

hypothesis of no autocorrelation. In this case it can be inferred there is very little evidence of relationship between successive residuals and as such the study concludes that there is no autocorrelation.

Normality test

A normality test is done to check whether the errors are normally distributed around the mean. When errors are not normally distributed we have the problem of non-normal disturbances. A normal distribution is not skewed (skewness=0) and it is defined to have a coefficient kurtosis of 3 and where the p-value is not more than 0.05 at 5% significance level (Mantalos, 2010). The study did a normality test and the results are presented below.

Figure 1: Histogram



Source: Researcher

From the above results in figure 1 above we find that the kurtosis has a coefficient of 7.055 which is far beyond the required value of 3 and the p-value is 0.000 which is less than 0.05. In this case therefore, the study concludes that the errors are normally distributed, and hence the assumption of ordinary least squares estimator holds which states that the estimators should be linear, unbiased and consistent and have the minimum variance

4.4.2 Multiple Regression Analysis

After carrying out the diagnostic tests above and ascertained that the assumptions of linear regression model holds, the study proceeds on to undertake a multivariate regression model to

determine the effect of credit risk management indicators on financial sustainability in microfinance institutions in Kenya.

The logistic regression used in this study were

$$Y_1 = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + e_{it}$$

$$Y_2 = \beta_0 + \beta_1 X_{1it} + \beta_2 X_{2it} + \beta_3 X_{3it} + \beta_4 X_{4it} + \beta_5 X_{5it} + e_{it}$$

Predictors: Constant, Portfolio at risk, Risk Cover Ratio , Loan Loss Provision, No. of Borrowers, Total Assets.

Dependent: Operational self-sufficiency (Y_1) and Financial Self Sufficiency (Y_2)

4.4.2.1 Model Summary

(a) Operational self-sufficiency (OSS) Model

The study used operational self-sufficiency to first measure sustainability before using the key dependent variable which is financial self sufficiency. This for the purposes of robustness check as financial self sufficiency measure is not a strong measure of sustainability compared to financial self-sustainability because financial self-sufficiency takes into account inflation and imputed cost of capital. However, the predictor variables used were the same.

Table 4.5 : Model fitness for operational self-sufficiency

R-squared	Adjusted R-squared	S.E. of regression	Sum squared resid	Durbin-Watson stat	Prob (F-statistic)
0.661005	0.604964	0.360474	24.84148	1.94321	0.00000

Source: Researcher

From table 4.5 the R-squared in this model is 0.66 and it shows the relationship between the predictor variables and the dependent variable which is relatively strong. In this case it can be construed that 66% of the changes in operational self-sufficiency can be explained by portfolio at risk, risk cover ratio, loan loss provision, no. of borrowers and total assets. This means that 34% of the changes in operational self-sufficiency can be explained by other factors not captured in this study. The P-value observed from the above output is 0.00000. This shows the model is significant and fit. The study therefore concludes that the predictor variables are jointly

significant in explaining the changes in the dependent variable and as such can be used to predict the stronger dependent variable, which is financial self-sufficiency.

Table 4 .6 Regression results for operational self-sufficiency variables

Variable	Coefficient	Std. Error	t-Statistic	Prob.
BORROWERS	0.005900	0.028784	0.204985	0.379000
LL PROV	-0.028728	0.020296	-1.415476	0.015910**
PAR	-0.407163	0.556077	-0.732207	0.004652***
RCR	0.003428	0.003783	0.906198	0.366300
TA	0.130912	0.017279	7.576267	0.000000***
C	0.070709	0.060565	1.167499	0.244900

* denotes 10% significance level, **denotes 5% significance level, ***denotes 1% significance level

Source: Researcher

From the above results of the study in table 4.6, Loan loss provision, portfolio at risk, and total assets all have significant effect on operational sufficiency, while risk cover ratio and number of borrowers do not have significant effect. The findings above therefore conclude that credit risk management indicators affect sustainability.

(b) Financial self-sufficiency (FSS) model

After carrying out regression tests on the variables with operational self-sufficiency and establishing that the variables are jointly significant, the researcher went ahead to regress the same predictor variables on the key dependent variable for this study which was financial self-sufficiency to find out the effect of credit risk management indicators on financial sustainability of microfinance institutions in Kenya.

Table 4. 7 Model fitness for Financial Self-Sufficiency

R-squared	Adjusted R-squared	S.E. of regression	Sum squared resid	Durbin-Watson stat	Prob (F-statistic)
0.556967	0.516496	0.348797	28.70169	1.734601	0.000000

Source: Researcher

R-Squared is the correlation between the observed and predicted values of dependent variable implying that the association of 0.56 from table 4.7 above, between financial self sufficiency and credit risk management indicators which are Portfolio at risk, Risk Cover Ratio, Loan Loss Provision, No. of Borrowers, Total Assets is relatively strong. This implies that the predictor variables can explain 56% of the changes in financial self-sufficiency. This means that 56% of the total variation in the Financial Self-Sufficiency Ratio can be explained by Portfolio at risk, Risk Cover Ratio, Loan Loss Provision, No. of Borrowers, Total Assets jointly, while 44% is explained by other factors not captured in this study.

Adjusted R^2 is called the coefficient of determination and tells us how the financial sustainability of the MFIs varies with variation in credit risk management indicators. In other words, adjusted r-squared gives more reliable results pertaining the explanatory power of the model. From table 4.7 above; the value of adjusted R^2 is 0.52. This implies that, 52% of the changes in financial sustainability can be reliably explained by credit risk management indicators.

4.2.2.2 Regression results for financial self-sufficiency (FSS) and its variables

After carrying out the diagnostic tests and establishing that the assumptions of linear regression model hold, and after doing the robustness check of the model using operational self-sufficiency, the researcher carried a regression analysis to establish the relationship between credit risk management indicators and financial sustainability using portfolio at risk, risk coverage ratio, loan loss provision and controlling for firm size and breadth of outreach using total assets and number of borrowers respectively. The regression results are displayed in the output below. The final regression equation is as follows:

$$Y = 0.038 - 0.574X_1 + 0.00159X_2 - 0.0257X_3 + 0.0029X_4 + 0.1253X_5$$

Table 4.8 : Regression results between financial self-sufficiency (FSS) and its variables

Dependent Variable: FSS					
Method: Panel EGLS (Cross-section random effects)					
Date: 04/24/14 Time: 12:20					
Sample: 2007 2012					
Cross-sections included: 30					
Total panel (balanced) observations: 180					
Swamy and Arora estimator of component variances					
Variable	Coefficient	Std. Error	t-Statistic	Prob.	
BORROWERS	0.002912	0.025905	0.11243	0.91060	
LL_PROV	-0.025656	0.017174	-1.493869	0.03700	**
PAR	-0.573649	0.492422	-1.164953	0.00560	***
RCR	0.00159	0.00352	0.451661	0.65210	
TA	0.125268	0.015403	8.13243	0.00000	***
C	0.038033	0.06425	0.591957	0.55460	
Effects Specification					
Cross-section random S.D. / Rho			0.203893	0.257	
Idiosyncratic random S.D. / Rho			0.346636	0.743	
Weighted Statistics					
R-squared	0.530002	Mean dependent var		0.370593	
Adjusted R-squared	0.516496	S.D. dependent var		0.501617	
S.E. of regression	0.348797	Sum squared resid		21.16868	
F-statistic	39.24281	Durbin-Watson stat		1.734601	
Prob(F-statistic)	0.00000				
Unweighted Statistics					
R-squared	0.556967	Mean dependent var		0.649956	
Sum squared resid	28.70169	Durbin-Watson stat		1.431832	

*10% significance level, ** 5% significance level, ***1% significance level

Source: Researcher

The reported F-statistics in table 4.7, from the regression output is 39.243 with P-value 0.0000. Since the F-statistics is more than 0.05 (5% significant level) and p-value is 0.000 then the researcher concludes that the predictor variables are jointly significant in influencing the changes in the dependent variable (financial self-sufficiency).

The value for β_0 , which is the value of Y when x is zero, is 0.038. This is called the Y intercept and it indicates that financial sustainability would go up by a factor of 0.038 when the organization does not have any credit risk management indicators. It has a positive impact but it does not significantly affect financial sustainability because its p-value is high, which stands at 0.5546. The p-value shows the level of significance and the higher the p-value, the lower the significance and the lower the p-value, the higher the significance of the variable.

Total Assets

Total assets being a proxy to measure MFI's size, was used in this study as a control variable. The results of this study revealed that total asset variable was the most significant in the sampled microfinance institutions because its p-value was 0.0000 at 1%, 5% and 10% significance levels. As pointed out earlier, the lower the p-value of a variable, the higher the significance of its influence on the dependent variable and vice versa.

Loans form the largest portion of assets for microfinance institutions because these are monies lent out and expected to be paid to the institution with an interest. The higher the loans given out, the more the financial sustainability increases. This is because the interest paid on loans, forms a major part of the operating revenue of the MFI and remember operating revenue is the numerator in the formula for calculating financial sustainability. Therefore when the numerator value goes up, the financial self-sufficiency ratio goes up, hence financial sustainability. Table 4.8 shows that total assets have a positive coefficient of 0.1253. This means that a unit increase in total asset would cause a significant increase in financial self-sufficiency by a factor of 0.1253. This shows that increasing total assets by giving more loans increases financial sustainability.

Portfolio at Risk > 30days (PAR >30)

Portfolio at risk was one of the main variables used as an indicator of credit risk management in microfinance institutions. The portfolio at risk>30 variable reflects the true risk of a delinquency problem because it considers the full amount of the loan at risk particularly when the loan payments are small. It is a ratio that shows the quality of a portfolio i.e the default status. The lower the ratio of portfolio at risk, the healthier the portfolio (loans) and the higher the portfolio at risk ratio, the worse the portfolio. From table 4.8 the result shows that, portfolio at risk > 30 days has a coefficient of -0.5734 which indicates a negative significant effect on financial self-

sufficiency. An increase of one unit in portfolio at risk, leads to a significant decrease in financial self-sufficiency by a factor of 0.5734. This means that in order to increase financial sustainability the MFI should have in place a well designed procedure to make sure loans are repaid well in order to reduce default (credit risk) and have a healthy portfolio to enhance financial sustainability.

Loan loss provision (LL-PROV)

The regression results from table 4.8 shows loan loss provision with a coefficient of negative 0.02566 and a p-value of 0.03700. This is highly significance at 5% and 10% significance levels. Loan loss provision was used as one of credit risk management indicators in microfinance institutions. In practice any loans that have the likelihood of not being repaid should be provided for in the financial statement of the microfinance institution. This is to cushion the institution from losses that may arise from the non-payment of any loans given to clients. High loan provision means poor repayments rates, and low loan provision means good repayment rates. From the results above, it indicates that loan loss provision is highly significant to financial sustainability. One unit increase in loan loss provision, leads to a significant decrease in financial self-sufficiency by a factor of 0.02566. Decrease in loan loss provision occasioned by good repayments, will significantly increase financial sustainability.

Risk coverage ratio (RCR)

Table 4.8 shows risk coverage ratio has a positive coefficient of 0.00159 which means its impact on financial sustainability is positive but not significant because its p-value is very high. The rule of thumb is that the higher the risk coverage ratio, the higher the institution is cushioned against loan losses arising from defaults. Risk coverage ratio is one of the variables that had surprises in this study because it was anticipated to be significant, however in this case, RCR turned out be insignificant.

Number of borrowers

In this study number of borrowers was used as a proxy to measure breadth of outreach. The number of borrowers is conventionally assumed to be positively associated with financial self-sufficiency because it is generally assumed that the larger the number of borrowers the better the

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outreach. The results in table 4.8 above show a coefficient for number of borrowers of 0.002912 and high p-value meaning it was not significant in this study. Contrary to best practice convention is the finding that the number of borrowers has no statistically discernible impact on financial self-sufficiency, meaning, increase in number of borrower does not automatically improve financial sustainability.

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CHAPTER FIVE

DISCUSSION OF FINDINGS, CONCLUSION AND RECOMMEDATION

5.1 Introduction

This chapter is divided into the following sections. Discussion of the findings where the results of the study have been discussed in line with the result findings of other researchers. Here the findings of this study have been backed up by findings of other researchers. The next section entails conclusions made from the results obtained, and then recommendations have been made thereof from the study. Limitations of the study have been high lightened and lastly suggestions for further studies have been made.

5.2 Credit risk management on financial sustainability in microfinance institutions

The findings from this study show that credit risk management affect financial sustainability in microfinance institutions. Credit risk management was the predictor variable which was measured by portfolio at risk 30 days, loan loss provision and risk coverage ratio. Total assets and number of borrowers were the control variables in the study. Their effect and significance in this study have been discussed in the sub-sections that follow.

5.2.1 Portfolio at risk 30 days (PAR>30) and financial sustainability

Portfolio at risk 30 days as one of the main variables used as an indicator of credit risk management for the 37 sampled Kenyan microfinance institutions shows a mean value of 0.0561. The higher the portfolio at risk ratio, the worse it is for the lending institution, and the lower the portfolio at risk ratio, the better for the institution because this ratio shows the exposure of the institution to credit risk (the risk of default). It shows the degree of the quality of an institution's portfolio. According to the results of the study it shows that the default rate is relatively low because par 30 days averages to 5.61%. However the benchmark provided by CGAP for PAR>30 is 3% (Tucker 2001). A study by Woller & Schreiner (2002) on 13 village banks revealed a PAR>30 ratio of 2% in this case which very low indicating a healthy portfolio because the default rate was low in these village banks. Another study by Bogan (2012) involving MFIs in Africa, East Asia, Eastern Europe, Latin America, the Middle East, and South Asia for the years 2003 to 2006 using data from MIX website where he focused on outreach, efficiency, and financial sustainability revealed that MFIs in Eastern Europe and Central Asia region had a portfolio at risk >30 ratio of 3.16% and those in African region had 7.03% .

Another study covering 64 microfinance institutions of the Middle East and North Africa (MENA) region, by Bassem, (2012) on financial performance of MFIs, revealed that portfolio at risk variable had a strong influence on the financial performance of MFI with a negative correlation coefficient which was statistically significant at 1%. This negative relationship confirms that a higher portfolio at risk would block good financial results. MFIs can therefore be concerned to improve the portfolio at risk to ensure their financial sustainability. This therefore , shows that credit risk management in African region, Kenya included, is still higher than other regions and this has affected the sustainability of MFIs in Africa and more so in Kenya.

The results regression for portfolio at risk > 30 days has a coefficient of -0.5734 which indicates a negative significant effect on financial self-sufficiency. In this case therefore it means that, an increase of one unit in portfolio at risk, leads to a significant decrease in financial self-sufficiency by a factor of 0.5734. Therefore, in order to increase financial sustainability the MFI should have in place a well designed procedure to make sure loans are repaid well in so as to reduce default (credit risk) and have a healthy portfolio to enhance financial sustainability. This is in line with findings by Ayayi (2012) who found out that portfolio at risk>30 has a negative impact on financial performance of MFI's and concluded that credit risk management practices affects financial sustainability of microfinance institutions. The same findings were observed by Khan & Ashta (2013) in their study about managing multifaceted risks among Microfinance institutions in Bangladesh.

5.2.2 Loan Loss Provision (LL_PROV) and Financial Sustainability

Loan loss provision was another indicator for credit risk management in microfinance institutions that was used in this study. The higher the loan loss provision, the higher the number of loans that are not paid as scheduled, indicating a low repayment. On the other hand, high loan repayment rate means few loans or non have to be provided for. This means that if the repayment rate is high, the institution is performing well financially because the core business of microfinance institutions is giving loans. The average loan loss provision for the sampled microfinance institution was 3.3% which is low compared to the maximum provision of 25% required by CGAP meaning the loan repayments were fairly good. However, a study carried out by Sharma (2008) in Nepal showed an average loan loss provision of 1.01% which means the repayment rate for Nepalese microfinance institutions is better than in Kenya. This indicates that

the microfinance institutions in Kenya face higher credit risk than their counterparts in Nepal because in Kenya MFI clients have poor loan repayments and as such higher loan loss provisions have to be made to cover for losses arising from non repayments of loans advanced.

The regression results of the 37 sampled microfinance institutions shows a coefficient of negative 0.02566 with a p-value of 0.03700 which is highly significant. One unit increase in loan loss provision, leads to a significant decrease in financial self-sufficiency by a factor of 0.02566. This is supported by findings in a study carried out by D'Espaller (2009) in Bangladesh who found out that good repayment rate positively impacted financial performance in microfinance institutions.

5.2.3 Risk Coverage Ratio (RCR) and Financial Sustainability

The mean value for average risk coverage ratio in this study was 116%. The higher the risk coverage ratio, the better for the organization as it denotes a higher cover of loan losses and hence a good cushion for the institution from losses emanating from defaults because the organization has made enough provision to adequately cover the portfolio at risk. Risk coverage ratio has a positive coefficient of 0.00159 which means its impact on financial sustainability is positive but not significant because its p-value was very high.

The study observed that the risk coverage ratio for the sampled microfinance institutions was more than the 100% as provided by CGAP which shows that generally the microfinance institutions are well-cushioned from loan losses. However, the findings of this study contradicts with a report by AMFI (2012) which stated that that risk coverage ratio in the microfinance sector as a whole stood at 46.2% in Kenya and 56.2% in the whole of Africa in 2012.

5.2.4 Number of borrowers and financial sustainability.

Number of borrowers was used in this study as control variables for breadth of outreach. The mean value for the sampled 37 microfinance institutions 21,654 in real terms, however it had no statistical significance on financial sustainability. A *FinAccess National Survey on Profiling developments in financial access and usage in Kenya* (2013) done by Financial Sector Deepening- Kenya (FSD-Kenya) indicated low breadth of outreach in microfinance sector in Kenya. According to this FSD 2013 report, microfinance institutions have only been able to serve 651,873 of the Kenyan population. This translates to 3.5% which shows clearly the number of people borrowing loans from microfinance institutions is low compared to the total population

of over 40 million people in Kenya. Therefore, from the above findings, the researcher concludes that financial sustainability of microfinance institutions is still low. However, the regression results revealed that the number of borrowers is not significantly related to financial sustainability and this is line with the findings of Woller & Schreiner (2002) who found out that increasing the number of borrowers does not necessarily increase financial self-sufficiency.

5.2.5 Total Assets and financial sustainability

Total asset was another parameter used as a control variable to measure the size of the institution. The mean value was 1.19bn in real terms and the regression results revealed a strong positive correlation with financial sustainability. It can therefore be inferred that the average total assets of the microfinance industry is on average 1.19 million shillings (approx 14m USD). This is much better compared to the average of USD 8,052,676 total asset for Africa as per the study done by Lafourcade, Isern, Mwangi, & Brown (2005). This shows that the financial sustainability in the sampled microfinance institutions in Kenya is better.

Loans form the largest portion of assets for microfinance institutions because these are monies lent out and expected to be paid to the institution with an interest. The higher the loans given out, the more the financial sustainability increases. This is because the interest paid on loans, forms a major part of the operating revenue of the MFI and remember operating revenue is the numerator in the formula for calculating financial sustainability. Therefore when the numerator value goes up, the financial self-sufficiency ratio goes up, hence financial sustainability. The results from this study shows that total assets have a positive coefficient of 0.1253. This means that a unit increase in total asset would cause a significant increase in financial self-sufficiency by a factor of 0.1253 meaning total assets can be increased by giving more loans and consequently increasing financial sustainability. The study therefore, finds that the size of the microfinance institution is critical in enhancing the institution's financial sustainability. The findings of this study corresponds with the findings of Demirgüç, Kunt and Cull (2009) who carried out a study on financial performance and outreach, found out that age and size of the microfinance institution are significantly positively linked to financial sustainability. Another study by Ejigu (2009) who conducted a performance analysis for 16 MFIs in Ethiopia established that profitability and sustainability of MFIs go hand in hand with their size, that is, size of the MFIs affect profitability and sustainability positively.

In conclusion therefore, this study holds the same view by Sarker (2006) who argues that sound credit risk management is a key pre-requisite for the strength, profitability and growth of any financial institution, and strong earnings and profitability profile of a financial institution reflects good health which enhance their ability to support present and future operations. In this case the long term survival of the institution becomes certain. However the findings of this study revealed that MFIs in Kenya have not yet attained financial sustainability. This is highly supported by the same findings of Ayayi & Sene (2010), and Hermes & Lensink (2007) who found out that because of the high cost of providing credit, most MFIs are not financially sustainable and are thus reliant on donor subsidies. In fact Annim (2009) in his study on microfinance efficiency for 164 MFIs noted how the micro banking bulletin for 2008 showed an aggregate picture of African MFIs being financially unsustainable, which signals their reliance on other sources of funds.

5.3 Conclusion

The aim of the study was to find out the effect of credit risk management on financial sustainability in microfinance institutions in Kenya. The study encompassed three objectives. The first objective was to evaluate credit risk management used in microfinance institutions. Portfolio at risk 30 days late (PAR>30), Risk Coverage Ratio and Loan loss provision were the credit risk management parameters that were used in this study. Portfolio at risk>30 and loan loss provision were found to have a significant negative effect on financial sustainability. However risk coverage ratio did not have any significant impact on financial sustainability.

The study also controlled for size of the institution and breadth of outreach whereby total assets and number of borrowers were used as the proxies respectively. Total assets were found to be highly significant while number of borrowers did not have any statistical significant in this study.

The next objective was to assess the financial sustainability of microfinance institutions in Kenya. The study used operating self-sufficiency and financial self sufficiency. The two parameters were less than 100% which showed that the microfinance institutions in Kenya have not yet attained sustainability because the parameters should be equal to or more than 100% to indicate sustainability. This means that many MFIs still depend on subsidies that they receive from governments and other funders.

The last objective but not the least, was to establish the relationship between credit risk management and financial sustainability of microfinance institutions in Kenya. The study established a relatively strong relationship between credit risk management and financial sustainability as evidenced by R-squared of 0.56. This means that credit risk management can explain 56% of changes in financial sustainability. Therefore the model is fit for forecasting.

From the findings, the study concludes that MFIs need management of credit risk to prevent it from failing in its obligation and meeting its objective, minimize loan defaulters in order to have a healthy portfolio and ensure the organization performs better thereby increasing financial sustainability and helping the organization in attaining maximum returns for its investors. It is evident that credit risk management affects financial sustainability of MFIs. The MFIs should mitigate credit risk to avoid adverse effect on its financial sustainability. Portfolio at risk needs to be minimized to ensure a healthy portfolio. High repayment rates should be maintained to avoid delinquencies which results in high loan provisions. Having a relatively strong linear relationship between credit risk management and financial sustainability, it can be concluded that credit risk management is fundamental in achieving financial sustainability for MFIs in Kenya.

The study also reveals that the microfinance sector in Kenya has not yet achieved financial sustainability because many MFIs still depend on subsidies that they receive from governments and other funders. This has been perpetuated by the high cost of providing credit in Kenya prompting most MFIs to be reliant on donor subsidies. All in all because grants and subsidies are not guaranteed, the MFIs should strive for efficiency and apply aggressive loan recovery policies to cover all their expenses. This will in the long run go a long way in ensuring long term survival of the institution in terms of financial sustainability.

5.4 Recommendations

Given the findings from this study, there are a number of recommendations that can be adopted by the MFIs in mitigating credit risks facing them to enhance their financial sustainability. The MFIs should be aggressive and employ a thorough and detailed vetting process to make sure that they don't fall victims of moral hazards and adverse selection. This way they will avoid chances of giving money to potential defaulters, meaning the portfolio at risk will be minimized. Loan repayment rate needs to be enhanced in MFIs in order to achieve good repayments and by extension reduce loan loss provision which adversely affect financial sustainability of MFIs. The

MFIs need to put in place a well designed lending policy to mitigate credit risk all the way from vetting to repayment of the final installment of the loan.

The findings of this study also reveal that total assets are a significant factor in financial sustainability. Increasing total assets would significantly enhance financial sustainability. The researcher therefore recommends that MFIs should strive to increase their asset base in order to be more financially sustainable.

Unless financial self-sufficiency is reached, the long term provision of financial services is undermined by the continued necessity to rely on donor funds. Therefore it can be concluded that in order to increase financial sustainability, the MFI should: minimize portfolio at risk by advancing loans to client who pay well, ensure good repayment rates by having effective collection policies this way loan loss provision will be minimal and, growing their assets.

5.5 Limitation of the study

The main limitation of the study was getting data for all the years under study for the microfinance institutions sampled. Some MFIs did not have data for all the years in the MIX Website and also AMFI website. This was challenging because the higher the number of observations the more the reliable the results can be.

Another limitation was that all microfinance institutions did not make reports to the MIX website. In fact, out of the 37 sampled MFIs, 7 of them did not have any information in the MIX website even though they appeared as members of AMFI and as such the data that was obtained was only for 30 MFIs.

5.6 Suggestion for further research

The study investigated the effect of credit risk management on financial sustainability of MFIs in Kenya. According to the findings of the study, it was established that sustainability of Kenyan MFIs is far from being achieved meaning that there is still heavy reliance on donor funding and government subsidies. This situation is disturbing because donations and grants cannot be endlessly available. Therefore this study recommends a further research on the factors affecting financial sustainability of MFIs in Kenya. This will go a long way to help MFIs deal with such factors in order to address the issue of financial sustainability to ensure a stable microfinance sector in Kenya.

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APPENDICES

Appendix 1: Morgan Stanley Credit risk Factor Analysis

Factor	Indicator	Benchmark (%)
Loan Portfolio	Portfolio at Risk: (Portfolio at Risk over 30 days + Rescheduled/Restructured Loans) / (Gross Loan Portfolio) Write-Offs: (Last Twelve Months of Write-Offs) / (Average Gross Loan Portfolio) Size of Portfolio: Gross Loan Portfolio	24
Profitability, Sustainability, Operating Efficiency	Sustainability: (Operating Income)/ (Financial Expenses + Loan Loss Provisions + Write-offs + Operating Expenses) ROAA: (Net Income) / (Average Assets) Operating Efficiency: (Total Operating Expenses) / (Average Gross Loan Portfolio)	23
Management & Strategy	Quality of Senior Management and Board Strategy and Business Plan (including competitive landscape) Quality and Support from Shareholders and Network	7
Systems & Reporting	Quality of Management Information Systems Quality and Speed of Data Feed Quality of Reports and Distribution/Analysis of Reports	11
Internal/Operational Controls	Operational Procedures Internal Controls	10
Asset/Liability Management	Leverage: (Total Liabilities) / (Net Worth + Subordinated Debt) Exposure to Foreign Currency: (Financial Debt in Non-Hedged Foreign Currency) / (Total Financial Debt) Liquidity: (Cash + Short-Term Investments) / (Gross Loan Portfolio)	19
Growth Potential	Regulatory Environment and Government Involvement Number and Density of Micro Entrepreneurs Behavior of Micro Entrepreneurs towards Micro Loans	6

Source: (Arvelo et al., 2008)

Appendix 2: Microfinance Institutions Registered with AMFI

MEMBER NAME	ADDRESS
BANKS	
K-rep Bank Ltd	K-Rep Centre, Wood Avenue P.O BOX 25363-00603 NAIROBI
Equity Bank	Equity Centre, Upperhill P.O BOX 75104-00200 NAIROBI
Co-operative Bank	Co-operative Bank of Kenya Ltd Co-operative Hse Building- 4th Floor P.O BOX 48231-00100, NAIROBI
Kenya Post Office Savings Bank	Market Lane Off 17 Banda Street, Postbank House P.O BOX 30311-00100 NAIROBI.
DEPOSIT TAKING MICROFINANCE	
Kenya Women Finance Trust-DTM	Upperhill, Kiambere Road P.O BOX 4179-00506 NAIROBI.
Rafiki Deposit taking Microfinance Ltd	Elroy Plaza, Tom Mboya Street, P.O. Box 66049 00800 Nairobi
Faulu Kenya DTM	Ngong Road, Ngong lane P.O BOX 60240-00200 NAIROBI
SMEP DTM	Kirichwa Road, Kilimani P.O BOX 64063 NAIROBI
Remu DTM Ltd	Finance House, 14th Floor, Loita street P.O. Box 20833-00100 Nairobi
Uwezo DTM Ltd	Park Plaza, Ground Floor, Moktah Daddah Street P.O. Box 1654-00100 GPO Nairobi
Century DTM Ltd	New Pumwani Road K K Plaza, Gikomba
Sumac Credit DTM Ltd	Consolidated Bank Building, Koinange Street, 2nd Floor P.O. Box 11687-00100 Nairobi
INSURANCE	
CIC Insurance	CIC Plaza, Mara Road P.O Box 59485-00200, NAIROBI.
Chartis insurance	Chartis Insurance Company Ltd. Chartis House, Eden Square Complex, Chiromo Road

	P.O Box 49460-00100, Nairobi. www.chartisinsurance.com
Microensure Advisory Services	Hughes building, Kenyatta avenue, 8th floor P.O. Box 13383-00100, Nairobi.
WHOLESALEERS	
Jitegemee Trust	K-Rep Centre, Wood Avenue P.O BOX 21768-00505 NAIROBI
OIKOCREDIT	Methodist Ministries Centre, Olitokitok road 2nd Floor P.O BOX 67181 NAIROBI
MESPT	2nd flr vision towers muthithi rd, westland P.O. Box 187 Sarit Centre 00606 Nairobi info@mespt.org
Women Enterprise Fund	NSSF Building, Eastern Wing, Block A, 14th Floor P.O. Box 17126-00100 Nairobi wefsecretariat@yahoo.com
SACCOS	
Unaitas Sacco Society Ltd. formerly Muramati Sacco Society Ltd	Muramati Building, hospital road, Muranga P.O. Box 1145-10200, Muranga.
DEVELOPMENT PARTNERS	
Swiss Contact	Westlands,Vanguard House, 6th Floor, P.O Box 47996,00100, Nairobi. info@swisscontact.co.ke www.swisscontact.co.ke
RETAIL	
Blue Limited	Chester House-Koinange Street P.O BOX 27749-00100 NAIROBI
K-rep Development Agency	K-Rep Development Agency Ltd K-Rep Centre 7th Flr. Wood Av. Kilimani P.O. Box Box 10528 – 00100, Nairobi.
Eclof Kenya	Chiromo, Royal Offices, Mogotio Road P.O BOX 34889 NAIROBI Email: info@eclof-kenya.org
KADET	Capital Hill, Cathedral Road Community

	P.O BOX 1676-00200 NAIROBI
BIMAS	Bimas Complex P.O BOX 2299 EMBU
SISDO	Ngong Road, Ngong lane P.O BOX 76622-00508 NAIROBI
Micro Africa Ltd	P.O BOX 52926 NAIROBI
Opportunity Kenya	Geomaps Centre-Matumbata rd Upper Hill P.O BOX 19497-00202 Nairobi
Yehu Microfinance Trust	Buxton, Tom Mboya Street P.O BOX 82120 NAIROBI
Fusion Capital Ltd	ACK Garden house, Wing A, Ground Floor, 1st Ngong Avenue, Community next to ardhi house.
Canyon Rural Credit Ltd	Studio Hse,3rd floor P.O. box 46532-00100 Nairobi.
One Africa Capital Ltd	Koinange Street-Ratansi Educational Trust Building, 2nd Floor P.O. Box 74093-00200 oneafrica.microfin@yahoo.co.uk
Jitegemea Credit Scheme	Jogoo Road, KCB building P.O BOX 46514, NAIROBI jitegemea@wananchi.com
AAR Credit Services	Methodist Ministries Centre, 1st Floor Oloitokitok Road
Agakhan Foundation Microcredit Programme	Mpaka plaza, Westlands 3rd floor P.O BOX 13149-00100, NAIROBI
ADOK TIMO	Sifa House, Ground Floor, Mission Rd. Off Kakamega Rd. Opposite Kibuye Market. KISUMU.
Pamoja Women Development Programme	Kikinga House, Kiambu Town P.O. Box 2472 – 00100 Nairobi. E-mail: info@pawdep.org
Juhudi Kilimo Co.Ltd	Muca Road, Ngong Road P.O. Box 10528-00100 Nairobi E-mail : nat@juhudikilimo.com
Musoni Kenya Ltd	Cape Office Park Along Ring Road Kilimani, Opposite Yaya Centre P.O. Box 25351-00100 Nairobi.
Molyn Credit Ltd	Bruce House 9th Floor Standard Street P.O. Box 10144-00100 Nairobi

Renewable Energy Technology Assistance Programme (RETAP)	Email : info@molyn.co.ke Waumini Hse, Westlands 1st Floor P.O. Box 28201-00200 Nairobi E-mail : info@retap-africa.org
Rupia Ltd	View Park Towers, 10th Floor P.O. Box 2987-00200 Nairobi Tel : 2251389 Email : info@rupialtd.com
Taifa Options Microfinance	Finance House, Kenyatta Highway P.O. Box 727, Ruiru E-mail : taifaoption@yahoo.com
U&I Microfinance Ltd	1st Floor, Asili Complex River Road/Latema Road Junction Opposite Kampala Coach E-mail: info@uni-microfinance.co.ke
Select Management Services Ltd	Kenya Re towers, off Ragati Road P.O. Box 27639, 00506 Nairobi.
Greenland Fedha Ltd	KTDA, KTDA farmers building P.O. Box 30213-00100 Nairobi.
Youth Initiatives – Kenya (YIKE)	Kariobangi North, Sanoda Hse, 2nd Flr P.O. Box 50622-00200, City Square, Nairobi
Biashara Factors	Finance House, 11th Floor, Loita Street P.O. Box 66065-00800 Nairobi
Platinum Credit Limited	2nd floor, union towers, moi avenue P.O. Box 73304-00200 Nairobi info@platinumcredit.co.ke
Ngao Credit Ltd	2nd Floor NHIF Bldg. Community P.O. Box 60776-00200 Nairobi Email: info@ngaocredit.com
Indo Africa Finance	Museum Hill Centre 3rd Floor, Museum Hill Road P.O. Box 39435-00623 Nairobi – Kenya Email: info@indoafricafinance.co.ke
Springboard Capital	Kensia House along Muranga road, Opposite Kobil Petrol Station 1st Floor, suite no.12 P.O. Box 23720-00100, Nairobi.
Mini Savings & Loans Ltd	Highway Building, Githunguri Town (Near Githunguri Post Office)

	P.O. Box 874-00216, Githunguri, Kiambu Email: minisaving@yahoo.com
KEEF-Kenya Entrepreneurship Empowerment Foundation	Mapa House 3rd Floor Kiambu Road P.O. Box 648 Kiambu
Women Enterprise Solutions	Development House, Moi Avenue P.O. Box 4083-00200 Nairobi. info@wesokenya.com
Focus Capital Limited	Donholm Mina Centre P.O. Box 2406-00202 Nairobi. Email: aligeproperty@rocketmail.com
Samchi Credit Limited	Parklands Plaza P.O. Box 16982-00620 Nairobi. Email: martin.gikera@samchicredit.co.ke , info@samchicredit.co.ke
Fountain Credit Services Ltd	Ngong Road , near Kobil Petrol Station P.O. Box 72367-00200 Nairobi. Email: mgachau@fep-group.com , gkariuki@fep-group.com
Milango Financial Services	Rozina Building, Moi Avenue Street P.O. Box 99637-80107, Mombasa Email: info@milangokenya.co.ke
Nationwide Credit Kenya Ltd	Trishul Towers, 1st Floor Near Globe Roundabout Next to Paramount Plaza P.O. Box 41873-00100 Nairobi. Email: nationwidekenya@yahoo.com
Fort Credit Limited	Equity Plaza (Thika) 2nd Floor P.O. Box 6685-001000 Thika Email: info@fortcredit.org

Source: AMFI website (www.amfi.com)

Appendix 3: Descriptive statistics for financial self-sufficiency variables in real terms

Descriptive statistics for financial self-sufficiency variables in real terms							
	BORROWERS	GLP	LL_PROVISION	LL_RATIO	PAR	RCR	TA
Mean	21,654	822,000,000	38,482,709	0.033026	0.0561	1.157559	1,190,000,000
Median	1,995	110,000,000	2,849,207	0.015999	0.0295	0.286361	183,000,000
Maximum	413,040	13,200,000,000	734,000,000	0.737973	0.417143	106.2317	20,400,000,000
Minimum	0		(5,276,489)	-0.037	0	0.480519	0.0000000
Obs.	180	180	180	180	180	180	180

Appendix 4: Histogram for FSS Model

