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Capital structure and financial sustainability: stakes of microfinance institutions in Bamenda, Cameroon

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Abstract

This research assesses the effect of capital structure on the sustainability of Microfinance Institutions (MFIs) in Bamenda, Cameroon. We use panel data obtained from audited annual financial statements of fifteen (15) MFIs, comprising both member- and shareholder-owned MFIs in Bamenda, Cameroon from 2014 to 2020, and an ex-post facto causal research design. Debt, equity, grants, and retained earnings are used to capture capital structure, while Operational Self-Sufficiency is used as a proxy for sustainability. The Generalised Least Squares and the quantile-on-quantile techniques are used for data analysis. Our findings indicate a statistically significant negative relationship between debt, grants and financial sustainability of MFIs, while a statistically significant positive relationship is found between retained earnings and financial sustainability of MFIs. A positive, though statistically insignificant relationship is found between equity or share capital and MFI financial sustainability. The results are robust upon consideration of different quantiles. Based on the findings, MFIs in Cameroon should rely more on retained earnings and equity to be more financially sustainable. The findings additionally provide evidence relating to the shortcoming of grants in the financing of development initiatives.

Keywords Capital structure, Financial sustainability, GLS, Quantile-on-quantile, Microfinance

Introduction

Financial intermediaries play a key role in enhancing development globally. Prominent in the intermediation industry is the question of the best mix of financing sources for lending institutions. This question resonates in the microfinance industry, which has historically been primordial in poverty reduction efforts across the developing world. Microfinance relates to the provision of financial services to poor and low income earners, who historically had been excluded from accessing formal financial services by commercial banks, for reasons relating among others to their low incomes, lack of skills, lack of collateral, small loans, and lack of documentation [13, 14, 27]. By providing training, small loans with flexible repayment schedules, and relying on soft information, social capital, and innovative collateral like joint liability in group loans, microfinance successfully overcame most of the barriers which hitherto had prevented the poor from accessing formal financial services. The industry's success in enhancing financial access is a result of such innovations.

In Cameroon, as in many developing countries, microfinance continues to play a central role in financing development initiatives. Microfinance Institutions (MFIs) in the country are legally classified into three categories, namely categories one, two and three. Category one

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MFIs include Cooperatives and Credit Unions. They are not restricted to any start-up capital, but can only provide financial services to their members, and not to third parties [19]. Category two MFIs comprise institutions that collect savings, accept deposits and lend to both members and non-members or third parties. Their minimum capital as stipulated by the regulatory authority, the Central African Banking Commission (COBAC) is XAF300million, approximately USD600,000. Category three MFIs comprise lending institutions that do not collect savings and deposits to make up their capital. Rather, their capital is gotten from issuing and selling shares. Such institutions include microcredit and project financing institutions. The minimum start-up capital here is XAF150million, approximately USD300,000 [3, 19].

The microfinance landscape in Cameroon is dominated by category one MFIs, with Credit Unions controlling close to 86% of the market in terms of the number of institutions, and outlets [5, 19]. The growing number of category one institutions is due to their easy formation, lower capital requirements and the fact that they can easily opt to belong to a network and benefit from the many advantages of the umbrella institution. In 2019, Cameroon had 418 accredited MFIs. Today, there exist over 450 registered MFIs in Cameroon with approximately XAF250billion (USD500million) accumulated by way of deposits from close to one million customers [3]. As opposed to the traditional commercial banks in Cameroon which provide similar financial services, MFIs are often confronted with two challenges. Firstly, their services must be affordable enough to enable them meet their desired client base. Secondly, they must be profitable enough to be able to cover their costs, avoid overdependence on donors, and overall be sustainable. This trade-off between the social and financial objective remains a dilemma for MFIs in the country.

Given the importance of microfinance to global development efforts, it is imperative that MFIs sustainably address access problems, amplify depth, and contribute positively to financial and economic development efforts, especially where financial systems are bank-based. Empirical research on the industry's performance in the above domains thus abounds. In relation to the industry's financial performance, mainstream research has historically focused on the profitability of MFIs. Among studies which have taken this route are those of Ahlin et al. [4], [26], [46], and Anyangwe et al. [6]. As [25] and [20] argue however, profitability does not directly translate to sustainability. MFIs may be profitable but not sustainable. All sustainable MFIs must however be profitable. Sustainability in simple terms is the ability of an MFI to cover all its costs from internally generated income, or without depending on external support or financing by way of grants and subsidies [1, 47].

Studying the financing of MFIs and their sustainability is important for a number of reasons. Nyamsogoro [43] for example argues that the absence of MFIs is better than having unsustainable ones. In the same line, Schreiner [49] opines that unsustainable MFIs would not be able to continue supporting the poor in future because they will cease to exist. Otero [45] advances two reasons for MFIs to attain sustainability, namely to qualify the institutions for loans from external sources to enable them augment their operations, and to enable them achieve their long term goal of poverty alleviation. At a macro level, the sustainability of MFIs remains a subject of prime importance, given that billions of people across the developing world still lack access to financial services, implying institutions specifically targeting the poor are still highly needed.

Despite its importance in the microfinance domain, interest in the sustainability of MFIs has only recently peaked in academic circles. This has to a great extent been due to criticism over aid, which a lot of MFIs in years gone relied on in funding their activities, and a subsequent reduction in such funds globally [21]. The rise of Microfinance Investment Vehicles (MIVs), and an increase in the number of profit-seeking investors in the microfinance industry have equally necessitated this new orientation. MFIs have thus had to rethink their funding strategy and seek alternative sources of funds to enable them meet poverty reduction targets over the long term.

Empirical research has attempted to establish a model that explains the relationship between capital structure and the sustainability of MFIs [29, 35, 51, 54]. Research in this area is however sparse. Findings too have been mixed, mostly because sources of capital in MFIs are not uniformly distributed due to differences in the nature of variables that determine those sources such as traditional patterns of saving and lending. Literature thus far has consequently not been able to establish a universal model that explains the effect of each source of capital on sustainability. In much of mainstream research in microfinance, continued attention is still placed on the performance of MFIs, with majority of these studies using international samples [11, 53, 54], and a number of others focusing mostly on high income countries [11, 32, 52]. Little till date has been done in relation to the capital structure of MFIs in the developing world in general, and Cameroon in particular. Among the existing few studies in Cameroon, Fonchamnyo et al. [18] focus on the role of competition on microfinance sustainability (Measured using return on asset) and employed aggregate data for Cameroon. Sound appraisal of the effect of sources of capital on the sustainability of MFIs remains lacking in

Cameroon. This study fills this gap by making a succinct appraisal of the effect of capital structure on the sustainability of MFIs in the context of Cameroon.

The rest of this paper is structured as follows: "Literature review" Section is dedicated to related literature. "Methodology" Section dwells on the methodology, commencing with the dataset, and moving on to the empirical model. Results of the empirical analysis are presented and discussed in "Results and discussions" Section. "Conclusion" Section concludes.

Literature review

Theoretical framework

The theoretical underpinnings relating to the orientation of MFIs can be appraised from the Institutionalist and Welfarist approaches. The institutionalist approach highlights the necessity to create viable financial institutions that can sustainably attend to the needs of customers [12, 15, 41]. Adair and Berguiga [2] argue that the central focus here is the institution, wherein success is measured based on the degree of progress made by the establishment towards attaining financial self-sufficiency. The Welfarist approach, known as the social wellbeing approach argues in favour of curbing poverty through the supply of financial services to the poor, irrespective of who finances the provision of these services [58]. This entails helping the poor gain financial autonomy and enhance their wellbeing.

Empirical review

From an empirical perspective, only a handful of empirical studies have been carried out globally to ascertain the determinants of MFI sustainability. Available empirical literature presents several disparities in terms of the effect of different variables, with results depending on the region in question, and the type of data employed. Kinde [35] opines that various sources of capital could affect profitability, and thus the sustainability of MFIs, implying the existence of a relationship between financing and financial sustainability. However, the relationship between MFI financing and financial sustainability remains understudied and largely unexplored.

Using data on MFIs in South Asia, Memon et al. [39] examine the determinants of financial sustainability of MFIs. Findings following regression analysis using a fixed effect estimator indicate that human development, interest rates, and private credit are vital drivers of financial sustainability. Using an unbalanced panel spanning 2008–2014, Naz et al. [42] assess the determinants of MFI sustainability in Pakistan. Findings following regression analysis indicates that MFI size, efficiency, portfolio at risk, average loan size and yield on loan are the main determinants of financial sustainability.

Bogan [11] assesses the optimal capital structure for MFIs using panel data on MFIs in Africa, East Asia, Eastern Europe, Latin America, the Middle East and South Asia for the period 2003–2006. Findings from this study indicate that grants, subsidies and equity capital negatively affect Operational Self-Sufficiency (OSS). Kinde [35] assesses the determinants of financial sustainability of Ethiopian MFIs, with financial self-sufficiency (FSS) as the main measure of sustainability. Findings following empirical analysis indicate that the capital structure of MFIs has no effect on FSS. A similar finding of no relationship between capital structure and MFI sustainability is obtained in a study of MFIs in Nigeria by Kimando [34]. Meanwhile, MFI outreach, measured by depth and breadth, dependency ratio, and cost per borrower are found to be key determinants of FSS. Using a global panel of MFIs, Githaiga et al. [22] conclude that human capital efficiency and capital employed efficiency enhances financial sustainability of MFIs globally.

In a more elaborate study on different capital structure forms and sustainability, Bogan [11] finds a negative relationship between grants and operational self-sufficiency (OSS). Meanwhile, a negative relationship is found between debt and FSS. Sekabira [51] assesses the effect of capital structure on the performance of MFIs in Uganda. The author, based on research findings argues in favour of the increased use of equity, and lower dependence on grants and subsidies. Debt and grants, the author argues have a noticeably damaging effect on MFI financial sustainability. Further empirical evidence favouring increased use of equity is found by Hartaska and Nadolnyak [29], wherein the authors find a positive relationship between equity and financial sustainability of MFIs. Flores-Chia and Mougenot [17] empirically find the rate of interest, number of years of operation, asset size and return on assets as the main drivers of financial sustainability of cooperatives in Peru.

Iezza and La Cour [30] assess the effect of capital structure on the performance of MFIs. The authors find that highly leveraged MFIs attain better social performance with respect to breadth of outreach, as they are able to capitalise on scale, hence addressing the information asymmetry problem, and consequently adverse selection and moral hazard. In the context of Cameroon, Fonchamnyo et al. [18] assess the determinants of financial sustainability. Using return on assets as a measure of sustainability, the authors find that outreach, competition, and capital adequacy positively affect financial sustainability, while portfolio-at-risk has a negative effect on

this sustainability. Tehulu [54] assesses the effect of credit expansion on the financial sustainability of MFIs in 31 Sub Saharan Africa economies, and finds among others that credit expansion, loan intensity and portfolio-at-risk explains financial sustainability. Yougang [59] assesses the effect of institutional governance on the sustainability of MFIs in Cameroon. The author empirically finds that the respect of prudential ratios, and self-sufficiency enhances microfinance sustainability. In a similar study, Tenekeu [56] find equity, grants and deposits as drivers of MFI sustainability in the Cameroon context.

Based on the empirical evidence presented above, it is clear that though diverse factors have been proven empirically to affect MFI sustainability, an appraisal of key capital structure components like debt, grants, share capital and retained earnings have been given little consideration. In this study, we hypothesise that capital structure is a vital determinant of the sustainability of MFIs, particularly in the context of Cameroon which has in the past years witnessed notable MFI failures. This study is thus not only relevant but timely too, as the country strives to become an emerging nation by 2035. MFIs have a key role to play in this drive towards emergence, making this study of prime important to practitioners, policymakers, and microfinance financiers alike.

Methodology

Model specification

Despite differences in measures of microfinance sustainability identified in empirical literature, operational self-sufficiency remains one of the most popular measures used in empirical studies. Evidence of this is found in Schaffer and Fukasawa (2011), Bogan [11], Kipesha and Zhang [36], Tehulu [54], Githaiga et al. [22]. Following Bogan [11], Sekabira [51], Tehulu [53] and Kipesha and Zhang [36], we specify the following baseline model in this study:

$$Y_{it} = \beta_0 + \beta_j X_{it} + \omega_{it} \quad (1)$$

From model 1, Y is MFI sustainability, the dependent variable; i is the individual dimension representing the different MFIs sampled in Bamenda (see "Appendix 1"), t is the time dimension, X is the vector of exogenous variables (which include the loan-to-deposits ratio, age of the MFI, MFI membership as a proxy for size, and a dummy variable accounting for the political crisis period, precisely from 2017). From the above baseline model, our estimated model is:

$$\begin{aligned} \mathrm{OSS}_{it} = {} & \beta_0 + \beta_1 \mathrm{Debt}_{it} + \beta_2 \mathrm{ShareK}_{it} + \beta_3 \mathrm{Rear}_{it} \\ & + \beta_4 \mathrm{Grants}_{it} + \beta_j X_{it} + \omega_{it} \end{aligned} \quad (2)$$

where OSS is the outcome variable and denotes operational self-sufficiency; Debt stands for the debt ratio; ShareK designates Share capital; Rear denotes Retained earnings; and Grants stand for grants or rewards. β_1, β_2, β_3 and β_4 are regression parameters to estimate for each independent variable. β_0 is the intercept and ω is the error term.

Dependent variable

In our model, the dependent variable is operational self-sufficiency, which is used as a proxy for MFI sustainability. In the literature, different approaches have been employed to measure, MFI sustainability among which are financial self-sufficiency (FSS), operational self-sufficiency (OSS) and return on assets (ROA). OSS is a measure of how adequate MFI revenues are to cover total costs, namely operating costs, loan loss provisions and financial costs, without recourse to grants, subsidies and donations [4]. FSS is a subsidy-adjusted measure of financial sustainability which considers the adjusted value of revenues and expenses, a popularly used measure by NGOs []. ROA on its part evaluates the profitability of the MFI (Ross et al. [48]). In this study, we use the OSS index, following Bogan [11], Sekabira [51], Tehulu [53], Kipesha and Zhang [36], Tehulu [54] and Memon and Seaman [40]. We construct this index as follows:

$$\mathrm{OSS} = \frac{\text{Total operating revenues}}{\text{Financial expenses} + \text{Operating cost} + \text{Loss on expenses}} \times 100$$

Independent variables

Fehr and Hishigsuren [16] argue that MFIs have diverse sources of finance at their disposal, which explains their functionality and sustainability. Among the sources identified in the extant literature are donations and grants, savings, debt, commercial loans, securitization, share capital, retained earnings and equity. Based on the availability of data and in line with previous studies, we adopt debt, equity, retained earnings, and grants as the main components of finance or capital structure for MFIs.

We use the debt ratio as a measure of financing risk in our study. This ratio indicates the percentage of a company's assets that are financed by debt, and is computed as the ratio of total debt or long-term liabilities to total assets. Companies with high debt/asset ratios are said to be highly leveraged. This is represented mathematically as:

Grants represent a reward, usually financial, given by one entity, typically a company, foundation, or government, to an individual or a company to facilitate a goal or incentivize performance. Grants are essentially gifts that do not have to be repaid under most conditions. To capture grants, we use the grant ratio computed below. A similar ratio is used in Atkinson et al. [7], Bogan [11] and Sekabira [51].

$$\text{Grants} = \frac{\text{Grants}}{\text{Total revenue}}$$

Retained earnings indicate the percentage of a company's earnings that are not paid out in dividends but credited to shareholders for investment. It is the opposite of the dividend pay-out ratio, and as such, is often referred to as the retention rate. Following Sekabira [51], we compute the retained earnings ratio using the following formula:

$$\text{Rear} = \frac{\text{Retained earnings}}{\text{Net income}}$$

Share capital is typically referred to as shareholders' equity or owners' equity for privately held companies, and represents the amount of money that would be returned to a company's shareholders if all of the assets were liquidated and all of the company's debt was paid off in the case of liquidation. Following Bayai and Ikhide [10] and Aveh et al. [8], we capture MFI share capital or equity using the Share capital ratio, computed as follows:

$$\text{Sharek} = \frac{\text{Shareholders equity}}{\text{Total assets}}$$

We employ several control variables in our analysis, notably the loan-to-deposits ratio to capture the MFI's dependence on deposits, age of the MFI, active MFI membership as a proxy for size of the MFI, and a dummy variable for the crisis period in the study area, resulting from an internal conflict in force since 2017.

Estimation technique

We adopt an ex-post facto research design in this study, and make use of secondary data obtained from audited annual financial reports, particularly the income statements and balance sheets of 15 MFIs consisting of 7 category one and 8 category two MFIs (see "Appendix 1") over the period of 2014–2020 in Bamenda, Cameroon. We employ the Generalized Least Squares (GLS) estimator in our analysis. This methodology is employed because of its numerous advantages over commonly used estimation methodologies in empirical literature like the Panel Ordinary Least Squares estimator (POLS). Specifically, GLS corrects for possible issues of heteroscedasticity, serial correlation, and cross-sectional correlations [23]. As noted by Green [23], in the presence of a micro panel wherein the time and individual dimensions are relatively small, a basic pre-test within panel data frameworks like unit root and cointegration is not of great importance. In this regard, the panel should be checked for problems like serial correlation and heteroscedasticity. Therefore, we employ serial correlation and heteroscedasticity as basic pre-tests to validate the adopted methodology.

To ascertain the presence or absence of serial correlation, we employ the Wooldridge Test of serial correlation which has a null hypothesis of no panel autocorrelation. Further, we employ panel group-wise heteroscedasticity tests that reports test statistics for heteroscedasticity, notably the Lagrange Multiplier (LM) Test, Likelihood Ratio (LR) Test, and Wald Test. The three test statistics have as null hypothesis the existence of panel homoscedasticity. Furthermore, in order to capture time-invariant shocks and account for the robustness of outcomes across different levels, we employ the quantile-on-quantile technique. This approach permits us make an appraisal of the established relationship of the variables outside the mean, ensuring an understanding of outcomes that are non-normally distributed.

Results and discussions

Descriptive statistics and pairwise correlation

Table 1 presents the characteristics of the five variables under study in terms of their mean, standard deviation, and minimum and maximum values. From Table 1, the average OSS of the MFIs under study is 104%, with a standard deviation of 7.6%. Equally, OSS has respective minimum and maximum values of 31 and 197%. This indicates high variation of the minimum and the maximum values below and above the mean respectively. In this regard, understanding the factors that drive this variation in MFI sustainability becomes imminent.

Table 1 equally reveals that the respective mean values of share capital and debt capital are 9% and 91%, while their standard deviations are 8.3% and 7.6%. As such, these variables are potential factors that may influence MFI sustainability. The maximum and minimum values of debt capital which respectively stand at 82% and 117%, demonstrate that some of the MFIs studied face high financing risk. The mean value of retained earnings and grants respectively are 84% and 3%. This indicates that retained earnings and grants equally stand out as potentially key determinants of MFI sustainability. With regard to the control variables, respective means of the

Table 1 Descriptive statistics of these variables under considerations. *Source*: computed by author 2022

Variable	Mean	Std. Dev	Min	Max	Observation
OSS					
Overall	1.037	0.315	0.31	1.972	$N=105$
Between		0.292	0.465	1.476	$n=15$
Within		0.138	0.795	1.648	$T=7$
Sharek					
Overall	0.093	0.083	0.027	0.51	$N=105$
Between		0.073	0.043	0.348	$n=15$
Within		0.043	0.02	0.492	$T=7$
Debts					
Overall	0.913	0.076	0.821	1.166	$N=105$
Between		0.075	0.855	1.158	$n=15$
Within		0.024	0.862	0.975	$T=7$
Rear					
Overall	0.838	32.747	0	100	$N=105$
Between		22.925	29.044	100	$n=15$
Within		24.023	15.294	157.679	$T=7$
Grants					
Overall	0.027	0.019	0.001	0.099	$N=105$
Between		0.017	0.005	0.059	$n=15$
Within		0.009	−0.004	0.067	$T=7$
Loanst ~ t					
Overall	0.724	0.254	0.021	1.051	$N=105$
Between		0.245	0.033	0.987	$n=15$
Within		0.089	0.241	1.106	$T=7$
Age					
Overall	20.267	12.18785	5	45	$N=105$
Between		12.5554	5	45	$n=15$
Within		0	20.26667	20.26667	$T=7$
Members					
Overall	18,209.6	16,489.02	3650	64,620	$N=105$
Between		15,581.87	5209.143	52,265.29	$n=15$
Within		6565.078	5013.952	69,081.1	$T=7$

loan-to-deposits ratio, age of the MFI and MFI membership are 72%, 20 years and 18,209 members, while their respective standard deviations are 25%, 12 years and 16,489 members. The maximum and minimum values of the loan-to-deposits ratio (105% and 2% respectively) indicate that some of the MFIs under study finance part of their lending activities using funding sources completely unrelated to deposits. A typical example of this could be debt financing.

In order to avoid problems of multicollinearity and have an apriori relation between the variables, we run a pairwise correlation. The outcome of the pairwise correlation reported in Table 2 shows that some variables, notably retained earnings, loan-to-deposits, and number of members, have a positive relationship with financial sustainability. This positive relationship implies that any increase in these variables will be accompanied by an increase in OSS or financial sustainability, and vice versa. The correlation results equally indicate that share capital, debt ratio and grants are negatively correlated with operating self-sufficiency. Overall, none of the pairs of explanatory variables have a coefficient of more than 0.7, a threshold above which Gujarati and Porter [24] argue presents a case for multicollinearity. We therefore discard any problems of multicollinearity relating to our analysis.

Prior to our regressions, we conduct a number of tests relating to serial correlation, heteroscedasticity, and endogeneity. The results of these tests are presented in Table 3. Based on the results, we firstly reject the null hypothesis in relation to the Wooldridge test which has a null hypothesis that there is no autocorrelation. Precisely, the p-value for the F-test is significant at 10%, and the p-value for the LM test is significant at 1%, indicating the presence of autocorrelation in the panel which must be corrected.

With regard to heteroscedasticity, we apply the panel group-wise heteroscedasticity test. All the p-values of

Table 2 Pairwise correlations. *Source*: computed by author 2022

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) OSS	1.000							
(2) Sharek	−0.407	1.000						
(3) Debts	−0.574	0.667	1.000					
(4) Rear	0.664	−0.455	−0.653	1.000				
(5) Grants	−0.311	0.210	0.205	−0.390	1.000			
(6) Loanstodeposit	0.558	−0.587	−0.622	0.563	−0.126	1.000		
(7) age	0.568	−0.202	−0.365	0.322	−0.167	0.312	1.000	
(8) members	0.463	−0.166	−0.318	0.297	−0.092	0.295	0.534	1.000

Table 3 Diagnostic test. *Source*: computed by author 2022

Test	Test statistics	*p* value
Autocorrelation test		
Wooldridge *F* test	4.4395	0.05360
Wooldridge LM test	12.7051	0.0004
Heteroscedasticity		
Lagrange multiplier LM test	8488.7096	0.000
Likelihood ratio LR test	27.2562	0.0178
Wald test	4.06e+04	0.000
Endogeneity test	0.638	0.4243

Table 4 GLS Regression result

Variables	(1) GLS	(2) GLS	(3) GLS
Sharek	0.124	0.0362	0.0590
	(0.172)	(0.0861)	(0.107)
Debts	−0.888***	−0.469**	−0.448**
	(0.299)	(0.213)	(0.227)
RER	0.213***	0.309***	0.332***
	(0.0707)	(0.0607)	(0.0621)
Grants	−1.093	−0.911**	−0.981*
	(0.867)	(0.451)	(0.517)
Loanstodeposit		0.0995**	0.101*
		(0.0451)	(0.0524)
Age		0.170***	0.179***
		(0.0349)	(0.0349)
Members		0.00417	0.00188
		(0.0218)	(0.0251)
Crisis			0.0191
			(0.0188)
Constant	1.611***	0.610**	0.563*
	(0.307)	(0.294)	(0.321)
Observations	105	105	105
Number of unit	15	15	15
chi2	66.19	191.8	281.0
Prob > chi2	0.000	0.000	0.000

Standard errors in parentheses

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

the three reported test statistics, namely the Lagrange multiplier test, the likelihood ratio, and the Wald test are significant at 5% level. Consequently, we reject the null hypothesis of their variances being homoscedastic.

Based on the serial correlation and heteroscedasticity results above, there is a need to solve these problems, as their presence can render the results biased and make them poor for inferencing. On this premise, we adopt the GLS technique that accounts for and corrects for both problems, and produces robust results as compared to the conventional panel fixed effect and random effect estimators. Additionally, the outcome of the endogeneity test shows that the null hypothesis of no endogeneity cannot be rejected. This implies that, our data does not suffer from the problem of endogeneity, and the GLS is thus an efficient estimator. The results of the GLS regression are presented in Table 4.

The first column presents the outcome of the baseline model wherein only the key explanatory variables are considered. Meanwhile, column two presents the outcome when we employ our controls, notably the loan-deposit ratio, age of the MFI, and MFI membership. In column three, we add the crisis component.

Based on the results, we find a positive, though statistically insignificant relationship between share capital and the financial sustainability of MFIs in all three models, implying an increase in share capital will lead to an increase in financial sustainability. Additionally, we find a statistically significant negative relationship between debt capital and MFI financial sustainability in all three models. This implies that an increase in debt capital by 1-unit will lead to a decrease in financial sustainability by 0.888, 0.469 and 0.448 units respectively, everything being equal. This result corroborates that of Tehulu [53] who empirically prove that the use of debt reduces the financial sustainability of MFIs. The author argued that debt has not been a popular MFI-financing source because of the costly periodic interest and related payments meant to service debt, regardless of whether a MFI makes profit or not. Similar findings were made by Kinde [35] in the case Ethiopia, Kiiru et al. [33] in the case of Kenya, and Sekabira [51] in the case Uganda. However, it contradicts the outcome of Kumar [37] who made a case for reverse causality flowing from financial sustainability to MFI debt levels, and Kyereboah-Coleman [38], Basu [9] and Kanini [31] whose findings indicated a positive relationship between debt capital and MFI financial sustainability.

In relation to retained earnings, we find a statistically significant positive relationship between this variable and the financial sustainability of MFIs. This result is consistent upon inclusion of all the control variables in our model. From the baseline model, a 1-unit increase in retained earnings leads to an increase in OSS by 21.3%. This result aligns with those of Wanbua [57] in Kenya. This result implies that for the sustainability of MFIs to be enhanced, higher use of retained earnings should be encouraged.

A statistically significant negative relationship is found between grants and the financial sustainability of MFIs. An increase in grants by 1-unit lead to a decrease in financial sustainability by 1.093, 0.911 and 0.981 units

respectively across all models, ceteris paribus. This corroborates the argument of Hermes et al. [28] that overdependence on grants may lead to unsustainability in the microfinance industry. This result concurs with the findings of Bogan [11] and Sekabira [51]. It is worth noting that the introduction of the crisis dummy variable in column three reduces the significance level of the relationship between grants and financial sustainability of MFIs. This indicates the effect of civil unrest on the sustainability of development-related initiatives or organisations, and makes an argument for the need of some minimum support to MFIs in countries and/or regions in crisis-hit zones.

A positive relationship is found between other control variables, namely loan-to-deposits ratio, age and MFI membership, and financial sustainability of MFIs. Thus an increase in the rate of loan-to-deposits ratio will increase financial sustainability of MFIs. This may be due to the fact that an increase in deposits increases a MFI's ability to create credit. This result is in line with Flores-Chia and Mougenot [17]. The positive effect of age on the financial sustainability of MFIs reveals the value of managerial experience in the microfinance industry. Equally, the size of the MFI with respect to membership enhances sustainability, implying bigger MFIs are more sustainable than smaller ones. As MFIs grow in size, so does their sustainability.

As earlier highlighted, in order to capture time-invariant shocks and account for the robustness of results across different levels, we employ the quantile-on-quantile technique. The outcome of the quantile approach presented in Table 5 accounts for variations within the 30th, 60th and 90th quantiles. Based on the results here, the positive relationship between share capital and financial sustainability obtained from the GLS estimation is reaffirmed for all three quantiles. However, the results become significant for the 30th and 90th quantiles only. Still in relation to the results, grants and debt significantly reduce financial sustainability in all three quantiles considered. This validates the initial outcome obtained in the GLS estimation. The use of retained earnings significantly increases financial sustainability in all quantiles considered, again, reaffirming earlier results. The loan-to-deposit ratio, age of MFI, and MFI membership equally remain positive in all the quantiles. However, relatively high heterogeneity is found in the results for the crisis variable. We observe a positive and significant effect of the crises on financial sustainability in the 30th and the 90th quantiles, while a negative and insignificant effect is obtained in the 60th quantile. This shows that some financial institutions have benefited from the civil unrest while others have been affected negatively. The effect of the crisis variable on MFI sustainability thus remains largely inconclusive, and may require the consideration of several other factors, like the legal category of the MFI among others.

Table 5 QQ Regression results. *Source*: computed by author 2022

VARIABLES	(1) QQ-30th	(2) QQ-60th	(3) QQ-90th
Sharek	0.527***	0.0617	0.150***
	(0.193)	(0.0653)	(0.00341)
Debts	−0.632***	−0.349***	−0.510***
	(0.195)	(0.106)	(0.00842)
Rear	0.215***	0.267***	0.237***
	(0.0149)	(0.0251)	(0.00107)
Grants	−3.416***	−2.449***	−2.198***
	(0.168)	(0.348)	(0.0276)
Loanstodeposit	0.210***	0.114***	0.133***
	(0.0268)	(0.0234)	(0.00269)
Age	0.0934***	0.112***	0.122***
	(0.00881)	(0.00847)	(0.000582)
Members	0.0330***	0.0450***	0.0493***
	(0.00832)	(0.00699)	(0.000760)
Crisis	0.0382***	−0.0100	0.0239***
	(0.0147)	(0.0307)	(0.000528)
Observations	105	105	105
draws_retained	900	900	900
draws	1000	1000	1000
N_g	15	15	15

Standard errors in parentheses

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

Conclusion

This study examined the effect of capital structure on the financial sustainability of MFIs in Bamenda, Cameroon. The study made use of panel data running from 2014 to 2020 on 15 MFIs, and applied the Generalised Least Squares regression, and a quantile-on-quantile regression technique. Findings indicate that debt and grants have a negative effect on MFI sustainability, while share capital and retained earnings have a positive effect on MFI sustainability. Based on the results, we recommend that the government should put in place a maximum debt ceiling on every deposit-taking MFI. In addition, the government should consider setting a floor on the cost of lending to prevent MFIs from lending excessively. MFI managers should consider ploughing back the profits realized into their institutions to maintain a better and more sustainability-enhancing capital base. Grants should be avoided where possible,

as these tend to be a braking force to sustainability across the microfinance industry.

This study has not been without flaws. First is the restricted scope of the study due to its focus only on Bamenda, which represents one among the several cosmopolitan cities of Cameroon, and just a regional capital. The initial intention was to cover the whole of the North West Region. But a realisation that not all MFIs were accredited, and not all reported their performance to regulatory bodies shifted the focus to selected MFIs with complete and authentic financial statements. Also, the inconsistency in financial reporting among MFIs militated against efforts to build a macro panel dataset.

Appendix 1

See Table 6

Table 6 List of microfinance f institution with branches considered. *Source*: computed by author 2022

Microfinance name	Category	Microfinance name	Category
Aghati	1	Nkwen	2
Aghem	1	Ntambeng	1
Alou	1	Ntarinkon	2
Awing	1	Tadkon	1
Azire	2	Mitayen	2
Bafut	2	Pple 4 health	2
Bapcull	2	Unics	2
Chomba	1		

Table 7 List of Abbreviation. *Source*: computed by author 2022

Abbreviations	Meaning
CamCCUL	Cameroon Cooperative Credit Union League
COBAC	Central African Banking Commission
FCFA	franc des colonies françaises d'Afrique
FSS	financial self-sufficiency
GLS	generalized least squares panel method
LM	Lagrange Multiplier
LR	Likelihood Ratio
MFIs	Microfinance Institutions
NGOs	nongovernmental organisations
OSS	operational self-sufficiency
Rear	Retained Earnings Ratio
ROS	return on assets
ShareK	Share capital ratio

Appendix 2

See Table 7

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DCF participated in writing all sections and interpretation. TA participated in writing all sections and discussion. NNC participated in writing all sections and discussions. GDD participated in writing, data analyses and interpretation. All authors read and approved final version.

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Declarations

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Consent for publication
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Competing interests
The authors declare that they have no competing interests.

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References

1. Abu Wadi R, Bashayreh A, Khalaf L, Abdelhadi S (2022) Financial sustainability and outreach in Microfinance Institutions: evidence from MENA countries. J Sustain Financ Invest 12(1):238–250
2. Adair P, Berguiga I (2010) Les facteurs déterminants de la performance sociale et de la performance financière des institutions de microfinance dans la région MENA: une analyse en coupe instantanée. Région et Développement 32:91–119
3. Adamou N, Jude FA, Dieudonné MG, Abba B (2020) Effect of the socioeconomic characteristics of borrowers on microcredit repayment behaviour: an application to a category ii microfinance institution in Cameroon. J Econ Manag Sci 3(2):47–47
4. Ahlin C, Lin J, Maio M (2011) Where does microfinance flourish? Microfinance institution performance in macroeconomic context. J Dev Econ 95(2):105–120
5. Akume DA, Annicet BMN (2017) The performance of Microfinance Institutions in Cameroon: does financial regulation really matter. Res J Financ Account 8(2):2222–1697
6. Anyangwe T, Vanroose A, Fanta A (2022) Culture and the performance of Microfinance Institutions. J Financ Manag Mark Inst 10(1):2250004
7. Atkinson J, De Janvry A, McIntosh C, Sadoulet E (2013) Prompting microfinance borrowers to save: a field experiment from Guatemala. Econ Dev Cult Change 62(1):21–64
8. Aveh FK, Krah RY, Dadzie PS (2013) An evaluation of sustainability and subsidy dependence of Microfinance Institutions in Ghana. Int Bus Manag 6(1):55–63
9. Basu K (2014) Commitment savings in informal banking markets. Journal of Development Economics, 107, 97–111.
10. Bayai I, Ikhide S (2018) Financing structure and financial sustainability of selected SADC Microfinance Institutions (MFIs). Ann Public Cooperative Econ 89(4):665–696

11. Bogan VL (2012) Capital structure and sustainability: An empirical study of microfinance institutions. Review of Economics and Statistics, 94(4):1045–1058.
12. Brau JC, Woller GM (2004) Microfinance: a comprehensive review of the existing literature. J Entrepreneurial Financ 9(1):1–28
13. Chikwira C, Vengesai E, Mandude P (2022) The impact of Microfinance Institutions on poverty alleviation. J Risk Financ Manag 15(9):393
14. Chomen DA (2021) The role of Microfinance Institutions on poverty reduction in Ethiopia: the case of oromia credit and saving share company at Welmera district. Fut Bus J 7(1):1–10
15. Ejigu L (2009) Performance analysis of a sample Microfinance Institutions of Ethiopia. Int NGO J 4(5):287–298
16. Fehr M, Hishigsuren D (2004) Critical analysis of diverse funding of Islamic microfinance institution: a case study in BMT Amanah Ummah Surabaya Indonesia. In: Proceeding 2nd ISRA Colloquium, Malaysia
17. Flores-Chia J, Mougenot B (2023) Analysis of the financial sustainability of the cooperative savings and credit sector in Peru. Int J Soc Econ 50(3):452–461
18. Fonchamnyo CD, Wiysanyuy BM, Assi MM (2017) The effect of competition on the financial sustainability of Microfinance Institutions in Cameroon. Res J Financ Account 8(4):2222–2847
19. Fotabong LA (2012). The Microfinance market of Cameroon-analyzing trends and current development. Available at SSRN 2007912.
20. Gambo N, Rikwentishe R, Usman ND, Ikyabo AY (2022) Profitability and Financial Sustainability of Microfinance Bank in Nigeria. FUW-International Journal of Management and Social Sciences, 7(2):21-21.
21. Githaiga PN (2022) Revenue diversification and financial sustainability of Microfinance Institutions. Asian J Account Res 7(1):31–43
22. Githaiga PN, Soi N, Buigut KK (2023) Does intellectual capital matter to MFIs financial sustainability? Asian J Account Res 8(1):41–52
23. Green WH (2012) Econometric analysis. Maxwell Macmillan International
24. Gujarati DN, Porter DC (2009) Basics econometrics, 4th edn. Irwin/McGraw-Hill
25. Guntz S (2011) Sustainability and profitability of microfinance institutions. CAIFD-Center for Applied InternationalFinance and Development, Research Paper, 4.
26. Gul FA, Podder J, Shahriar AZ M (2017) Performance of microfinance institutions: does government ideology matter?. World Development, 100, 1-15.
27. Gupta PK, Sharma S (2021) Literature review on effect of Microfinance Institutions on poverty in South Asian countries and their sustainability. Int J Emerg Mark. https://doi.org/10.1108/IJOEM-07-2020-0861
28. Hermes N, Lensink R, Meesters A (2018) Financial development and the efficiency of microfinance institutions. In Research Handbook on Small Business Social Responsibility (pp. 177–205). Edward ElgarPublishing.
29. Hartarska V, Nadolnyak D (2007) Do regulated Microfinance Institutions achieve better sustainability and outreach? Cross-country evidence. Appl Econ 39(10):1207–1222
30. Iezza P, La Cour L (2010) Financial sustainability of microfinance. Copenhagen Business School, Copenhagen
31. Kanini SK (2016) Effects of capital structure on financial performance of commercial banks in Kenya (Doctoraldissertation). repository.seku.ac.ke
32. Khachatryan K, Hartarska V, Grigoryan A (2017) Performance and capital structure of Microfinance Institutions in Eastern Europe and Central Asia. East Eur Econ 55(5):395–419
33. Kiiru JM, Mburu JG, Klaus F (2008) Does participation in microfinance programs improve householdincomes: empirical evidence from Makueni district, Kenya (No. 307-2016-4879, pp. 53-58).ageconsearch.umn.edu
34. Kimando L, Kihoro JMD, Njogu GWM (2012). Factors influencing the sustainability of micro-finance institutions in Murang'a Municipality. repository.cuk.ac.ke
35. Kinde BA (2012) Financial sustainability of Microfinance Institutions (MFIs) in Ethiopia. Eur J Bus Manag 4(15):1–10
36. Kipesha EF, Zhang X (2013) Sustainability, profitability and outreach tradeoffs: evidences from microfinance institutions in East Africa. European Journal of Business and Management, 5(8).
37. Kumar KN (2012) Dynamic incentives in microfinance group lending: an empirical analysis of progressive lending mechanism. Sage Open, 2(2), 2158244012444280.
38. Kyereboah-Coleman A (2007) The impact of capital structure on the performance of microfinance institutions. The Journal of Risk Finance, 8(1), 56-71.
39. Memon A, Akram W, Abbas G, Chandio AA, Adeel S, Yasmin I (2022) Financial sustainability of microfinace institutions and macroeconomic factors: a case of South Asia South. Asian J Macroecon Public Financ 11(1):116–142
40. Memon SB, Seaman C (2021) Empowering Women through Microfinance Banks in Rural Areas of Pakistan.In The Emerald Handbook of Women and Entrepreneurship in Developing Economies 391–408. Emerald Publishing Limited.
41. Morduch J (1998) Does microfinance really help the poor?: New evidence from flagship programs in Bangladesh. Princeton: Research Program in Development Studies, Woodrow School of Public and International Affairs
42. Naz F, Salim S, Rehman RU, Ahmad MI, Ali R (2019) Determinants of financial sustainability of Microfinance Institutions in Pakistan. Управленец 10(4):51–64
43. Nyamsogoro G (2010) Microfinance Institutions in Tanzania: a Review of Growth and Performance Trends, the Accountant Journal, 26 (3):3–16.
44. Ofeh MA, Jeanne ZN (2017) Financial performances of Microfinance Institutions in Cameroon: case of CamCCUL Ltd. Int J Econ Financ 9(4):207
45. Otero M (1999) Bringing development back, into microfinance. J Microfinanc/ESR Rev 1(1):2
46. Postelnicu L, Hermes N (2018) Microfinance performance and social capital: a cross-country analysis. Journal of Business Ethics, 153, 427-445.
47. Rahman MA, Mazlan AR (2014) Determinants of financial sustainability of Microfinance Institutions in Bangladesh. Int J Econ Financ 6(9):107–116
48. Ross SA, Westerfield RW, Jordan BD, ROBERTS GS (1998) Fundamentals of Corporate Finance. McGraw-Hill Companies Inc. ISBN 978-0-07-105160-6
49. Schreiner M (2000) Credit scoring for microfinance: Can it work?. Journal of Microfinance/ESR Review, 2(2):6.
50. Schäfer K, Fukasawa Y (2011) Factors determining the operational self-sufficiency among Microfinance Institutions. Adv Bus Res 2(1):171–178
51. Sekabira H (2013) Capital structure and its role on performance of Microfinance Institutions: the Ugandan case. Sustain Agric Res 1:10. https://doi.org/10.22004/ag.econ.230559
52. Tchuigoua HT (2015) Determinants of the governance quality of Microfinance Institutions. Q Rev Econ Financ 58:32–43
53. Tehulu TA (2013) Determinants of financial sustainability of Microfinance Institutions in East Africa. Eur J Bus Manag 5(17):152–158
54. Tehulu TA (2022) Credit expansion and financial sustainability of Microfinance Institutions: a generalized method of moments panel data analysis. Cogent Bus Manag 9:1. https://doi.org/10.1080/23311975.2022.2140490
55. Tenekeu NK, Nzongang J (2020) Les déterminants de la pérennité des institutions de microfinance au Cameroun. J Acad Financ 11(1):122–138
56. TENEKEU NK (2022) Sources of funding and sustainability of Microfinance institutions in Cameroon: an explanation using the pecking order theory. Revue Internationale des Sciences de Gestion:5(4)
57. Wambua MM (2018) Effect of capital structure on financial sustainability of deposit-taking Microfinance Institutions in Kenya (Doctoral dissertation).
58. Woller GM, Dunford C, Woodworth W (1999) Where to microfinance. Int J Econ Dev 1(1):29–64
59. Yougang B (2021) Gouvernance Institutionnelle et Pérennité des Etablissements de Microfinance au Cameroun. Revue Int Sci Gest 4(2):1037–1061

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