Credit Risk, Firm Size and Financial Perfomance of Microfinance Banks In Kenya.

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Abstract

Microfinance banks (MFBs) in Kenya have continued to record huge annual losses contrarily to their counterpart, commercial banks that have been resilient and reported improved financial performance. The aim of the study was to explore the effect of Firm Size, credit risk on financial performance of Microfinance banks in Kenya. The target population was MFBs regulated by Central Bank of Kenya (CBK). The study employed census method. Secondary data for thirteen (13) MFBs was collected from published annual reports for the period 2011-2019. The study employed explanatory research design. Unbalanced panel regression model was employed to examine the impact of independent variables on dependent variable using unbalanced panel data. The dependent variable, financial performance was measured by Return on Equity (ROE). The independent variable credit risk was measured with following ratios Net non-performing loan ratio, Asset quality ratio, Loan Loss Provision to total Loan ratio and Loan Loss Provision to total equity ratio while the total asset of MFBs was the indicator of the moderating variable, firm size. The finding depicted Credit risk had negative significant effect on financial performance. The model F statistics indicated a strong statistical significance of credit risk on financial performance of MFBs at 5% level of significance. The finding further showed that the firm size had a positive significant moderating effect on the relationship between credit risk and financial performance, thus depict that large sized MFBs were better placed in managing credit risk. Inconclusion, the negative and significant relationship between credit risk and financial performance indicate poor asset quality or high non-performing. The study recommends that management of MFBs establish stringent credit policy and robust credit risk management framework to reduce non-performing loans and default levels.

Keywords: *Financial Performance; credit risk; liquidity risk; Microfinance Bank; Firm Size*

1.0 Introduction

In developing and underdeveloped countries, microfinance sector is considered as a strategic means to the poverty reduction which is promoted by both governments and donors for social and financial being of a society (Founanou & Ratsimalahelo, 2016). Microfinance thrives in

economies of developing and transiting countries. There main objective being provision of financial services to poor section of the society excluded by providers of formal financial services or in general consider as an unbankable or undeserving. They are commonly referred as the Undeserved, these segments mainly consist working poor, majority of whom survive on less than US $ 2 per day, they further include self-employed or micro-entrepreneurs, running a micro-business. Majority of these poor people toil in the informal sector, which developing nations constitute up to 80 percent or more (Benedetta, 2015). Availing financial resources to the poor segment is a vital mechanism for poverty alleviation and wealth generation in underdeveloped economies where enormous unmet demand for financial facilities is existent. There exist limited inclusion and use of financial services by underprivileged in commercial banks, which is attributable to high expenses of market agreements and limitations (Demirgüç-Kunt & Klapper2012). The ability of the poor to borrow, pay moderate interest charge and save continuously has been well proved by Microfinance institutions (MFIs), which as a results leads to great improvement in credit markets for developing nations.

The World Bank's survey, The Global Findex (2015) reports impressive progress of financial inclusion of undeserved between 2011and 2014. The survey found substantial number of people approximately 700 million opened an account with a prudential and non-prudential form of financial institutions such as commercial banks, MFBs, credit-only MFIs, cooperatives as well mobile banking providers service providers. It further, reported an increase of adults holding banks accounts from 52% to 61% while the financially excluded people fell by 20%, to 2 billion adults.

The Moroccan microfinance sector is the most developed in Middle East and North Africa (MENA) region with outstanding portfolio of 64% for the entire region. Despite Morrocan MFIs rapid growth in MENA region, the sector has lacked comprehensive risk management guidelines and concrete institution framework. This as attributed rapid growth of portfolio and wide spread multiple borrowing hence higher levels of indebtedness and loan defaults (MicroFinanza, 2014)

According to FinAccess Household 2016 survey, financial inclusion in Kenya increased to 75.3% in 2016, a 50% increase in the last ten years. The financially excluded Kenyan stood at 17.4% in 2016 compared to 41.3% in 2006 which translates more than half reduction of excluded. However, financially excluded Kenyan remained high at rural areas at 22.0% compared to urban areas at 9.5% in year 2016. In addition, uptake from informal financial

service from *chamas*, ROSCAs, shopkeepers, shylocks and employers remained relatively high for women at 10.2% in 2016 compared to men at 4.1% in the same period in 2016.

According CBK (2013), Credit risk refers to the anticipated risk to bank's earnings and capital as a result of failure of the obligor to comply with the contract requirements with the financial institution or otherwise the borrower defies contractual agreement. Afriyie and Akotey (2012) observe that level credit risk in bank is performance indicator of financial institution's capital which numerous bank regulatory authority consider. They further notes that effective CRM tools and strategies are key factors to a banks' success or failure as well as future growth. It is a structured approach of uncertainty management through risk assessment, development of strategies to manage it and mitigation of risk using managerial resources. CRM tools and techniques involves risk transfer to other parties or total avoidance of risk and defusing negative eventualities within the bank incases when faced with high credit defaults (Afriyie & Akotey,2012).

A survey on risks facing microfinance industry conducted in 70 countries based on 306 responses by CSFI (2014) reported that top ten ranking risks internationally included over-indebtedness, credit risk, competition, risk management, governance, strategy, political interference, management, regulation and staffing. However, in Africa, they found that credit risk, governance, over-indebtedness, risk management, management strategy, completion liquidity and technology management ranked highest among the 19 risk under consideration. According to FinAccess (2016) report there has been a tremendous increase of uptake of financial products of prudentially governed service providers, supervised and monitored by authorized statutory body in the last ten years to 42.3 % in year 2016 from 15.0% in 2006. Despite the impressive use of financial service, the Central Bank Kenya bank supervision report 2016 reported that MFBs' Earning before tax declined by 169% from Kshs 549 Million for the year ending 2015 to a loss of Kshs. 377 million for the period ended 2016 (CBK, 2016). Addition, CBK Bank supervision report 2017, indicated an overall drop in performance of MFBs with joint loss before tax of Ksh 622 million in 2017 (CBK, 2016; CBK, 2017). It on this background the study intends focus on effects of credit risk on financial Performance of MFBs.

2.0 Objectives

1. To examine the effect of credit risks on the financial performance of Microfinance banks in Kenya.
2. To determine the moderating effect of firm size on financial performance of Microfinance Banks in Kenya.

3.0 Theoretical Framework

Marashdeh (2014) posit that fundamental argument for agency theory is that corporate interaction between the shareholders and the firm managers cause conflicts of interest dues to divergent interest.

The central postulation of agency theory is that managers pursue and maximize their own utility rather than enhancement of shareholder's economic welfare; contracts are expensive when writing and executing; information is disseminated asymmetrically between partners in the agency relationship; and the principal and agent have restricted or confined rationality Marashdeh (2014). However, information asymmetry arises between firm' management and shareholders since the latter cannot accurately determine or quantify the output of managers, who are more knowledgeable on daily operation of the firm. Therefore, due to imperfect information, shareholder's face adverse selection problem since they cannot perfectly evaluate the suitable skills or abilities the managers assert to possess at employment contracting, thus may fail to select well suited applicant to execute responsibilities and duties within the company or improperly gauge their output (Jensen & Meckling, 1976). In microfinance institutions agency problem is likely to arise if the managers have individual vested interests in the organization. Some issues would be that the managers allocate themselves loans at the expense of the members and failure to carryout due diligence before extending credit facilities. This theory has critical link to credit risk and their respective impacts on financial performance of MFBs.

4.0 Literature Review

A study on determinants of MFIs profitability in Sub Saharan countries in Africa was conducted by Murui (2011), using Generalized Method of moments (GMM) system on unbalanced panel data of 210 MFIs for periods within year 1997 to 2008. The study used ROA and ROE as indicators of profitability while using PAR-30, write-off ratio(WOR), loan loss reserve ratio (LLR) and risk coverage ratio (RC) as indicators of credit risk. The study did find evidence of negative and significant impact of credit risk on profitability. The study suggested that credit risk exposure results to lower profitability of MFIs. In conclusion, the study recommended for improvement in information capital to enhance better client screening procedures and mitigation of adverse selection problems.

According to Ayayi (2011), MFIs that have credit risk management systems resulted to higher profitability measured by ROA in Vietnam. Additionally, the study found due to proper governance structures within the institutions lead to low-credit risk, low loans write-off and higher portfolio quality. Bedecarrats et al (2011) intimated that MFI's quality of service delivery and reasonable interest rates resulted to reduced Portfolio at Risk (PAR-30) and write off ratio which in turn would strengthen customers' reimbursement capacity, which consequently lowers loan delinquency and defaults. The study further concluded improved MFI's portfolio quality would be observed through establishing a good working condition and staff training. Tanui et al (2015) conducted an investigation of the effect of credit risk management practices on profitability of SACCOs Nakuru east sub-county Kenya. The study was based on descriptive survey that targeted credit officers and credit managers in deposit

taking. The study found out evidence of a strong association between credit risk management practices- credit scoring and credit administration- and financial performance.

Gatehum, Anwen and Bari (2015) investigated the correlation between credit risk management and financial performance of Ethiopia's commercial banks for period of five years between 2009 to 2014. Using panel data set from the commercial banks the established there exist a strong relationship between credit risk and performance of commercial banks. Commercial banks performance was measured using ROA and ROE while indicators for credits risk management were capital adequacy ratio (CAR), Non-performing loan ratio (NPLR), loan provision to total loan ratio (LPTLR), loan provision to Non-performing loan ratio(LPNPLR) and loan provision to total asset ratio(LPTAR). Using multiple regression model to carry out analysis on cross sectional data of Pakistan's microfinance banks on relationship between credit risk management practices and loan performance in, Ahmed and Malik (2015) found a that credit terms and client appraisals as indicators of credit risk management practice to have positive and significant influence on loan performance while the collection policy and credit risk control to having positive though insignificant impact on dependent variable

5.0 Conceptual Framework

According Cooper and Schindel (2008) defines conceptual framework as a graphical representation of constructs of variables studied and their relationship. The conceptual framework consisted of independent variable, credit risk (measured by Net non-performing loan ratio, Asset quality ratio, Loan loss Provision to total loan ratio and loan loss provision to total equity ratio), dependent variable, financial performance (measured by Return on Asset and Return on equity) and moderating variable, Firm size (Total Assets).
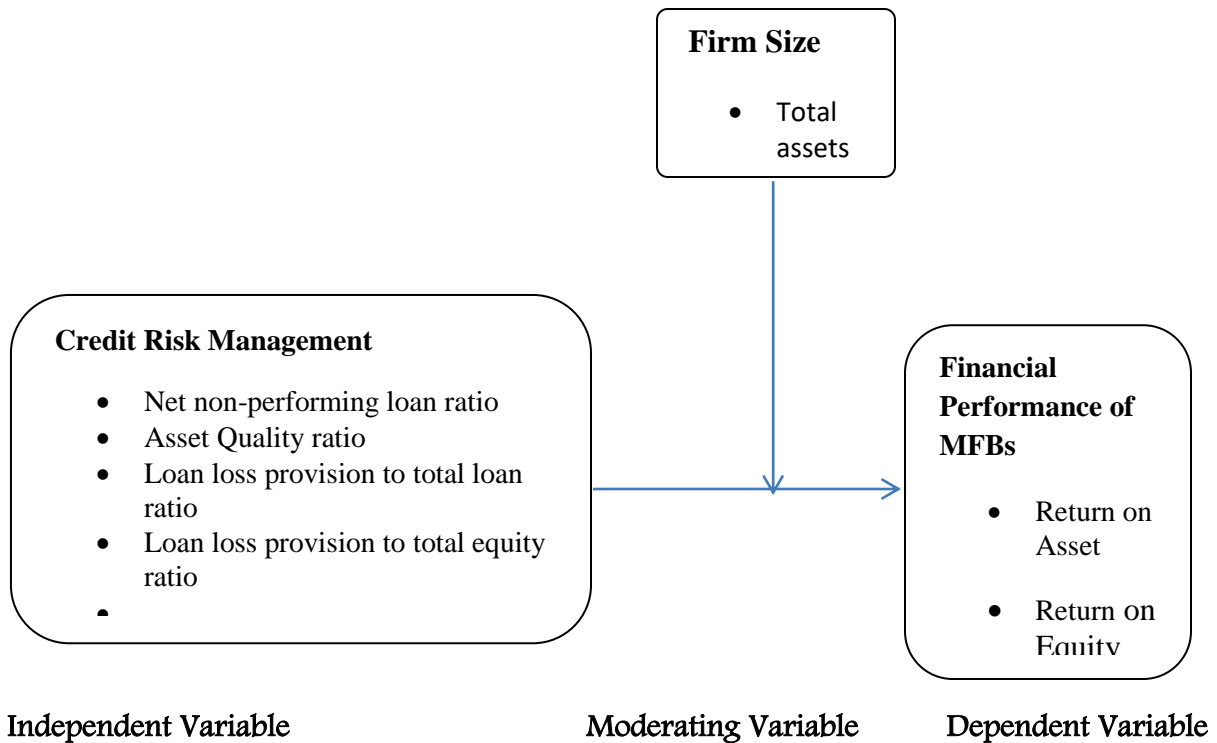
Firm Size

- Total assets

Credit Risk Management

- Net non-performing loan ratio
- Asset Quality ratio
- Loan loss provision to total loan ratio
- Loan loss provision to total equity ratio

Financial Performance of MFBs

- Return on Asset
- Return on Equity

Independent Variable   Moderating Variable   Dependent Variable

Figure 1 Conceptual Framework

6.0 The Study Methodology

The study employed combination of explanatory research design and quantitative research design. Panel data regression was used to determine the extent to which credit risk affects financial performance of MFBs in Kenya for the periods 2011-2019. Further, the study examined the moderating effect of firm size on financial performance. Panel data will be considered as appropriate since it measures and demonstrates effects that hardly detectable through use of cross-sectional data or time series data. (Pascal,2012; Gujarati & Porter, 2010). The target population was the thirteen (13) MFBs licensed and regulated by Central Bank of Kenya (CBK) as at December 2019. The study adopted Census method. The census approach enhance validity on data collected by minimizing errors associated with sampling techniques (Saunders, Lewis & Thornhill, 2009). The study was based on secondary data collected from audited annual financial statements of MFBs between years 2011 and 2019.

7.0 Model Specification

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7.1 Empirical Model

$$ROA_{it} = \beta_0 + \beta_1 NNPLR_{it} + \beta_2 AQR_{it} + \beta_3 LLPTLTR_{it} + \beta_4 LLPTER_{it} + \mu_{it} + \varepsilon_{it} \ldots\ldots(7.1)$$

$$ROE_{it} = \beta_0 + \beta_1 NNPLR_{it} + \beta_2 AQR_{it} + \beta_3 LLPTLTR_{it} + \beta_4 LLPTER_{it} + \mu_{it} + \varepsilon_{it} \ldots\ldots(7.2)$$

Where;

ROA_{it} is Return on Asset for MFB i at time t

ROE_{it} is Return on Equity for MFB i at time t

β_0 is the constant or intercept

$\beta_i; (i = 1,2,3,4)$ is coefficient of regression

$NNPLR_{it}$ is independent variable, Net Non-performing loan ratio of MFB i at time t

AQR_{it} is independent variable, Asset Quality Ratio for MFB i at time t

$LLPTLR_{it}$ is independent variable, Loan Loss Provision to Total Loan Ratio of MFB i at time t

$LLPTER_{it}$ is independent variable, Loan Loss provision to Total Equity ratio for MFB i at time t

μ_{it} is the individual level effect.

ε_{it} is the idiosyncratic error

7.2 Moderating Effect Model

$$ROA_{it} = \beta_0 + \beta_1 NNPLR_{it} + \beta_2 AQR_{it} + \beta_3 LLPTLR_{it} + \beta_4 LLPTER_{it} + \mu_{it} + \varepsilon_{it} + FSIZ \ldots$$
(7.3)

$$ROE_{it} = \beta_0 + \beta_1 NNPLR_{it} + \beta_2 AQR_{it} + \beta_3 LLPTLR_{it} + \beta_4 LLPTER_{it} + \mu_{it} + \varepsilon_{it} + FSIZ \ldots$$
(7.4)

FSIZ is the moderating effect of firm size

8.0 Empirical Results and Discussion

Descriptive statistics were used to summarize data and to identify patterns. Though descriptive statistics doesn't allow coming up with conclusion, the nature of data was presented in terms of their mean, maximum and minimum, standard deviation, Jacque-Bera (JB) statistic in Table 1.

Table 1: **Descriptive Statistics**

Variable	min	max	Mean	St.Dev	JB	P-value(JB)
Credit risk (CR)						
CR	~18.569	*207.58*	*23.296*	*21.672*	*1.673*	*0.450*
NNPLR	~50	57.246	8.116	12.152	1.548	0.497
AQR	0	65.942	17.222	15.323	1.115	0.564
LLPTLR	0	61.538	8.653	9.813	1.257	0.459
LLPTER	~177.778	900	25.037	96.223	1.285	0.781
Moderating variable						
FSIZ	1.771	4.507	3.004	.833	*1.095*	*0.806*
Dependent variable						
Financial Performance	~764.338	165.748	~19.106	86.794	1.233	*0.834*
ROA	~54.217	3.804	~6.898	~54.217	1.563	0.915
ROE	~1487.5	355.556	~31.314	~1487.5	0.968	0.678

Source: Study Data (2021)

The outcome in table 1 shows the mean value of financial performance of microfinance banks for the years 2011-2019 was negative 19.106% depicting that the overall sector of microfinance was incurring losses. The results showed that the return on equity as key measure of financial performance, having minimum value of ~1487.5% and maximum value of 355.556% with a mean value of ~31.314%. The results depict on average that banks earned ~31.314% return on equity with standard deviation of ~1487.5% indicating that banks were not utilizing owner's equity appropriately, likewise the mean value of Return to Asset was ~6.898%, implying that that MFBs asset were not utilized optimally. As indicated in the table above the overall credit risk mean for the microfinance banks was 23.296% implying high customer defaults. As shown from the table 1, the mean value of net non-performing loss ratio was 8.116%, Asset quality ratio 17.222%, Loan loss provision to total loan ratio 8.653% and

Loan Loss provision to total equity ratio 25.037%, the positive mean indicates existence of high exposure of credit risk.

Correlation Matrix

Table 2: **Correlation Matrix of ROE and Credit risk components.**

Variables	ROE	NNPLR	AQR	LLPTLR	LLPTER	FSIZ
ROE	1.000					
NNPLR	-0.059	1.000				
AQR	-0.096	0.421***	1.000			
LLPTLR	-0.127	-0.214***	0.439***	1.000		
LLPTER	-0.952***	0.055	0.127	0.199*	1.000	
FSIZ	0.116	0.026	-0.100	-0.294***	0.014	1.000

*** $p<0.01$, ** $p<0.05$, * $p<0.1$
Source: Study Data (2021)

The table 2 depicts correlation of explanatory variable and return on equity as on measure of the financial performance of microfinance banks. It is observed that all credit risk indicators are inversely correlated with return of equity for MFBs. The Loan loss provision to total equity ratio is negatively and significantly correlated to ROE, with a correlation coefficient values of -0.952.

Table 3: **Correlation Matrix of Credit risk components, Firm Size and ROA.**

Variables	ROA	NNPLR	AQR	LLPTLR	LLPTER	FSIZ
ROA	1.000					
NNPLR	0.230**	1.000				
AQR	~0.054	0.421***	1.000			
LLPTLR	~0.405***	~0.214***	0.439***	1.000		
LLPTER	~0.229**	0.055	0.127	0.199*	1.000	
FSIZ	0.544***	0.026	~0.100	~0.294***	0.014	1.000

*** $p<0.01$, ** $p<0.05$, * $p<0.1$
Source: Study Data (2021)

The results in table 3 depicts positive and significant correlation between Net Non-performing loan ratio and firm size with Return on Assets (ROA). The indicate that as the rate of NNPLR and firm size assets increases, the ROA increases with a correlation coefficient values of 0.230 and 0.544. Further, as observed from the above table 3, Loan loss provision to total loss ratio (LLPTLR) and Loan loss provision to Total Equity Ratio (LLPTER) is negatively and significantly correlated with ROA.

Table 4: **Correlation Matrix of Credit risk components, Firm size and ROE**

Variables	ROE	CRM	FSIZ
ROE	1.000		
CRM	~0.884***	1.000	
FSIZ	0.116	0.040	1.000

*** $p<0.01$, ** $p<0.05$, * $p<0.1$
Source: Study Data (2021)

From the outcome of table 4, the independent a variable, credit risk is strong negatively and significantly correlated with the Return to Equity (ROE) at correlation coefficient value of ~0.884. Similarly, the firm size has a weak positive and insignificant correlation coefficient with ROE (r = 0.116).

Table 5: **Correlation Matrix of Credit risk, Firm size and ROA**

Variables	ROA	CRM	FSIZ
ROA	1.000		
CRM	~0.125	1.000	
FSIZ	0.544***	0.040	1.000

*** $p<0.01$, ** $p<0.05$, * $p<0.1$
Source: Study Data (2021)

From the results of table 5, the independent a variable, credit risk is weakly correlated and insignificantly correlated with the Return to Assets (ROA) at correlation coefficient value of -0.125. On the other hand, the firm size has a fairly moderate, positive and significant correlation coefficient with ROE (r = 0.544).

Serial Correlation Test

Table 6: **Wooldridge test for autocorrelation in panel data**

Test	F	Prob > F	Conclusion
Wooldridge test for autocorrelation	0.2336	0.792	Autocorrelation not present

Source: Study Data (2021)

The results presented in table 6 above indicated that serial correlation test has not been violated since the Wooldridge test was insignificant at 0.05.

Model Determination and Regression analysis.

Hausman Specification Test.

Hausman test for specification was conducted to determine whether to use the random effects model or the fixed effect model. Hausman tests the null hypothesis that the preferred model is random effects versus the alternative to the fixed effects. The test rejects the null when the p-value is less than 0.05. Table 7 shows that Hausman specification test favors Fixed effect model (chi-square=14.458., P<0.05) at 5% level of significance the diagnostic tables and the conclusion are all based on the fixed effect panel regression model.

Table 7: **Hausman specification test**

	Coef.
Chi-square test value	14.458
P-value	.002

Source: Study Data (2021)

Fixed effect panel regression estimates of Credit risk on ROA.

Table 8: **Fixed effect panel regression estimates of Credit risk components on ROA.**

ROA	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
NNPLR	-0.015	0.081	-0.19	0.850	-0.176	0.146	
AQR	0.044	0.060	0.73	0.466	-0.075	0.163	
LLPTLR	-0.028	0.092	-0.30	0.762	-0.212	0.156	
LLPTER	-0.032	0.007	-4.31	0.000	-0.047	-0.017	***
Constant	-6.485	1.178	-5.51	0.000	-8.830	-4.140	***

Mean dependent var	-6.898	SD dependent var	12.034	
R-squared	0.203	Number of obs	94.000	
F-test	4.895	Prob > F	0.000	
Akaike crit. (AIC)	590.243	Bayesian crit. (BIC)	602.960	

*** p<0.01, ** p<0.05, * p<0.1
Source: Study Data (2021)

The fixed effect panel regression estimates provided in table 8 shows that model R^2 explains 20.3 percent of the variability in ROA as result of credit risk. The remaining percentage of variation in ROA may be as a result of Variables not included in the model. The model F statistic indicated a strong statistical significance at 5% level of significance (F-statistic =4.895, P<0.05). This implies that the Credit risk affects the financial performance (ROA) of MFBs in Kenya.

The loan loss provision to total equity ratio (LLPTER) of microfinance banks in Kenya was found to be negatively related to financial performance of microfinance banks in Kenya. The coefficient was 0.032 and significant at 5% level of significance. This implies that a unit increase in the loan loss provision to total equity ratio (LLPTER) would result in 0.032 units decrease financial performance (ROA) of MFBs in Kenya. The results were agreement with Alshatti (2015)

The Net non-performing loan ratio (NNPLR) and Loan Loss Provision to Total loan Provision (LLPTLR) of MFBs in Kenya were found to be negatively related to financial performance of MFBs in Kenya. The asset quality ratio (AQR) was found to be positively related to financial performance of microfinance banks in Kenya. The coefficient was 0.044 and insignificant. The

results were consistent with results from previous study Al-khouri (2011)& Ogboi &Unuafe (2013)

Fixed effect panel regression estimates of Credit risk components on ROE.

Table 9: **Fixed effect panel regression estimates of Credit risk components on ROE**

ROE	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
NNPLR	-0.189	0.475	-0.40	0.692	-1.134	0.757	
AQR	-0.066	0.352	-0.19	0.851	-0.766	0.634	
LLPTLR	2.755	0.543	5.07	0.000	1.673	3.837	***
LLPTER	-1.698	0.044	-39.01	0.000	-1.785	-1.612	***
Constant	-9.956	6.918	-1.44	0.154	-23.732	3.820	

Mean dependent var	-31.314	SD dependent var	169.013	
R-squared	0.953	Number of obs	94.000	
F-test	394.253	Prob > F	0.000	
Akaike crit. (AIC)	923.143	Bayesian crit. (BIC)	935.859	

*** p<0.01, ** p<0.05, * p<0.1

The fixed effect panel regression estimates provided in table 9 shows that model R^2 explains 95.3 percent of the variability in ROE as results of credit risk components. The remaining percentage of variation in ROE may be as a result of Variables not included in the model. The model F statistic indicated a strong statistical significance at 5% level of significance (F-statistic =394.253, P<0.05). This implies that the Credit risk affects the financial performance (ROE) of microfinance banks in Kenya.

The Net non-performing loan ratio (NNPLR) of microfinance banks in Kenya was found to be positively related to financial performance and statistically significant. The coefficient was 2.755 and significant at 5% level of significance. This implies that a unit increase in the Net non-performing loan ratio (NNPLR) would result in 2.755 units increase financial performance (ROE) of MFBs in Kenya. The finding was in agreement with Million, et al (2015).

The loan loss provision to total equity ratio (LLPTER) was found to be negatively related to financial performance of MFBs in Kenya. The coefficient was -1.698 and significant at 5% level

of significance. This implies that a unit increase in the loan loss provision to total equity ratio (LLPTER) would result in ~1.698 units decrease financial performance (ROE) of MFBs in Kenya.

Moderated Fixed effect panel regression estimates of CRM on ROA by firm size

Table 10: **Moderated Fixed effect panel regression estimates of Credit risk components on ROA by firm size**

ROA	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
NNPLR	~0.234	0.426	~0.55	0.583	~1.083	0.614	
AQR	0.501	0.317	1.58	0.118	~0.130	1.132	
LLPTLR	~0.896	0.511	~1.75	0.084	~1.915	0.124	*
LLPTER	0.105	0.091	1.16	0.250	~0.076	0.287	
FSIZ	11.248	3.095	3.63	0.001	5.079	17.418	***
NNPLR_FSIZ	0.034	0.176	0.19	0.847	~0.317	0.385	
AQR_FSIZ	~0.161	0.122	~1.32	0.192	~0.405	0.083	
LLPTLR_FSIZ	0.337	0.214	1.57	0.120	~0.090	0.764	
LLPTER_FSIZ	~0.055	0.037	~1.48	0.142	~0.129	0.019	
Constant	~38.780	8.725	~4.45	0.000	~56.173	~21.388	***

Mean dependent var	~6.898		SD dependent var	12.034
R-squared	0.418		Number of obs	94.000
F-test	5.749		Prob > F	0.000
Akaike crit. (AIC)	570.634		Bayesian crit. (BIC)	596.067

*** p<0.01, ** p<0.05, * p<0.1
Source: Study Data (2021)

Table 8 shows that for Model 1, R^2 = .203 and [F = 4.895, p < .05]. The value of R^2 indicates that 20.3% of the variance in the ROA is explained by credit risk components. Model 2 shows the results after the interaction term (firm size) was included in the equation. Table 10 also indicates that the inclusion of the interaction term resulted into an R^2 change of [.418~.215= .215, [F = 5.749, p < 0.05]. The results show a presence of significant moderating effect. To put it differently, the moderating effect of Firm size explains 21.5% variance in the ROA, above and beyond the variance by credit risk.

Moderated Fixed effect panel regression estimates of Credit risk components on ROE by firm size

Table 11: **Moderated Fixed effect panel regression estimates of Credit risk components on ROE by firm size**

ROE	Coef.	St.Err.	t-value	p-value	[95% Conf	Interval]	Sig
NNPLR	3.073	2.633	1.17	0.247	-2.175	8.321	
AQR	-2.358	1.958	-1.20	0.233	-6.261	1.546	
LLPTLR	6.035	3.163	1.91	0.060	-0.271	12.340	*
LLPTER	-3.414	0.562	-6.07	0.000	-4.535	-2.293	***
FSIZ	18.915	19.146	0.99	0.326	-19.251	57.081	
NNPLR_FSIZ	-1.340	1.090	-1.23	0.223	-3.513	0.832	
AQR_FSIZ	0.813	0.757	1.08	0.286	-0.695	2.322	
LLPTLR_FSIZ	-1.601	1.326	-1.21	0.231	-4.245	1.043	
LLPTER_FSIZ	0.695	0.229	3.04	0.003	0.239	1.152	***
Constant	-62.482	53.973	-1.16	0.251	-170.075	45.111	

Mean dependent var	-31.314	SD dependent var	169.013	
R-squared	0.962	Number of obs	94.000	
F-test	204.388	Prob > F	0.000	
Akaike crit. (AIC)	913.232	Bayesian crit. (BIC)	938.665	

*** p<0.01, ** p<0.05, * p<0.1
Source: Study Data (2021)

Table 9 shows that for Model 1, R^2 = .962 and [F = 394.253, p < .05]. The value of R^2 indicates that 96.2% of the variance in the ROE is explained by credit risk components. Model 2 shows the results after the interaction term (firm size) was included in the equation. Table 11 also indicates that the inclusion of the interaction term resulted into an R^2 change of [.962- .953 = .009, [F = 204.388, p < 0.05]. The results show a presence of significant moderating effect. The results were in agreement with Misman and Bhatti (2020)

CONCLUSION AND RECOMMENDATIONS

The study found that there exists relationship between credit risk and financial performance. The regressions results reveal that credit risk metrics are highly statistically significant with adverse effect on financial performance of MFBs in Kenya. The study further concluded that banks firm size affected the relationship between credit risk and financial performance. Credit risk metric, LLPTLR and LLPTER had statistically significant on ROE of MFBs.

The study recommends that MFBs to manage their credit risk through adopting effective credit policy and diversify investment portfolio. Additionally, MFBs should establish stringent credit policy and robust credit risk management framework to reduce non-performing loans and default levels.

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