

Firm-specific Characteristics and Microcredit Pricing: Evidence from Sub-Saharan Africa

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Abstract

This research explores the key factors that drive the high interest rates observed in microfinance institutions (MFIs) by focusing on the effects of firm-specific characteristics in the context of MFIs from Sub-Saharan Africa (SSA). The study utilizes data from 129 MFIs in SSA from 2004 to 2018. Random-effects GLS regression is employed as our main method of data analysis. The study unveils that operating inefficiency and capitalization drive interest rates positively, whereas higher loan intensity and loan officer productivity are negatively associated with microcredit interest rates. Moreover, we find that MFIs with higher credit risk in the previous period tend to reduce interest rates in the current period, possibly to reduce the total debt burden for the borrowers and improve repayment rates, or alternatively, due to shifts to more creditworthy borrowers. Nevertheless, our study is unable to find any evidence of discrimination against women via charging higher interest rates. The results are robust regardless of whether the MFIs are large-scale or small- and medium-scale MFIs, except for loan officer productivity and credit risk, which hold valid only for small- and medium-scale MFIs but not for large-scale MFIs. Our findings have several considerable implications for how MFIs could provide more affordable microcredit for the poor. More specifically, MFI managers need to reduce operating inefficiencies, invest more of their assets in loan portfolios, improve loan officer productivity, and expand the scale of MFI operations through debt leverage to reduce interest rates.

Key Words: Capitalization, Interest rates, Operating efficiency, Loan intensity, Microcredit pricing, Productivity, Microfinance institutions, Sub-Saharan Africa

JEL Classification: E43, G10, G21

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1. Introduction

Sub-Saharan Africa (SSA) has very low financial intermediation compared to the rest of the world. Traditional banking services are also not accessible to poor people, and access to finance is difficult. Accordingly, microcredit, offered by microfinance institutions (MFIs), has become an essential financial product to support the poor, since capital constraint is the main hurdle to start or expand micro and small businesses (Lwesya & Mwakalobo, 2023). Nevertheless, appropriate microcredit pricing is essential to providing affordable finance for the poor. Microcredit pricing has gained increased attention from scholars due to its significance in the financial performance (Kar & Swain, 2014; Tehulu, 2022b) and social missions (Adusei, 2021) of MFIs and, most importantly, because the interest rate in MFIs is significantly higher compared to the interest charges in commercial banks (Uddin et al., 2024). Many people claim that microcredit prices, namely interest rates in the microfinance sector, are excessive, which, according to Cuéllar-Fernández et al. (2016), is a form of poverty penalty.

Given the need to identify ways to reduce microcredit interest rates, this paper explores the key factors that drive the high interest rates observed in MFIs by focusing on the effects of firm-specific characteristics in the context of MFIs from SSA. More specifically, our study highlights the effects of loan intensity, loan officer productivity, and capitalization on microcredit pricing. Lower loan intensity² could imply higher non-earning (liquid) assets, and hence, MFIs might attempt to compensate for the opportunity cost they incur on the liquid assets through the allocation of credits at higher interest rates. In contrast, higher liquidity might also pressurize such MFIs to rush to reallocate funds from the excess non-earning assets to microcredits, even at lower interest rates. Given that the gross loan portfolio comprises a significant proportion (67 percent) of the assets of MFIs (Tehulu, 2022b), it is essential to examine how loan intensity influences interest rates. The productivity of loan officers might also be vital to the MFI operating efficiency, which is considered as the main driver of interest rates (Cuéllar-Fernández et al., 2016; Uddin et al., 2024).

Moreover, the microfinance sector in SSA is highly capitalized with capital to asset ratio of around 34 percent (Tehulu, 2022a). This might suggest difficulty of accessing

² Loan intensity represents the gross loan portfolio as a percentage of total assets (Tehulu, 2022b).

cheaper debt sources to fund loans and possibility of allocating the limited loanable funds at higher interest rates. The corporate finance literature also recognizes equity capital as the riskiest and most costly source of finance since equity securities are residual claim instruments and dividend payment is discretionary. Hence, interest rates might rise with the capitalization of financial institutions (Tan, 2012; Tumwine et al., 2018). On the other hand, the equity capital of many MFIs comes from donations and public funding rather than private funding, and capital transfers are usually made to support government development agendas and not at arm's length. Consequently, higher capitalization could also allow MFIs to reduce interest rates. Therefore, empirical research is needed on the implication of high capitalization in microcredit pricing.

Our study contributes new empirical evidence to the extant literature by exploring the effects on microcredit interest rates of strategies that promote greater loan intensity and loan officer productivity and that reduce unnecessary reliance on equity capital. There are numerous studies that have investigated interest rates in the banking sector literature (Tennant & Folawewo, 2009; Tan, 2012; Were & Wambua, 2014; Nassar et al., 2014; Obeng & Sakyi, 2017; Tumwine et al., 2018; Kamasa et al., 2023). However, empirical research on interest rates in the context of the microfinance sector is inadequate. The extant microfinance literature has examined the role of efficiency (Basharat et al., 2015; Uddin et al., 2024), profit orientation (Roberts, 2013), legal status (Nwachukwu et al., 2018), and competition (Al-Azzam & Parmeter, 2021) in the interest rate determination of MFIs. The prior studies, however, fail to explore the implications of certain firm-specific characteristics such as loan intensity, loan officer productivity, and capitalization on the interest rates charged by MFIs. While there is some literature linking interest rates to capitalization in the banking sector context (Tan, 2012; Ahokossi, 2013; Tumwine et al., 2018), empirical evidence from the microfinance sector is missing.

Most importantly, besides introducing loan intensity, capitalization, and loan officer productivity, our study is also the first study to explore the effects of other firm-specific characteristics (such as operating inefficiency, funding cost, credit risk, and gender) on microcredit interest rates by considering MFIs from SSA, a region that was disregarded in previous studies. Many people in SSA are in absolute poverty, and affordable microcredits are needed for this region to alleviate poverty. Moreover, MFIs in SSA also have the lowest gross loan portfolio in absolute terms (Tehulu, 2023) and high operating expenses (Lafourcade et al., 2005) compared to other regions. Thus, this study could allow identifying the factors that determine the level

of interest rates in MFIs from SSA and how these rates could be reduced to support the poor through greater access to affordable microcredit. Accordingly, the study explores the nexus between firm-specific characteristics and microcredit interest rates in the context of MFIs in SSA.

In the next section (Section 2), we provide the related literature review. Section 3 describes the research data and methodology, comprising data, variables, modeling, and our method of data analysis. Section 4 presents the research results and discussion, and the conclusions are provided in Section 5.

2. Literature Review

The widely accepted pricing technique for products including loans is cost-plus pricing; loan prices depend on the magnitude of costs incurred by financial institutions. One mechanism is the interest rate pass-through, in which a change in the policy rate of a central bank determines the interest rates charged by financial institutions, as the policy rate matters when borrowing from the inter-bank market and in open market operations. However, in Africa, MFIs often charge substantial interest rates even when central bank rates are much lower. One reason is that a lower central bank policy rate cannot reduce information asymmetry (risk) and the higher operating costs borne by MFIs; hence, MFIs might charge high interest rates despite low policy rates. There could also be a lag in the pass-through mechanism due to administrative inertia, as adjusting interest rates also entails costs: MFIs have to train loan officers, rewrite loan contracts, and notify a multitude of borrowers each time a rate changes, and hence, they might wait until a significant change is made by the central bank for them to change their own interest rates. Hence, the existing literature establishes that cost-plus pricing (other than interest rate pass-through), information asymmetry, and other real-world frictions captured by various firm-specific factors determine interest rates (Dorfleitner et al., 2013; Were & Wambua, 2014; Tumwine et al., 2018; Uddin et al., 2024).

Firm-specific characteristics are the different dimensions of firm performance that are generally within the discretion of the management. Previous studies linking interest rates to different firm characteristics include Tumwine et al. (2018), Basharat et al. (2015), and Uddin et al. (2024). Using a sample of commercial banks in Uganda, Tumwine et al. (2018) investigated the relationship between lending rates and firm-specific characteristics such as operational efficiency, liquidity, capitalization, credit risk, and lending, while Basharat et al. (2015) and Uddin et al.

(2024) emphasized the role of operating efficiency in pricing loans. Were and Wambua (2014) also showed that firm-specific characteristics, including size, operating costs, and credit risk, among others, influence the interest rate spread of commercial banks. Likewise, Ahokpossi (2013) documented that bank-specific characteristics such as bank capitalization, credit risk, and liquidity risk are important drivers of interest margins in commercial banks from SSA. Based on the literature from the banking/microfinance sector, the commonly identified firm-specific determinants of interest rates charged by financial institutions include loan intensity, operating inefficiency, capitalization, productivity, funding cost, credit risk, and/or gender (women borrowers) (Dorfleitner et al., 2013; Basharat et al., 2014; Were & Wambua, 2014; Cuéllar-Fernández et al., 2016; Tumwine et al., 2018; Rocha et al., 2019; Uddin et al., 2024).

Loan intensity: Lower loan intensity could imply higher liquidity. Higher liquidity, in turn, reflects resource allocation inefficiency, as liquid assets provide lower returns and hence, might entail substantial opportunity costs for financial institutions (Bordeleau & Graham, 2010; Tumwine et al., 2018). As a result, MFIs with lower loan intensity might charge higher interest rates to compensate for the opportunity cost they incur on the liquid (non-earning) assets. MFIs with lower loan intensity also have lower financial sustainability (Tehulu, 2022b). Hence, such MFIs might also raise the interest rate on microcredits to counterbalance the negative effect of lower loan intensity on financial sustainability, as interest rates also contribute positively to MFI financial performance or sustainability (Kar & Swain, 2014; Tehulu, 2022b). Lower loan intensity (higher liquidity) also suggests lower loanable funds, which could lead to higher interest rates due to demand factors. Nevertheless, Bordeleau and Graham (2010) argue that higher liquidity could augment the resilience of financial institutions to liquidity shocks and contribute to lower borrowing costs for financial institutions and other economic agents in the financial system. Notwithstanding this, we expect that loan intensity is negatively associated with microcredit interest rates, as the "opportunity cost" argument is straightforward and might be valid.

Operating inefficiency: Numerous studies establish that operating inefficiency is the main determinant of interest rates (Dorfleitner et al., 2013; Were & Wambua, 2014; Tumwine et al., 2018; Uddin et al., 2024). Uddin et al. (2024) document that MFIs incur higher operating costs than conventional banks, which could, in part, explain why MFIs charge considerably higher interest rates than commercial banks. Rocha et al. (2019) also assert that MFI inefficiency could lead to a higher rate of interest

on loans. Compared to MFIs in other regions, most MFIs in SSA might have a greater social orientation, given that many people in this region live in absolute poverty. As a result, such MFIs might incur higher operating expenses, as serving small loans to many poorer borrowers is costlier than serving large loans to fewer, relatively less poor borrowers (Helms, 2006; Gutiérrez-Nieto et al., 2017). Accordingly, Cull et al. (2009) note that such MFIs could be obliged to charge higher interest rates on loans or accept subsidies. The latter, however, is not a sustainable source of finance. Hence, operating expenses could explain the high microcredit interest rates of MFIs, as the interest revenue should cover their operating expenses and other costs, consistent with Cost-Plus pricing theory. Hence, interest rates could be positively linked to operating inefficiency.

Capitalization: Financial institutions with higher capital ratios might have lower funding costs due to a lower risk of bankruptcy (Ćurak et al., 2012), and hence, such banks/MFIs might charge lower interest rates. On the other hand, a higher equity capital to asset ratio could also imply that financial institutions face pressure to increase interest rates in order to generate adequate profits and pay dividends to stockholders (Tumwine et al., 2018). However, in the microfinance sector, the source of equity capital for many MFIs is public funding and donations, and the capital transfer is not made at arm's length but is aimed at supporting the development agendas of the government that also address the grand challenges of the world – poverty and inequalities. Hence, MFIs with higher capitalization might support the poor by providing microcredits at lower interest rates and fulfill the expectation of funding bodies, including donors, which will, in turn, help to secure additional equity funding in a sustained manner.

Nevertheless, given that the main sources of equity funding are donors and public funding bodies, MFIs with higher capitalization might also have a greater social responsibility orientation and, as a result, incur considerable operating expenses in serving small loans to the poorest of the poor. This could lead to a positive association of capitalization with interest rates. Higher capitalization might also imply difficulty in raising cheaper debt funding and hence, could lead to allocation of the limited loanable funds at higher interest rates. The expected nexus between capitalization and MFI interest rates is, thus, inconclusive.

Loan officer productivity: Loan officers are line officers or field personnel that interact with clients, excluding analysts or administrative staff that do not have direct client contact (Basharat et al., 2014). Prior research provides strong evidence that loan contract design and interest spreads are significantly influenced by loan officers,

emphasizing idiosyncratic differences among loan officers (Bushman et al., 2021). This is important in the microfinance industry, especially since MFIs are less likely to rely on hard information and most loan officers might have better information about their clients, putting them at a vantage point to influence loan contracts and interest rates, while individual differences among loan officers are also expected.

Nonetheless, even when MFIs' organizational mechanisms are able to systematically eliminate the impacts of any idiosyncratic differences among loan officers and MFIs rely on hard information, the productivity of loan officers, measured in terms of the number of borrowers served by each loan officer, could also influence the interest rate on microcredits by influencing the operating efficiencies of MFIs. For example, Basharat et al. (2014) find that MFIs' productivity, measured by the number of loans per staff, is inversely and significantly associated with operating inefficiency, suggesting that as MFIs supply a greater number of loans per staff, they will be more efficient since they are able to increase their loan portfolio relative to their operating expenses. Hence, we expect that loan officer productivity contributes to the reduction of interest rates by reducing operating inefficiencies, in line with the Cost-Plus pricing theory.

Funding cost: The interest rate on microcredits is also supposed to cover funding costs to generate a positive spread income that could cover operating expenses and other costs. Hence, MFIs might increase lending rates as funding costs increase, in line with Cost-Plus pricing theory. Fabbro and Hack (2011) also assert that lending rates rise with an increase in debt funding costs and/or with an increase in equity funding, a source of finance costlier than debt funding. Dorfleitner et al. (2013) also find a positive association between the two, indicating that financial institutions pass higher financial expenses on to borrowers by allocating credits at higher interest rates. Therefore, we hypothesize that funding cost has a positive effect on interest rates.

Credit risk: It could be argued that microcredit pricing should take into account the creditworthiness of borrowers, and MFIs are supposed to incorporate a higher risk premium for assuming a higher credit risk. The information asymmetry theory suggests that MFIs, unlike commercial banks, provide financial services for the impoverished and could fear adverse selection due to higher default risk and might charge a higher interest rate. Ho and Saunders (1981) also argue that interest spread depends, in part, on the degree of managerial risk aversion. They view the managers of financial institutions as risk-averse and require a higher interest rate to accept higher risk. Accordingly, previous studies have also documented a positive nexus between credit risk and interest rates (Tarus et al., 2012; Were & Wambua, 2014).

Tarus et al. (2012) confirm that credit risk influences the net interest margin of commercial banks in Kenya positively and significantly. Ahokpossi (2013) also finds that credit risk has a significant and positive association with net interest margins. Consequently, the expected relationship between credit risk and interest rates is positive.

Gender (women borrowers): Women or women-owned small businesses could face greater difficulties accessing finance than men or men-owned counterparts. Gender discrimination in credit markets is an obstacle to women's careers when female entrepreneurs are unable to obtain finance to start a small business (Andrés et al., 2021). When they gain credit access, they are charged higher rates of interest. For example, Dorfleitner et al. (2013) use a global dataset of 712 MFIs and uncover that interest rates rise with an increase in the proportion of women borrowers. Using bank and micro-firm data from Italy, Alesina et al. (2013) also show that women borrowers pay higher interest on credits than men, although their study does not discover any evidence that men borrowers are less risky than women.

Nevertheless, gender could be correlated with a number of firm-specific characteristics. For example, as stated earlier, providing small loans to a large number of poor people (mainly women) might lead to higher operating costs than providing large loans to fewer, relatively less poor people (Helms, 2006; Gutiérrez-Nieto et al., 2017). Hermes et al. (2011) also provide evidence that MFIs serving more women borrowers tend to be less efficient. Hence, the increase in interest rates on credits for women could also be due to higher operating costs, rather than negative discrimination against women, supporting cost-plus pricing. As a result, we hypothesize that there is no discrimination against women through charging higher interest rates when controlling for the important drivers of interest rates, including operating costs and credit risk.

3. Data and Methodology

3.1. The Data, Variables and Modelling

The study employs data from 129 MFIs in SSA during 2004 to 2018. The MIX Market database is the source of our data for MFI-specific characteristics. The database is available within the World Bank catalogue. This dataset is the only available dataset from the World Bank data catalogue at the present time, and similar datasets have been used by numerous recently published papers such as Githaiga and Bitok (2025), Tehulu (2026) and Mia (2026) because research results are assumed to

be stable across different time periods, making investments in research meaningful; otherwise, every published paper will become useless quickly as time passes (Tehulu, 2026). The World Bank database of development indicators is utilized for obtaining data for macroeconomic variables. The outcome variable in this study is the microcredit interest rate (*MIR*), measured by the yield on gross loan portfolio, consistent with Nwachukwu et al. (2018). The yield on gross loan portfolio represents the financial revenue on loans scaled by the gross loan portfolio (average). Our main explanatory variables are firm-specific characteristics including loan intensity (*LOI*), operating inefficiency (*OPI*), capitalization (*CAP*), loan officer productivity (*LOP*), funding cost (*FCO*), credit risk (*CRR*), and gender (*GEN*). Hence, our outcome variable (*MIR*) has the following model specification (Eq. 1):

$$\begin{aligned}
 MIR_{i,t} = & \beta_0 + \beta_1 LOI_{i,t} + \beta_2 OPI_{i,t} + \beta_3 CAP_{i,t} + \beta_4 LOP_{i,t} + \beta_5 CRR_{i,t-1} + \beta_6 FCO_{i,t} + \beta_7 GEN_{i,t} \\
 & + \phi_1 SCA_{i,t} + \phi_2 CUC_i + \phi_3 NGO_i + \phi_4 RUB_i + \phi_5 INF_{c,t} + \phi_6 GDPC_{c,t} + (\eta_i + \varepsilon_{i,c,t})
 \end{aligned}
 \tag{1}$$

We follow the definition of the MIX Market, as data is obtained from the same. We measure *LOI* by using the gross loan portfolio to asset ratio in line with Tehulu (2022b); we postulate that lower loan intensity could lead to higher interest rates because MFIs would have to make up the opportunity costs of greater liquidity so as to ensure financial sustainability. On the other hand, higher *OPI* could drive up interest rates as MFIs have to cover the higher operating costs (Nwachukwu et al., 2018). *OPI* is represented by the operating expense to asset ratio. *CAP* is calculated as the equity capital to asset ratio (Tehulu, 2022a), while *LOP* is the number of active borrowers per loan officer. Enhancing *LOP* could be an important mechanism to lower interest rates as it reduces MFIs' operating costs; whereas, as noted in the previous section, the expected result regarding *CAP* is inconclusive.

Besides, we hypothesize that MFIs with higher *CRR* would require a risk premium and raise interest rates to contain such costs (Nwachukwu et al., 2018); *CRR* is captured by the fraction of loans greater than 30 days in arrears. *FCO* represents the financial expense-to-asset ratio (Tehulu, 2026), and we expect that MFIs with higher *FCO* would increase interest rates to cover costs, consistent with Cost-Plus pricing theory. *GEN* is the proportion of women borrowers, measured as the number of women borrowers divided by total borrowers (Al-Azzam & Parmeter, 2021). Women demand small loans, and this might drive up operating costs and hence, interest rates; however, women are more creditworthy than men, and hence, MFIs

with more women borrowers might charge lower interest rates as they benefit from lower loan defaults. Hence, other MFI-specific factors (e.g., *OPI* & *CRR*) might matter in determining interest rates as they represent channels by which *GEN* impacts interest rates, rather than a negative women discrimination through charging higher interest rates.

Our model in Equation 1 (*Eq.1*) controls for the ownership structure of MFIs. MFIs have various ownership structures (legal status), with some organized as non-bank financial intermediaries (NBFIs) or micro-banks and others as NGO MFIs, credit unions/cooperatives, or rural banks. The ownership structure of MFIs might matter in microcredit pricing as it is associated with the social and financial orientation of MFIs. Nwachukwu et al. (2018) reveal that micro-banking practices raise microcredit interest rates in comparison to MFIs with other ownership structures. However, their study fails to investigate whether this difference is driven by credit unions/cooperatives, NGO MFIs, or both. Hence, we incorporate two dummies that take 1 if an MFI is a credit union/cooperative (*CUC*) or NGO MFI (*NGO*), and zero otherwise, to test whether differences exist in the level of interest rates of credit unions/cooperatives and NGO MFIs vis-à-vis NBFIs and micro-banks.

We also include the inflation rate (*INF*) and the natural logarithm of GDP per capita (*GDPC*) to control for the effects of macroeconomic developments on interest rates. Financial institutions might adjust lending rates to reflect the anticipated rates of inflation (Ćurak et al., 2012). Ahokpossi (2013) also reveals that interest margins are influenced by inflation. GDP per capita could capture the demand for loans, as poorer economies are expected to have higher demand for loans and, hence, higher interest rates compared to wealthier economies, which is consistent with the convergence theory. Finally, we also control for the scale of MFI operations, as large-scale lending could also be associated with interest rates (Nwachukwu et al., 2018; Al-Azzam & Parmeter, 2021). To this end, we include a large-scale dummy (*LSC*) which takes a value of 1 if the gross loan portfolio of an MFI is greater than 8 million USD; otherwise, it is zero, in line with the MIX Market classification.

3.2. Method of Data Analysis

This study employs random-effects GLS regression to explore the nexus between firm-specific characteristics and microcredit interest rates. Fixed-effects regression is not appropriate since time-invariant variables are also incorporated in our econometric model, and fixed-effects regression analyses will automatically drop those variables from our research model. Random-effects GLS regression also

improves the efficiency of our model as it does not apply differencing, which reduces the total number of usable observations when there are many missing values in the dataset. Hence, random-effects GLS regression is appropriate for our study because it is efficient and allows us to analyze the effects of time-invariant variables as well. We use clustered robust standard errors at the MFI level to deal with problems of autocorrelation and heteroskedasticity in the random error terms. Consequently, this study applies random-effects GLS regression with standard errors clustered robust. For comparison, we also provide the ordinary least squares (OLS) estimates to check the consistency of our results when we vary the estimation methods.

Dynamic panel data analysis techniques such as the generalized method of moments (GMM) are not suitable for our study because our dataset contains many missing values and does not allow the use of GMM, as this estimation technique applies differencing, which reduces usable data when there are missing values. While credit risk might influence or be influenced by interest rates, there are no theoretical foundations to support reverse causality regarding the remaining right-hand-side variables. Hence, we have used the lag value of credit risk to deal with the endogeneity problem. We have also included several potential determinants to avoid omitted variable bias, which is one factor for the endogeneity problem. Most importantly, regressing the explanatory variables against the residuals also confirms that the endogeneity problem is not a main concern in our study (results omitted to save space). As to cross-sectional dependence (CSD), it might be a concern for MFIs operating in the same country more than it is for those in different economies, as the former are more likely to be affected by common shocks. Hence, we have used clustered robust standard errors at the country level to confirm the robustness of our results after accounting for any unobserved country-specific shocks, which could affect all MFIs operating in the same economy simultaneously (see Table 3, Model 3). To account for CSD for MFIs in different economies due to, for example, global shocks, we have also included year dummies in Table 3, Model 4.

Regarding outliers, such as negative capitalization, extreme loan intensity, and interest rates, we preferred to keep them rather than trim the data because such data are not errors but reflections of the heterogeneity of the microfinance sector in SSA and could provide useful information. In the field of Accounting and Finance, negative capital reflects cumulative losses that have exceeded the capital invested. In the SSA economies, many MFIs are NGO MFIs, which may have a negative equity-to-asset ratio due to their social orientation and higher operating costs as they serve small loans to the poorest of the poor. Excluding such MFIs would lead to a

survivorship bias, where we study just the healthiest MFIs, rather than the reality of the entire microfinance industry in Africa. The same is true for loan intensity and interest rates. Higher loan intensity is mainly characteristic of credit-only MFIs, which do not accept deposits; such MFIs might not be subject to primary reserve and liquidity requirements, allowing them to invest more of their assets in loan portfolios. Several MFIs in SSA also have extreme portfolio yield, lower than 10% (or even 5%) and exceeding 100%, given that some MFIs are not-for-profit, subsidized, and social-mission-oriented, while others are for-profit with high operating costs. Trimming the data would exclude MFIs whose inclusion could have provided valuable information.

4. Results and Discussions

4.1. Descriptive Statistics and Correlation Results

The results of the descriptive statistics (Table 1) indicate that the mean financial revenue on gross loan portfolio (interest rate) is 37%, and its standard deviation is 22%, suggesting that while some MFIs are charging excessive interest rates, others charge very low interest rates. The gross loan portfolio as a percentage of total assets (loan intensity) is on average 67% with substantial variability; some MFIs have as low as 6%. The operating expense (22%) of MFIs is considerably larger than their financial expense (3%). Hence, operating inefficiency might be a better predictor of interest rates compared to funding costs. The equity-to-asset ratio (capitalization) is 32% with a standard deviation of 25%. This implies that while the microfinance sector in SSA is on average a well-capitalized sector, numerous MFIs are capital constrained, given that some MFIs also have a capital deficiency. Similarly, there are considerable differences in loan officer productivity among MFIs in SSA. The variability in credit risk and gender (women borrowers) is also significant. The mean value of the proportion of women borrowers (62%) suggests the absence of negative discrimination against women in credit access from MFIs in SSA. However, whether they are charged higher interest rates when they get credit access, other things being constant, is another important issue discussed in Section 4.2.

Table 1: Descriptive Statistics

Variables	Obs.	Mean	Std. Dev.	Min.	Max.
Interest rate	1007	0.374	0.220	0.015	1.884
Loan intensity	1264	0.673	0.783	0.061	27.417
Operating inefficiency	1150	0.218	0.154	0.019	1.053
Capitalization	1268	0.324	0.246	-1.534	1
Productivity	815	341.459	251.539	0	1966
Credit risk	1031	0.083	0.102	0	0.97
Funding cost	1140	0.030	0.030	0	0.195
Gender (Women borrowers)	1003	0.616	0.321	0	1
Large scale MFIs	1277	0.397	0.489	0	1
Credit Unions/Cooperatives ^a	1324	0.266	0.442	0	1
NGO MFIs ^a	1324	0.310	0.463	0	1
Rural Banks ^a	1324	0.025	0.156	0	1
Inflation	1324	0.079	0.069	-0.090	0.444
GDP per Capita (natural logarithm)	1324	6.589	0.688	4.855	8.988

^a The benchmark legal status is micro-banks and NBFIs.

NB.: Figures are rounded to three decimal places, and the results shall be understood with this caveat in mind

The results of the pair-wise correlation (Table 2) show that there is a significant positive correlation between operating inefficiency and interest rates. Capitalization and funding cost also have positive and significant correlations with interest rates. On the other hand, the correlations between loan intensity, loan officer productivity, and credit risk are negative and statistically significant, at least at the 95% confidence level. Table 2 also reveals a significant positive correlation between women borrowers and interest rates. However, the proportion of women borrowers is also positively and significantly correlated with operating inefficiency, capitalization, and NGO MFIs—a type of MFI that is among the most inefficient and charges higher interest rates compared to other types of MFIs, as shown in Table 2. The negative correlation between credit unions/cooperatives and interest rates implies that such mutually owned MFIs charge lower interest rates compared to MFIs with other ownership structures (legal statuses).

Table 2: Pairwise Correlation Results

Interest rate	Interest rate	Operating inefficiency	Credit risk (Lag)	Loan intensity	Funding cost	Capitalization	Productivity
Interest rate	1.000						
Operating inefficiency	0.738***	1.000					
Credit risk (Lag)	-0.157***	-0.026	1.000				
Loan intensity	-0.061**	0.028	-0.136***	1.000			
Funding cost	0.223***	0.122***	0.030	0.024	1.000		
Capitalization	0.221***	0.232***	-0.239***	0.129***	-0.324***	1.000	
Productivity	-0.287***	-0.260***	-0.032	0.179***	-0.080**	0.103***	1.000
Women borrowers	0.302***	0.284***	-0.162***	0.013	-0.007	0.197***	0.071*
Large scale MFIs	-0.164***	-0.244***	-0.024	-0.013	0.214***	-0.316***	0.080**
NGO MFIs ^a	0.208***	0.312***	-0.048	0.034	0.119***	0.119***	0.051
Credit Unions/Cooperatives ^a	-0.403***	-0.360***	0.076**	0.016	-0.280***	-0.152***	0.004
Rural Banks ^a	0.034	-0.053*	0.082***	-0.051*	-0.022	-0.122***	0.060*
Inflation	0.256***	0.211***	-0.092***	0.012	0.074***	0.142***	0.012
GDP per Capita	0.080***	0.009	0.081***	-0.003	0.235***	-0.223***	0.025

Table 2: Continued ...

	Women borrowers	Large scale	NGO MFIs	Credit Unions/Coop.	Rural Banks	Inflation	GDP per Capita
Women borrowers	1.000						
Large scale MFIs	-0.168***	1.000					
NGO MFIs ^a	0.361***	-0.171***	1.000				
Credit Unions/Coop. ^a	-0.296***	0.043	<i>N/A</i>	1.000			
Rural Banks ^a	-0.051	-0.132***	<i>N/A</i>	<i>N/A</i>	1.000		
Inflation	0.085***	-0.108***	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>	1.000	
GDP per Capita	0.023	0.328***	<i>N/A</i>	<i>N/A</i>	<i>N/A</i>	-0.190***	1.000

*** shows significance at 99 percent confidence level, ** represents significance at 95 percent confidence level and * indicates significance at 90 percent confidence level. ^a The benchmark legal status is micro-banks and NBFIs. *N/A* means not applicable.

4.2. Regression Results and Discussions

Table 3 displays the regression results on the determinants of interest rates on microcredits. Model 1 displays the random effects estimates. For comparison and to check the consistency of the results, we provide the OLS estimates in Model 2. In Model 3, we provide the clustered robust standard errors at the country level to deal with CSD. Model 4 accounts for CSD across MFIs in different economies by including time fixed effects. Table 3 reveals that MFI-specific characteristics, including loan intensity, operating inefficiency, capitalization, loan officer productivity, and credit risk, are important factors in the determination of interest rates on microcredits. The results are robust regardless of the estimation techniques. While the between and overall R-squared are good, the reported within R-squared is relatively low; this is expected as the cross-sectional variation is more useful than the time-series variation, given our dataset contains a larger number of MFIs (N) than the time series dimension (T). Moreover, we are interested in the sign and statistical significance of the coefficients, especially given that the explanatory power of our model is statistically significant, as confirmed by the Wald Chi-Square and F-statistic of our regression results.

More specifically, we find that microcredit interest rates are negatively linked to loan intensity, implying that MFIs with lower loan intensity charge higher rates of interest on microcredits. The results are statistically significant at the 99 percent confidence level. This result supports Tumwine et al. (2018), who also find that the lending out ratio (measured as gross loan portfolio divided by customer deposits) has a negative influence on the interest rates of commercial banks in Uganda. Higher loan intensity implies that a greater proportion of the assets of MFIs are in the form of loans, rather than in liquid (non-earning) assets. Hence, the negative relationship between loan intensity and interest rates suggests that MFIs with lower loan intensity tend to compensate for the opportunity cost they incur on non-earning (liquid assets) through the allocation of credits at higher interest rates.

MFIs with lower loan intensity also have lower financial sustainability (Tehulu, 2022b), and such MFIs could raise the interest rate on microcredits to counterbalance the negative effect of lower loan intensity on financial sustainability, as interest rates also contribute positively to MFI financial performance or sustainability (Kar & Swain, 2014; Tehulu, 2022b). The study also uncovers a positive and significant association between operating inefficiency and microcredit interest rates, indicating that MFIs with higher operating expenses pass those costs on to borrowers by charging them higher lending rates. Our finding confirms the findings of previous studies such as Tumwine et al. (2018) and Uddin et al. (2024) that operating efficiency is one of the main factors that drive the interest rates of financial institutions.

Table 3: Modeling Microcredit Pricing: Regression Results

Variables	Interest rate on microcredit			
	Model 1 Random effects (clustered MFI level)	Model 2 OLS	Model 3 Random effects (clustered country level)	Model 4 Random effects with year dummies (clustered MFI level)
Loan intensity	-0.220** (0.050)	-0.279* (0.058)	-0.220**(0.060)	-0.219*** (0.049)
rating inefficiency	0.504*** (0.089)	0.907*** (0.085)	0.504*** (0.092)	0.494*** (0.083)
Capitalization	0.114*** (0.037)	0.168*** (0.045)	0.114*** (0.035)	0.108*** (0.036)
Productivity	-0.000** (0.000)	-0.000*** (0.000)	-0.000** (0.000)	-0.000** (0.000)
Credit risk (Lag)	-0.155** (0.075)	-0.282*** (0.090)	-0.155* (0.081)	-0.154** (0.070)
Funding cost	0.389 (0.299)	1.158*** (0.388)	0.389 (0.274)	0.394 (0.294)
Gender (Women borrowers)	0.035 (0.027)	0.040 (0.031)	0.035 (0.021)	0.032 (0.026)
Large scale MFIs	-0.007 (0.011)	0.033* (0.017)	-0.007 (0.010)	-0.003 (0.011)
Credit Unions/ Cooperatives ^a	-0.118*** (0.026)	-0.044** (0.021)	-0.118*** (0.037)	-0.075*** (0.028)
NGO MFIs ^a	-0.012 (0.035)	-0.010 (0.026)	-0.012 (0.049)	0.026 (0.032)
Rural Banks ^a	0.014 (0.033)	0.080** (0.038)	0.014 (0.038)	-0.000 (0.038)
Matured MFIs				-0.018 (0.016)
For-profit MFIs				0.047** (0.024)
Inflation	0.046 (0.042)	0.220*** (0.077)	0.044 (0.050)	0.069 (0.051)
GDP per Capita	0.038** (0.019)	0.048** (0.021)	0.038* (0.021)	0.050* (0.026)
Time fixed effects	No	No	No	Yes
Constant	0.149 (0.114)	-0.035 (0.129)	0.149 (0.145)	0.067 (0.156)
Model Test	Wald chi2(13) = 222.41 Prob > chi2 = 0.000	F(13, 128) = 28.38 Prob > F = 0.000	Wald chi2(13) = 551.55 Prob > chi2 = 0.000	Wald chi2(24) = 314.45 Prob > chi2 = 0.000
R square	within = 0.098 between = 0.684 overall = 0.662	R-squared = 0.722	within = 0.123 between = 0.683 overall = 0.666	
Observations	535	535	535	535
No. of MFIs	129	129	129	129

^a The benchmark MFIs are micro-banks and NBFIs. *** indicates significance at 99 confidence level; ** shows significance at 95 confidence level and * reflects significance at 90 confidence level. Standard errors are provided in parentheses. Clustered robust standard errors are used to deal with autocorrelation and heteroskedasticity problems in model 1 and cross-sectional dependence as well in model 3.

Similarly, interest rates are also positively linked to capitalization, and this is statistically significant at the 99 percent confidence level. This is in line with the literature from the banking sector, which reveals that interest rates rise with an increase in the capitalization of commercial banks (Ahokpossi, 2013; Tumwine et al., 2018). The major problem with equity capital in MFIs is the difficulty of raising such funds, which might pressurize MFIs with a higher capital ratio to allocate their limited loanable funds at higher interest rates. Hence, the need for strategies that allow accessing debt funding is critical to expand the scale of operation (lending), which could also help improve loan officer productivity and reduce operating inefficiencies (see Table 2).

Compared to equity, which is less accessible and expensive, debt leverage is a cheaper source of funds for MFIs. The literature also underscores the need for debt leverage and large-scale operations in MFI financial stability (Tehulu, 2026), which is vital for cheaper funding costs. Moreover, well-capitalized MFIs might also expand their operations by reaching underserved groups and incur higher operating costs in serving such market segments. In fact, MFIs with higher capitalization are mainly NGO MFIs, which have a social responsibility orientation, and could incur greater operating expenses as they tend to serve poorer clients (women) (see also Table 2). This higher operating cost could also drive the positive association of capitalization with interest rate.

On the other hand, we find that loan officer productivity is negatively associated with interest rates, a result that is statistically significant at least at the 95% confidence level. The results imply that the productivity of loan officers leads to lower interest rates, possibly by reducing the operating inefficiencies of MFIs (see Table 2). Basharat et al. (2014) also document that MFIs' productivity reduces their operating inefficiencies. We also find that higher credit risk in the preceding period is significantly associated with lower interest rates in the current period. MFIs with higher credit risk may reduce interest rates to reduce the total debt burden of the borrowers and improve repayment rates, since default risk is one of the detrimental factors to the financial sustainability of MFIs (Tehulu, 2022b). An alternative explanation could be that a rise in default risk might force MFIs to stop lending to high-risk borrowers and shift to prime borrowers, leading to lower interest rates to win creditworthy clients and remain competitive. Given that the documented relationship is a negative one, the result is not driven by reverse causality, as interest rates would likely impact credit risk positively, not negatively. Our findings, however, contradict the literature from the banking sector (Tarus et al., 2012;

Ahokpossi, 2013; Were & Wambua, 2014), which shows that financial institutions charge a higher risk premium commensurate with the higher risk of default assumed.

Our research findings, therefore, suggest that, in the microfinance sector, unlike the banking sector, the costs of loan default from an increase in interest rates are more substantial compared to the benefits of a rise in interest rates. As a result, MFIs with higher credit risk choose to reduce interest rates and lower the total debt burden of the borrowers so as to improve repayment rates. Our study, however, is unable to find any evidence of discrimination against women by way of charging higher interest rates. The positive correlation between women borrowers and interest rates observed in the pairwise correlation (see Table 2) hinges on the positive correlation of operating inefficiency and capitalization with serving more women borrowers, rather than an indication of negative discrimination. The results on funding cost are inconclusive. While it is positive but insignificant in the random effects model, it is positive and statistically significant in the OLS model. The insignificant result under the random effects estimate might be due to the inclusion of most of the determinants of funding cost in our interest rate model, which might have absorbed the predictive power of funding cost.

As for our control variables, the ownership structure of MFIs is an important determinant of interest rates. Compared to non-bank financial intermediaries and micro-banks, credit unions or cooperatives have lower interest rates, but no significant difference is observed in the case of NGO MFIs. Credit unions/cooperatives charge lower interest rates than micro-banks and NBFIs because the former have lower operating costs, funding costs, and capitalization (see Table 2). Theoretically, since NGO MFIs rely heavily on donations, we could expect such MFIs to provide microcredit at lower interest rates compared to MFIs with other ownership structures. However, this is not actually the case, mainly because NGO MFIs are the most inefficient types of MFIs, as reflected in their operating expense to total asset ratio (see Table 2).

The results also reveal that MFIs in wealthier economies charge higher interest rates compared to those in poorer economies, which contradicts the theory of convergence. This theory implies that interest rates could be higher in poorer economies than in wealthier economies, as the demand for loans is likely to be higher in the former. The result supports the findings of Dorfleitner et al. (2013), which document a positive association between gross national income per capita and interest rates. This might be due to higher funding costs in wealthier economies (see Table 2), as donations are less likely to be directed toward these economies, and MFI funding

might be made at market prices from private investors. The results on inflation and large-scale dummy are inconclusive; while insignificant in the random effects model, the results are statistically significant in the OLS model. Our findings have considerable implications for how MFIs could reduce interest rates to provide more affordable microcredit for the poor. More specifically, MFIs need strategies that promote greater loan intensity, loan officer productivity, operating efficiency, and cheaper debt leverage to reduce interest rates.

4.3 Robustness Tests

Following Tehulu (2026), who highlight possible heterogeneities in model estimation results across different scales of MFI operations, we have re-estimated our model for small- and medium-scale MFIs and large-scale MFIs separately, adding two more control variables: a for-profit MFI dummy to capture commercial or social orientation and a matured MFI dummy to control for the effect of age or life cycle. Table 4 displays these robustness test results. The significant positive relationships between operating inefficiency, capitalization, and interest rates are robust regardless of the scale of MFI operation. Higher loan intensity is associated with lower interest rates, while for-profit MFIs charge higher interest rates compared to not-for-profit counterparts regardless of scale of operation. For-profit MFIs charge, on average, 6% higher compared to not-for-profit MFIs, suggesting the social orientation of, and perhaps donations or subsidies for, the latter.

The results in Table 4 also highlight the possibility of heterogeneity in our model estimates, given the asymmetric effects of certain variables—such as loan officer productivity, credit risk, funding cost, credit union or cooperatives dummy, matured MFIs dummy, and inflation—between large-scale MFIs and small- and medium-scale MFIs. Loan officer productivity is vital to reducing interest rates in the case of small- and medium-scale MFIs, but not for large-scale MFIs, which already have better economies of scale. Likewise, the negative and statistically significant coefficient for credit risk and credit union or cooperatives dummy holds true only for small- and medium-scale MFIs. Compared to new and young MFIs, matured MFIs provide more affordable microcredit as long as they grow larger and expand their scale of operation with age, suggesting that age per se does not drive lower interest rates. Moreover, large-scale MFIs tend to increase interest rates with an increase in funding cost and inflation, while microcredit pricing in small- and medium-scale MFIs is unresponsive to these factors.

Table 4: Drivers of Microcredit Pricing: The moderating effect of the scale of MFI operation

Variables	Interest rate on microcredit	
	Large Scale MFIs Random effects (clustered at country level)	Small and Medium Scale MFIs Random effects (clustered at country level)
Loan intensity	-0.356***(0.115)	-0.222** (0.049)
Operating inefficiency	1.221*** (0.137)	0.444*** (0.093)
Capitalization	0.310** (0.136)	0.097*** (0.039)
Productivity	-9.34e-06 (0.000)	-0.000* (0.000)
Credit risk (Lag)	0.015 (0.057)	-0.234*** (0.093)
Funding cost	0.853* (0.476)	0.282 (0.252)
Gender (Women borrowers)	0.049 (0.033)	0.016 (0.036)
Credit Unions/Cooperatives	-0.014 (0.023)	-0.064* (0.035)
NGO MFIs ^a	0.039 (0.038)	0.050 (0.046)
Matured MFIs	-0.110** (0.053)	-0.000 (0.014)
For Profit MFIs	0.064*** (0.020)	0.059*** (0.024)
Inflation	0.136** (0.057)	0.080 (0.074)
GDP per Capita	0.015 (0.029)	0.034 (0.024)
Constant	0.197 (0.130)	0.171 (0.170)
Model Test	Wald chi2(13) = 644.84 Prob > chi2=0.000	Wald chi2(13) = 120.37 Prob > chi2=0.000
R square	within = 0.372 between = 0.870 overall = 0.850	within = 0.070 between = 0.664 overall = 0.630
Observations	172	331
No. of MFIs	46	101

^a The benchmark MFIs are micro-banks and NBFIs as well as rural banks, which has been dropped from the analysis due to collinearity problem. *** indicates significance at 99 confidence level; ** shows significance at 95 confidence level and * reflects significance at 90 confidence level. Standard errors are provided in parentheses. Clustered robust standard errors at a country level are used to deal with autocorrelation, heteroskedasticity and cross-sectional dependence.

7. Conclusion

Microcredit, which is offered by microfinance institutions (MFIs), is an essential financial product to support the poor, since capital constraint is the main hurdle to starting or expanding small business enterprises. However, the prices for microcredit, namely interest rates in the microfinance sector, are thought to be excessive. Given the need to identify ways to reduce these rates, this paper explores the key factors that drive the high interest rates observed in MFIs by focusing on the effects of firm-specific characteristics in the context of MFIs from Sub-Saharan Africa (SSA). The study utilizes data from 129 MFIs in SSA during 2004 to 2018. The random-effects GLS regression is employed as our main method of data analysis. Using a comprehensive model, the study finds that operating inefficiency and capitalization drive interest rates positively, whereas higher loan intensity and loan officer productivity are negatively associated with microcredit interest rates.

In addition, we find that MFIs with higher credit risk tend to reduce interest rates, possibly to reduce the total debt burden for the borrowers and improve repayment rates, which is an important determinant of MFIs' financial sustainability. Nevertheless, we are unable to find any evidence of discrimination against women by way of charging higher interest rates. We find that the positive correlation between women borrowers and interest rates observed in MFIs hinges on the positive correlation of operating inefficiency and capitalization with serving more women borrowers, rather than an indication of negative discrimination. As to our control variables, the ownership structure of MFIs is an important determinant of interest rates; compared to non-bank financial intermediaries and microbanks, credit unions or cooperatives have lower interest rates, but no significant difference is observed in the case of NGO MFIs. For-profit MFIs charge higher interest rates compared to not-for-profit counterparts. The results are robust regardless of whether the MFIs are large scale or small and medium scale MFIs, except for loan officer productivity, credit risk, and credit unions or cooperatives dummy, which hold valid only for small and medium scale MFIs but not for large scale MFIs.

Compared to new and young MFIs, matured MFIs provide more affordable microcredit as long as they grow larger and expand scale of operation with their age, suggesting that age per se does not drive lower interest rates. Moreover, large scale MFIs tend to increase interest rates with an increase in funding cost and inflation, while microcredit pricing in small and medium scale MFIs is unresponsive to these factors. Our findings have considerable implications on how MFIs could reduce

interest rates to provide more affordable microcredit for the poor. More specifically, MFI managers need to reduce operating inefficiencies, invest more of their assets in loan portfolios, improve loan officer productivity, and expand the scale of MFI operations through debt leverage to reduce interest rates. Notably, MFIs might need to increase their scale of operation (lending) to raise loan officer productivity, improve operating efficiency and loan intensity. Besides, MFIs need to take advantage of debt leverage to expand their operation and provide affordable microcredit, as debt funding is more accessible and cheaper compared to equity.

Finally, while our model incorporates several MFI-specific and macroeconomic variables as well as other control variables, microcredit pricing might be influenced by different factors that have not been accounted for in our model due to data unavailability or scope limitations, as some require additional data collection. We suggest that future studies explore the role of central bank regulatory frameworks and digital technology in microcredit pricing. Future research could also examine whether donated equity or subsidized capital contributes to the reduction of interest rates. Moreover, incorporating institutional factors such as political stability and control of corruption would enhance the predictive power of interest rate models. MFIs might require a higher risk premium in a weaker institutional environment. We believe additional studies are vital for developing a holistic view of microcredit pricing, given that every research project such as ours has its own delimitations.

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