International Journal of

Finance

(IJF)

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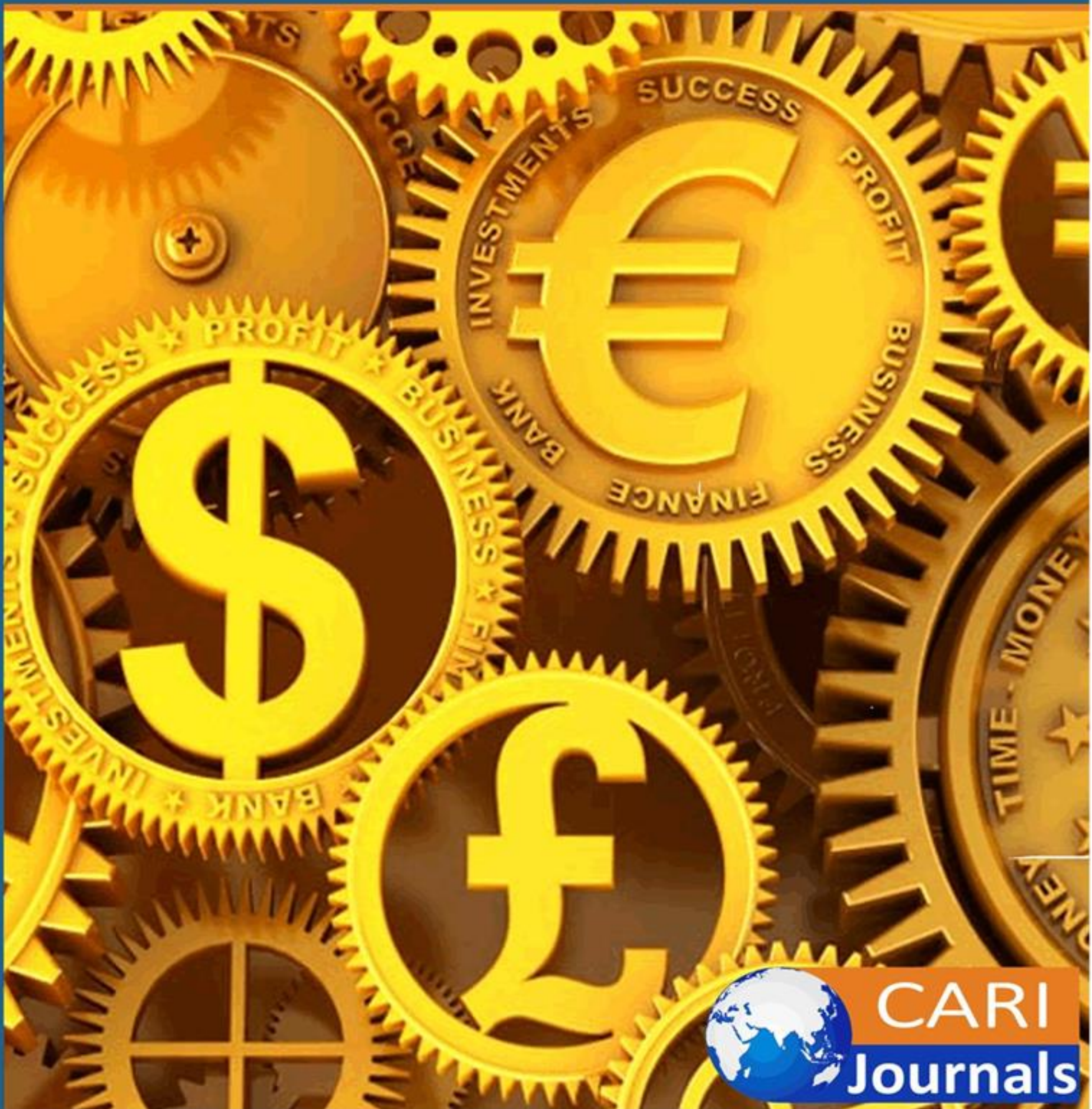

International Journal of Finance
ISSN 2520-0852 (Online)
Vol. 11, Issue No. 3, pp. 67 - 85, 2026
www.carijournals.org

Operational Risk Management and Financial Performance: An Empirical Analysis of Cost Efficiency and Return on Assets

NIYIBIZI François Xavier[1]*, Prof. GWAHULA Raphael[2], Dr. ABAYO Abdiel[3]

[1]Institut d'Ensignement Superieur de Ruhengeri

https://orcid.org/0009-0004-2586-6844

[2,3]The Open University of Tanzania, Dar Es Salam, Tanzania

Accepted: 5th May, 2026, Received in Revised Form: 12th May, 2026, Published: 23rd May, 2026

Abstract

Purpose: The study sought to analyze the effect of operational risk management on the financial performance of Microfinance Institutions (MFI) in Rwanda. The research analyzed the influence of the operational efficiency variables, which are Cost-to-Income Ratio (CIR) and Operating Expense Ratio (OER) on financial performance measured through Return on Assets (ROA), taking into account the Lending Rate (LR) and Inflation Rate (IR).

Methodology: A quantitative research method was used for the study, with panel data being used for the design. A total of 15 publicly listed microfinance institutions were chosen from a population of 22 firms whose data were readily available. Methods of data analysis included descriptive statistics, correlation analysis, and panel regressions using STATA software. The Hausman specification test was performed to identify which regression to use between fixed and random effects models.

Findings: From the analysis, it can be noted that there were significant negative correlations between financial performance and CIR ($r = -0.432$) as well as OER ($r = -0.398$). Also, regression results showed that CIR and OER had significant negative impacts on ROA, suggesting that higher operational costs lower profitability. Moreover, the lending rate was found to have a positive impact on ROA, while inflation had a negative impact, albeit not statistically significant. Also, it was found from the Hausman test results that $\chi^2 = 9.41$, $p = 0.024$; therefore, FE model is the preferred estimator. Overall, the paper concludes that operational risk management is an essential determinant of financial performance.

Unique Contribution to Theory, Policy and Practice: This research is an important contribution to the theoretical perspective of the connection between the management of operational risk and financial performance in MFIs. It stresses the significance of operational efficiency and regulation and will be useful for practitioners as they will be able to maximize profits by minimizing costs and improving internal control systems.

Keywords: *Operational Risk Management, Cost-To-Income Ratio, Operating Expense Ratio, Return on Assets, Microfinance Institutions*

JEL Codes: *G21, G32, D24, C23*

1. Introduction

Microfinance Institutions (MFIs) play a vital role in expanding financial inclusion and promoting economic development in many developing countries. These institutions provide low-income households and small entrepreneurs with financial services, including credit, savings, and payment facilities. Due to various barriers preventing access to formal banking systems, microfinance serves these underserved segments of society, contributing substantially to poverty alleviation and the expansion of small and medium-sized enterprises (SMEs). Yet, the sustainability of microfinance depends on MFIs' financial performance and operational efficiency. Operational inefficiencies tend to elevate costs and decrease profitability, which jeopardizes institutional sustainability and outreach scale (Cull et al., 2019)

As a consequence, managing operational risk has become a priority for financial institutions. Microfinance institutions operations involve small lending, decentralized models of credit provision, and intensive levels of client screening and supervision, which typically translate into the increased costs. Thus, an MFI's capacity to keep operational expenses in check emerges as a central determinant of its profitability and sustainability prospects. Operational risk management entails efforts at refining internal processes, bolstering controls, and enhancing the management system to bring down costs and strengthen financial performance (Hermes & Hudon, 2021).

Operational efficiency ratio including Cost-to-Income Ratios (CIR) and Operating Expense Ratios (OER) are commonly used metrics to gauge how financial institutions perform at operational risk management. The CIR measures how large operating costs are relative to revenues and captures how effectively the institution converts operating expenses into revenues. Low CIR values signal high operational efficiency and effective cost management. High CIR values highlight operational inefficiencies, which in turn drag down profits and put pressure on an institution's financial sustainability (Kar, 2022).

Likewise, the OER is indicative of the relationship between operating costs, measured by either total assets or the total loan portfolio. A high OER value reflects poor cost structures and high operational risk exposure, and may be the outcome of managerial inefficiencies or poor technology infrastructure within financial institutions. Microfinance institutions in particular tend to have high administrative costs and the intensive to ensure repayment. Consequently, operating costs represent a key variable for determining microfinance viability and profitability, making the effective management of those expenses' paramount for success (Muriu, 2020).

Various empirical researches have been written on the effect of operational efficiency on the financial performance of microfinance institutions. Hermes and Hodon (2021) finds that operational efficiency has a great effect on the profitability and financial performance of microfinance institutions especially in developing nations where microfinance institutions spend the bulk of their expenditures on operational costs and administration. Another study done by Kar (2022) also establishes a positive effect of cost efficiency on financial performance measures like Return on Assets and Return on Equity across a number of geographical locations and microfinance institutions.

This is even more so for many African nations where Microfinance Institutions are seen as an increasingly important sector that contributes to promoting financial inclusion, boosting social entrepreneurship and driving rural economic development. Despite its importance in driving the continent's financial development goals, the microfinance sector is associated with a number of operational challenges that make achieving these objectives harder for institutions including high administrative costs, limited economies of scale, poor technology infrastructure etc. which affect negatively the financial sustainability of these microfinance institutions. A study of African microfinance industries confirms that operational costs is amongst the largest factor influencing profitability and financial stability (Muriu, 2020).

In Rwanda, Microfinance Institutions are today an important segment of Rwanda's financial system and have proven instrumental in improving access to credit services for marginalized and low-income individuals. The growth of the industry can largely be credited to supportive policies and regulations instituted by the National Bank of Rwanda (NBR), the body in charge of regulating and supervising all financial institutions operating in Rwanda's borders. With the help of government, both the savings and credit cooperative societies and licensed microfinance institutions in the nation have grown rapidly in recent years providing much needed access to financial services for households and small entrepreneurs.

However, despite these gains the Rwandan microfinance industry still contends with some operational risk constraints that could undermine its financial performance. Issues such as high running costs, lack of modern technological resources to streamline operations, and the difficulties of providing financial services for scattered rural communities add to the challenges faced. Unless managed properly, the effect of these factors can be quite costly and lead to lower profitability of the institutions (Habimana & Mutabaruka, 2023).

To this end, a number of empirical studies have been done in Rwanda looking at the relationship between operational efficiency and the profitability of microfinance institutions. The findings suggest that microfinance institutions can reap substantial financial performance benefits from maintaining efficient cost management practices. The researched conducted by Nsengiyumva and Nkundabanyanga (2022) for example shows that there exists a very strong link between the level of operational expenses to income ratio of a microfinance institution and their return on assets ratios. Financial institutions who keep their operational expense to income levels down were found to generally perform better financially and exhibit stronger financial stability than their counterparts who had higher expense levels.

As noted above, other studies have looked at different determinants of financial performance for microfinance institutions. But some have also focused on credit risk, liquidity risk, and capital adequacy, leaving little emphasis on the management of operational risk and its implications on the financial performance of microfinance institutions. There is limited empirical evidence in the context of Rwanda on the linkages between financial performance of microfinance institutions and operational efficiency indicators including cost-to-income ratio and operating expense ratio among others (Hermes & Hudon, 2021).

Hence, this study is meant to fill this gap by exploring the effectof operational risk management on the financial performance of microfinance institutions in Rwanda, where little has been documented so far. Specifically, this study will focus on how two cost efficiency indicators the cost-to-income ratio (CIR) and operating expense ratio (OER) influence return on assets (ROA). To capture potential macroeconomic factors that can affect an institution's profitability through changes in borrowing costs or economic condition, among others, this study has also included lending rate (LR) and inflation rate (IR) as control variables (Kar, 2022).

By specifically investigating operational risk management determinants, this study therefore seeks to add on the existing body of literature on determinants of financial institutions' performance. It aims to establish the impact of selected operational efficiency indicators on the financial performance of microfinance institutions in Rwanda using empirical data. The findings of the research study are anticipated to contribute towards understanding how operational risk management affects the financial sustainability and overall performance of microfinance institutions in Rwanda.

2. Research Methodology

This study used a quantitative research design, relying on secondary panel data. It tested the effects of the level of operational risk management on the financial performance of microfinance institutions operating in Rwanda. The analysis examined the effect of the proxies of operational risk efficiency; Cost-to-Income Ratio (CIR), Operating Expense Ratio (OER), and how they influenced the Return on Assets (ROA). The financial ratios were estimated while taking into account the influence of macroeconomic factors such as lending rate (LR) and inflation rate (IR). Panel data was preferred because it controls for variation across the individual cross sections (MFIs) and over time, leading to more robust and reliable empirical evidence than the usual cross-sectional data.

The target population of this study consists of all 22 licensed Public Limited Companies MFIs currently operating in Rwanda and supervised by the National Bank of Rwanda. Only 15 MFIs were however selected through the purposive sampling technique due to completeness and consistency of the data record. Seven (7) of the twenty-two (22) licensed MFIs in Rwanda could not be included because of the lack of complete and reliable annual data records in some of the years under consideration. Secondary data were gathered from audited financial statements and other published official documents of financial reports. The sample data were analyzed using the STATA Statistical Software Release 14 for Windows. The analytical procedures entailed generation of summary statistics using descriptive statistics, correlation analyses and panel

International Journal of Finance
ISSN 2520-0852 (Online)
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regression modeling using fixed effects and random effects models of regression. To select the best model, Hausman test was done. The following panel regression model was used:

$ROA_{it}=\beta_0+\beta_1CIR_{it}+\beta_2OER_{it}+\beta_3LR_t+\beta_4IRt+\varepsilon_{it}$

Where:

ROA_{it}: represents Return on Assets of microfinance institution *i* at time *t*; CIR_{it}: represents Cost-to-Income Ratio; OER_{it}: it represents Operating Expense Ratio; LR_t: represents Lending Rate; IR_t: represents Inflation Rate; β_0: is the constant term; $\beta_1,\beta_2,\beta_3,\beta_4$: are regression coefficients; ε_{it} : is the error term.

3. Literature review

3.1 Theoretical Review

This study draws heavily on two prominent bodies of literature, one on risk management and another on financial performance measures. These two lines of thought converge on two particular theories; the Efficient Structure Theory and the Expense Preference Theory. The rationale behind drawing insights from these two theories is the common ground that both cover, which explains how good operational risk management, particularly cost and internal process management, influences the financial performance of the financial institution under analysis. The theories also offer a framework for analyzing the interplay between good operational risk management as proxied by Cost-to-Income ratio and the Operating Expense ratio and financial performance as proxied by Return on Assets.

Efficient Structure Theory

The efficient structure theory was put forth by Fama and French (1997). The basic premise of this theory is that the difference in financial performance (profitability) across financial institutions is a result of variations in managerial efficiency. Financial institution that operates at a high level of efficiency in management, risk mitigation, and resource utilization tend to have a higher Return on Equity and/or higher stock prices compared to their peers (Rahman et al., 2020).

Under the risk management tent, the concept of operational risk is central to this theory. The operational efficiency of a financial institution as measured by the cost to income ratio and the return on assets (the two key metrics explored herein) determines its ability to mitigate risks. Microfinances that are operationally efficient and effective in risk mitigation strategies tend to be more stable, hence more profitable, compared to their inefficient counterparts (Baltas et al., 2025).

Efficient financial institutions are those that can maintain low costs of doing business (cost-to-income ratios) and have adequate monitoring systems in place (return on asset ratios) while ensuring a robust risk management system (Alhaji et al., 2020). The Efficient Structure Theory also supports this finding as it explains how good cost management (cost-to-income ratio) enhances operational efficiency and profitability, thereby leading to good financial performance (return on assets).

Expense Preference Theory.

The second overarching theory driving this body of research is the so-called Expense Preference Theory. This theory originated in the banking literature as a behavioral explanation for why cost structures at financial institutions vary widely, as well as why some financial institutions are far more profitable than others. Specifically, it argues that managers may have incentives to increase their level of operating expense above what would be optimal if internal governance were strong and cost discipline was tightly enforced. When this happens, the elevated level of operating expense can have a negative effect institutional profitability and overall efficiency (Sousa et al., 2025).

When viewed through the lens of risk management, an increased level of operating expense suggests poor operational risk management practices within the institution. Failing to appropriately manage costs of administration, staff, buildings and technology infrastructure, or operating processes all leave the door open to various sources of operational inefficiency that can depress profitability over time. In the case of microfinance, there are many legitimate reasons that operational expense is generally higher as a share of total income compared to banks including monitoring costs on loans, the costs of delivering training to clients and providing ongoing outreach, and the general challenges of operating efficiently in remote locations all contribute to the challenge of keeping costs down but failing to do so efficiently can take a large toll on an MFI's ability to earn a profit.

The implication of Expense Preference Theory is therefore a prediction that the operating cost ratio (and other cost-related ratios) will show a significant inverse relationship with institutional profitability. A higher operating expense ratio and/or a higher cost/income ratio signal an inefficient cost structure, as well as poor risk management related to operational processes, which then translates into depressed return on assets (ROA). The latest research on both banking and microfinance sector performance supports this prediction, confirming that excessive operating expense is among the key drivers of downward pressure on institutional profitability across all types of financial institutions (Zineelabidine et al., 2024).

As applied to the case of microfinance institutions operating in Rwanda, the predictions of Expense Preference Theory suggest that weaknesses in an institution's capacity to manage operational risks and hence their higher operating costs will undermine financial performance of an MFI, even if the level of demand for its services remains relatively high. An MFI that does not keep administrative and operational costs under control will likely be less profitable regardless of the size of the portfolio of its outstanding loans than those that succeed at controlling those costs.

Thus, improving operational risk management capability emerges as an important strategy to improve MFI sustainability.

3.2 Empirical evidence

One common metric used as a proxy for the efficiency with which a financial institution operates and its ability to manage operating costs is the Cost-to-Income Ratio (CIR). Generally speaking, the lower a financial institution's CIR, the better it is at controlling the ratio of its operating expenses to its income, which improves profitability. Several empirical studies provide support for the argument that the CIR significantly impacts the financial performance of MFIs (micro-finance institutions). Zineelabidine et al. (2024) examined African microfinance institutions and found that those that exhibited higher cost efficiency were the ones that had a higher level of profitability, their results suggest that micro finance institutions that were able to efficiently manage the cost of operations were more likely to translate the revenues generated into profit. Similarly, Felix et al. (2025) investigated the impact of operational efficiency on Kenyan microfinance banks and reported that "operational efficiency proxy factors" positively impacted the Return on Assets of the microfinance banks they investigated, further supporting the efficiency hypothesis that financial institutions with lower cost structure tend to achieve superior performance.

Other empirical studies have produced contradicting results. Singh (2023) investigated several microfinance institutions in Nepal and discovered that in some cases operating expenses increased along with profitability, which she attributed to the fact that high operational expenditures may indicate that the institution is expanding, making new technological investments, and/or providing better customer service (implying that not all increases in operational costs reflect inefficiency but rather efforts aimed at enhancing long-term performance). Similar findings have been produced for Rwanda, where Kagishiro (2021) observed that for many microfinance institutions there was a positive relationship between profitability and certain operating costs indicating that the operating spending that occurred when the institutions grew, and became larger in scale, enhanced profitability.

Another operational risk factor commonly studied is the Operating Expense Ratio (OER), a proxy for how operational risks are managed in a financial institution. The OER calculates the proportion of the financial institution's operating expenses to either its total assets or its loan portfolio. A higher OER value reflects operational inefficiency that could potentially undermine an institution's profitability.

Empirical research mostly supports a negative relationship between OER and profitability, as expected. Muriu (2020) examined micro-finance institutions in various countries across Africa and concluded that institutions with a higher proportion of operating expenses suffered a decrease in profitability. Likewise, Hermes & Hudon (2021) explain that "in most cases, operating expenses comprise the largest share of micro-finance institutions' total expenditures," indicating that such expenses could greatly undermine an MFI's financial sustainability if left unchecked and unmanaged.

Other empirical studies have found contradictory results. In particular, some studies suggest that high operating costs may result from increased outreach activities, the investment in new digital technologies, and employee training. Baltas et al. (2025) note that some of the operational costs of micro-finance institutions might actually serve to improve the long-run operational efficiency and asset quality of the institutions, suggesting that while a large number of operating costs can be bad for profitability (because these costs eat up income), a carefully calculated strategic investment in operational capacity-building can enhance profitability in the long run.

Finally, interest-rate conditions, particularly the level of lending interest rate charged by the microfinance institution, are known to influence the profitability of micro-finance institutions through their impact on loan-demand elasticity and the borrowers' ability to repay, which together affect the volume and pricing of the loans made by the financial institutions and ultimately determine the amount of income generated. Here again, however, empirical evidence yields mixed results.

Lending rates were found to have a negative influence on microfinance performance. Molla and Kaur (2025), studied microfinance institutions in Ethiopia, finding that interest rate risk has a negative relationship with microfinance institutions' financial performance. Specifically, a higher lending rate might lead to increased costs of borrowing to their clients, leading to a higher risk of loan default, and eventually reduced profitability. Some scholars, however, argue that moderate lending rate has a positive influence on the financial performance of microfinance institutions as it could increase microfinance institutions' interest incomes and boost institutional sustainability. (Molla and Kaur 2025). Inflation, another macroeconomic variable, could affect financial institutions' operation environment. Particularly, rising inflation could lead to decreased loan repayment capability, increased operating costs, and reduced general financial stability.

The empirical findings of the link between inflation and microfinance performance are mixed. Kagishiro (2021) using Rwanda as the case study, found out that inflation negatively affects the profitability of microfinance institutions due to increased operating costs and reduction of financial returns in real terms, whereas Bouhamed and Salah (2026) found that inflation has no considerable effect on the financial performance of microfinance institutions in the MENA region. Such contradictory findings could imply that the effect of inflation on microfinance performance might be dependent upon institutional structures or macroeconomic context. Although still limited, the existing empirical research specifically focused on Rwanda's microfinance sector also reveals interesting trends. Kagishiro (2021) studied profitability determinants in microfinance institutions in Rwanda, finding that operational expenses and inflation have negative impacts on microfinance financial performance. Based on the findings, Kagishiro (2021) recommended the need to focus on enhancing operational efficiency to strengthen institutional sustainability. Likewise, Nsengiyumva and Nkundabanyanga (2022) found that the level of cost management practices have a significant influence on the financial performance of microfinance institutions in Rwanda, concluding that the improvement of operational efficiency through effective cost management practices would contribute to improved profitability in the Rwandan microfinance sector.

All in all, the existing empirical evidence seems to suggest that operational risk management plays an important role in explaining the financial performance of microfinance institutions. Most of the existing literature seem to support the assertion that efficiency cost management as shown by Cost to Income Ratio and Operating Expenses Ratios has a positive influence on financial performance of microfinance institution, but some scholars argued that there might be some operational expenditures that would positively affect the long-run growth trajectory of the institution and long-term sustainability. Also, macroeconomic factors like lending rate and inflation have an effect on microfinance institutions profitability, however, the effect of these factors could vary across country context or institutional context. Overall, the mixed results reported in the literature seem to call for more empirical evidence, especially for Rwanda. In doing so, the current study aims to contribute to this stream of literature by providing new empirical evidence regarding the effects of operational risk management on financial performance, based on the updated data collected from microfinance institutions in Rwanda, by investigating the combined effects of CIR, OER, LR and IR on ROA in Rwandan microfinance institutions.

4. Findings and Discussion

4.1 Findings

In Table 1, descriptive statistics of the variables used in this analysis have been presented. This table reports the mean, the standard deviation, the minimum, and the maximum for each variable. Dependent variable is Return on Assets (ROA), operational risk management indicators are represented by Cost-to-Income Ratio (CIR) and Operating Expense Ratio (OER) whilst Lending Rate (LR) and Inflation Rate (IR) serve as control variables. Descriptive statistics are summarized below and are useful to provide the first information about the distribution and general nature of the data that will be used to analyze the relationship between operational risk management and financial performance of Rwandan microfinance institutions.

Table 1:

Descriptive Statistics

Variable	Mean	Std. Dev	Minimum	Maximum
ROA	0.1019	0.107	0.00005	0.4038
CIR	1.1073	0.6215	0.4224	2.3903
OER	0.1883	0.1154	0.0346	0.3909
LR	23.27	1.28	14	24
IR	6.03	0.78	5	6.8

Note: ROA=Return on Asset; CAR= Cash Ratio; ECTA: Equity Capital to Total Asset; LR= Lending Rate; IR= Inflation Rate.

The mean of ROA is 0.1019 which means that on average ROA values for the sampled microfinance institutions during the studied period is about 10.19% which implies that these microfinance institutions are able to generate a profit of around 10.19% return on total assets. The ROA result suggests that most of microfinance institutions included in the study have been earning profits. Standard deviation of 0.107 shows a little variation of profitability level between different MFI and through time. Lowest value of ROA which is 0.00005 indicates that there are microfinance institutions that have experienced low level of profit. High ROA (0.4038) value also shows there are MFIs that earn high profit. Wide range of profitability level between 0.00005 and 0.4038 shows that some microfinance institution in Rwanda perform well while some don't.

Average CIR of 1.1073 means that the operational costs (expenses) on average exceeds operating income by 1.1073 times. Since most of CIRs are greater than 1 (which shows operating cost > income), this can infer that operational cost is high in most of the microfinance institution. This is consistent with the fact that microfinance activity is costly and requires extensive administrative expenses (loan monitoring and tracking clients, branch office maintenance). Large deviation of CIR shows wide variations in the level of cost-efficiency. Low value of CIR (0.4224) shows that there are some microfinance institutions whose costs is less than half its operating income, implying efficient operations. On the other hand, high CIR value (2.3903) implies that there are institutions who spend operating costs more than double its income which is indicative of inefficient operation. It also points towards potential operational risk exposure since high costs eat into income.

On average, operating expenses constitute about 18.83% of assets based on the mean OER of 0.1883. This is a common trend among microfinance firms. Because microfinance activities involve a large number of small loans with significant transaction costs and monitoring costs (branch office cost), it is normal to expect microfinance institution to operate at a high level of

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ISSN 2520-0852 (Online)

Vol. 11, Issue No. 3, pp. 67 - 85, 2026 www.carijournals.org

operating expenses. Deviation value of 0.1154 suggests that operating expense levels vary from one microfinance institution to another. A low value of 0.0346 indicates the existence of microfinance institution whose operating expense as % of asset is very small (efficient operator). On the other end, high OER (0.3909) implies that there are microfinance institution operating with a high percentage of assets devoted to paying operating expense which might negatively affect its profitability.

Average lending rate is about 23.27%. Interest rates are high for microfinance activity because microfinance firm incurs high transaction and monitoring costs and faces higher risk of credit losses. Deviation of 1.28 implies that there are little fluctuations in lending rate across the sample institutions. Minimum value of lending rate at 14% and high lending rate at 24% indicate that almost all microfinance institution sets its interest rate close to each other. This is not surprising given similar regulatory environments and competitive conditions in Rwanda's microfinance industry.

The average inflation rate (mean of 6.03%) suggests that during the study period, the economic environment was not severely inflationary. Standard deviation (0.78) indicates little changes in inflation level through time. There was only small fluctuation between highest value of 6.8% and lowest value of 5% which is consistent with stable macro-economic condition in the study country. Stable macro-economy provides conducive business climate for financial institutions like microfinance firms. This is because stable macroeconomy reduces uncertainty in financial planning and investment decision making.

Correlation Analysis between Operational Risk Indicators and Financial Performance

Table 2 shows the correlation matrix indicating how the variables used in this research work, namely ROA, CIR, OER, LR and IR correlate with each other. Correlation analysis was done to provide a first impression about the direction and the strength of relationships between the operational risk management indicators under study and the financial performance of microfinance institutions operating in Rwanda.

Table 2:

Pearson Correlation Matrix for the Variables used in the study.

Variable	ROA	CIR	OER	LR	IR
ROA	1				
CIR	-0.432	1			
OER	-0.398	0.354	1		
LR	0.241	0.178	-0.399	1	
IR	-0.086	-0.118	-0.014	-0.002	1

Note: ROA=Return on Asset; CAR= Cash Ratio; ECTA: Equity Capital to Total Asset; LR= Lending Rate; IR= Inflation Rate.

Looking at the findings first, there was a negative correlation between CIR and ROA (r= -0.432). This means that higher cost-to-income ratios correlated with lower rates of financial performance. Microfinance institutions that tended to spend more on operations relative to the amount of income they brought earn lower profit. Higher operating costs seem to correlate with lower profitability. This is also consistent with what the researcher called the “efficiency” argument. Those microfinance institutions that can more tightly control costs, all else being equal, will also likely have a higher return on assets.

Likewise, similar to how it’s related to ROA, OER also appears to move inversely to the profitability measures (r= 0.398). This finding suggests that a higher ratio of operating expense to assets is likely accompanied by lower profitability, and the inverse correlation suggests that high operating cost not only subjects microfinance institutions to operating risk but also decreases the degree to which their assets generate profit efficiently. The correlation between CIR and OER is also positive (r= 0.354). It seems logical that institutions that are characterized by high operating expense relative to income also exhibit a high ratio of operating expense to assets because both indicators are meant to gauge the operational efficiency of a microfinance institution. That said, although the correlation between the two variables is positive, its magnitude is moderate and well below multicollinearity thresholds so there shouldn’t be issues with multicollinearity when the variables are used together in a regression model.

The lending rate (LR) correlates with ROA with a weak positive sign (r= 0.241). This means that higher lending rates are correlated with slightly higher profitability because financial institutions make more money from their lending activities. But it also explains the small value of the coefficient, which is not statistically significant, as the relationship is rather loose. Conversely, the Inflation Rate (IR) exhibits a very low negative sign of correlation with ROA (r=-0.986). This suggests that, at least for the sample of MFI included in the study, the effect of inflation is minimal for the profitability performance. Again, this is corroborated by the low magnitude of the correlation coefficients, indicating that during the observation period, IR was not the key driver behind the financial success of Rwandan microfinance.

In conclusion, correlations indicated that, operational risks’ indicators such as CIR and OER, correlate negatively with the profitability performance, which makes sense, higher cost of operations should be detrimental to the financial health of MFIs in Rwanda. Also, correlations across explanatory variables remain mostly moderate enough so that multicollinearity shouldn’t represent a major issue once we run the regressions. Finally, the preliminary findings suggest that good management of the operational risks could prove an effective tool to improve the bottom line of microfinance institutions.

Panel Regression Analysis: Fixed Effects, Random Effects, and Hausman Test

To investigate the effect of operational risk management on the financial performance of MFI in Rwanda, panel data regression techniques were adopted. Both the Fixed Effects (FE) and Random Effects (RE) models were estimated to test the hypotheses on the effects of Cost-to-Income Ratio (CIR) and Operating Expense Ratio (OER) proxy for the level of the operational risk management on financial performance as represented by Return on Assets (ROA), after controlling for other control variables, such as lending rate (LR) and inflation rate (IR). To select the best fitting model for the purpose of the empirical research, the researcher carried out the Hausman specification test that enables a comparison between FE and RE estimators to find which model is the more suitable for the purpose of this researcher.

Fixed Effects Model Estimation Results

The findings of the Fixed Effects regression are reported in Table 3. The fixed effect model controls for the time-invariant heterogeneity among MFI. The coefficients reported below show how changes over time in an MFI's Cost-to-Income Ratio (CIR) and Operating Expense Ratio (OER) are correlated with MFI's Return on Asset (ROA), when the effects of Lending Rate (LR) and Inflation Rate (IR) are held constant.

The Fixed Effects regression results are presented in Table 3. The Fixed Effects model controls for unobserved heterogeneity across microfinance institutions by allowing each institution to have its own intercept. This model estimates the impact of operational risk management indicators Cost-to-Income Ratio (CIR) and Operating Expense Ratio (OER) on the financial performance of microfinance institutions measured by Return on Assets (ROA).

Table 3:

Fixed Effect Model

Variable	Coefficient	Std Error	t-statistic	p-value
CIR	-0.042	0.018	-2.33	0.025
OER	-0.118	0.051	-2.3	0.027
LR	0.003	0.001	2.1	0.041
IR	-0.002	0.002	-0.98	0.334
Constant	0.112	0.032	3.5	0.001

Note: ROA=Return on Asset; CAR= Cash Ratio; ECTA: Equity Capital to Total Asset; LR= Lending Rate; IR= Inflation Rate.

Fixed Effects Model (FE) was estimated to analyze the effect of operational risk management indicators on financial performance while controlling for institution-specific effects. Table 3 shows that CIR has a significant negative effect on ROA (β= - 0.042, p= 0.025). It means that

International Journal of Finance
ISSN 2520-0852 (Online)
Vol. 11, Issue No. 3, pp. 67 - 85, 2026 www.carijournals.org

when the ratio of operational costs to income increases, the profitability (ROA) of microfinance institutions goes down. Practically, the higher the operational inefficiencies (high CIR), the worse is the financial performance of MFI.

The second result is similar for OER which negatively affects the ROA (β= - 0.118, p= 0.027). This result supports the argument that the higher the share of operating expense to asset size, the lesser will be the ability of MFI to make profits from its assets. Therefore, these results support the need of efficient operational risk management and cost containment practices to boost up the financial performance.

The last two coefficients refer to the control variables. Lending rate seems to have a significant positive impact on ROA (β= 0.003, p=0.041), meaning that the higher interest rate on loans can translate into higher interest income which increases profitability (ROA) of MFI. Finally, the effect of inflation (IR) on ROA is negative (β= -0.002, p=0.334) but insignificant, meaning that during the study period, the inflation did not play a big role in the financial performance of sampled institutions.

Looking at the overall model statistics it can be seen that the Within R2 =0.407, showing that about 40.7% of the variation in ROA can be explained by the independent variables included in the model. Moreover, the F-statistic is also statistically significant (Prob> F= 0.0139), which suggests that the model is jointly significant, meaning that the explanatory variables have a combined effect on the financial performance of microfinance institutions.

Random Effects Model Estimation Results

Table 4 presents the estimation results from the Random Effects (RE) model. Contrary to the FE model, which takes the assumption that the individual-specific effects are correlated with the explanatory variables, the RE model assumes that the individual-specific effects are random and not correlated with the explanatory variables. This research estimates this model because it examines the effect of each independent variable on the financial performance while at the same time accounting for variations across different MFI.

Table 4:

Random Effect Model

Variable	Coefficient	Std Error	z-stat	p-value
CIR	-0.039	0.021	-1.89	0.041
OER	-0.109	0.057	-1.92	0.049
LR	0.002	0.001	1.94	0.052
IR	-0.002	0.002	-0.96	0.31

These results suggest that CIR maintains a negative relationship with ROA (β= -0.039, p=0.041) indicating that higher costs of operation can have a negative effect on financial performance. Similar observations are seen with OER where it continues to show a statistically significant negative relationship with ROA (β= -0.109, p=0.049), confirming the previous inference that the higher the cost of operating the microfinance institutions, the lower their profitability.

With regards to Lending Rate (LR), there seems to be a positive impact on ROA (β= 0.002, p=0.052) but LR is less statistically significant than the previous model. Lastly, we still observe that Inflation Rate (IR) is negative and statistically insignificant (β= 0.002, p=0.31). These results seem to confirm the earlier assertion that IR has little or no effect on microfinance profits.

To assess the most suitable estimator between Fixed Effects and Random Effects models, Hausman specification test was used and the later test reveals a chi-square value of 9.41 with a p-value of 0.024. Considering that the p-value is below 0.05, we can conclude that the null hypothesis stating the Random Effects model is proper is not supported.

Therefore, the Fixed Effects estimator emerges as a more appropriate methodological choice for this research, since the test confirms that individual attributes of microfinance institutions could be correlated with the explanatory factors. As a consequence, this finding supports the notion that the Fixed Effects model will yield consistent and unbiased parameter estimates regarding the association between operational risk and financial performance.

From the regression results it can be observed that both cost-to-income ratio (CIR) and operating expenses ratio (OER) exert a negative and statistically significant influence on ROA. An increase in the proportion of total costs incurred by MFI to their income and the share of total costs incurred by MFI to their asset value diminishes ROA. In other words, when taken in isolation, an improvement in one or the other factor contributes to increasing MFI profitability.

When both factors are taken into account simultaneously, results indicated that operational costs need to be managed properly so that they do not hamper the overall efficiency of the MFI and eventually affect its ROA. High levels of operating expenses are often reflective of inefficiencies in internal process management, administrative structures and functions, and poor resource allocation practices. All these can negatively affect the ability of MFIs to generate return from their assets. Hence, the cost-to-income ratio and operating expenses ratio need to be kept low, and only then can MFIs achieve a better return on assets. These findings confirm the importance of good operational risk management practices and improved cost efficiency, along with the implementation of an effective internal control framework, in enhancing financial performance.

4.2 Discussion of the findings

The study results revealed that operational risk management is a vital factor that determines the financial performance of MFIs in Rwanda. This conclusion emanates from observing how the two variables, CIR and OER, affected ROA negatively and significantly. The negative and significant coefficients imply that high operational costs tend to reduce profitability.

This relationship between CIR and financial performance is also supported by other studies. For example, Zineelabidine et al. (2024) found that African MFIs whose operational costs were relatively low exhibited higher profitability, which suggests that there is a cost-efficiency advantage in such entities. Furthermore, Felix et al. (2025) revealed that Kenyan MFIs that enhanced operational efficiency registered better financial performance. Such studies lend credence to the efficiency theory, which argues that MFIs that maintain low-cost operational expenses find it easier to turn their income stream into profits, which in turn translates to improved financial performance. In this regard, the findings presented in this study further validate that argument and emphasize the importance of cost management as a determinant of the sustainability of MFIs.

Additionally, this study's findings indicate that operating expense ratio (OER) negatively affects ROA. In other words, as the ratio increases, profitability decreases. This result is consistent with findings by other researchers. Muriu (2020) reported that high operating expenses lead to a decrease in the profitability of MFIs. Moreover, Hermes and Hudon (2021) highlighted the large portion of microfinance expenditures accounted for by operational expenses and noted that uncontrolled operational costs pose a danger to the financial viability of MFIs. Therefore, poor operational structure or high administrative cost increases exposure to operational risk, hence decreasing an MFI's ability to yield returns from its assets.

These conclusions, however, conflict with those of other empirical studies that found positive relationships between operating expenses and financial performance of microfinance institutions. Singh (2023) observed a positive effect of operational expenditure on financial performance in the short-run and argued that the positive relationship emerges where such expenditures finance expansion efforts, technology innovation, or improvement in services offered to clients. Further, Baltas et al. (2025) noted that the cost of improving an MFI's operational capacity or investing in digital infrastructure might lead to a temporary increase in costs; however, such investments would pay off by improving financial performance through increased operational efficiencies. Overall, it follows that there might be situations in which increasing operating expenses leads to improved financial performance in the long-run and vice versa.

Turning to the control variables, the study results showed that lending rate is positively related to financial performance. In essence, the findings indicate that as lending rates increase, financial performance also improves. It suggests that MFIs whose main revenue source is interest income can achieve higher levels of profitability by charging their customers at relatively high interest rates, especially since high-interest rates help to raise their income stream, leaving more resources for profits.

Nevertheless, some empirical studies have produced inconclusive findings regarding the relationship between the lending rates and financial performance of MFIs, such as Molla and Kaur (2025), who reported mixed results. These authors found that in Ethiopia's microfinance sector, lending rates have a negative relationship with financial performance because high-interest rates attract a risk of loan defaults that outweigh benefits accruing to MFIs due to higher interests charged on their lending. As such, MFIs operating within different economic conditions will likely experience varying effects of interest rates charged on the loans issued to their customers.

The findings also indicate that inflation had a negative though statistically insignificant effect on financial performance. In other words, based on these data, it appears that inflation didn't have a major effect on driving changes in financial performance among microfinance institutions in Rwanda during the study period. In this, the findings are partially consistent with those of Bouhamed and Salah (2026), who report that changes in the annual inflation rate didn't seem to significantly affect the financial performance of microfinance institutions in the Middle East and North Africa region. Other studies however, reported different results. Kagishiro (2021) reports that inflation exerted a negative effect on the profitability of microfinance institutions in Rwanda. She found that inflation raised operating costs and eroded the real value of financial gains. Thus, it seems that the effects of inflation on financial performance may depend upon macro-economic stability and the institutional capability to absorb and mitigate the associated risks and uncertainties. Taken together, these mixed results indicate that inflation's effects on financial performance appear to depend upon the macro-economic stability of the country and the capacity of microfinance institutions to absorb or mitigate the associated risks. Overall, the results of this study support the larger body of empirical literature indicating that operational efficiency is a significant factor affecting the financial performance of microfinance institutions (Chami et al., 2015). Effective management of operational costs (which is reflected in a lower Cost-to-Income Ratio and a lower Operating Expenses Ratio) positively affects both the profitability and financial sustainability of an MFI. It was noted above, however, that some operational expenditures also served to drive institutional growth through expanded services and outreach initiatives when they represented strategic investments. Consequently, the development of robust operational risk management practices and efforts to improve operational cost efficiencies would likely be instrumental to the financial performance of microfinance institutions in Rwanda and beyond.

5. Conclusion and recommendations

This study looked at how operational risk management affects the financial performance of microfinance institutions in Rwanda. It used indicators like Cost-to-Income Ratio (CIR) and Operating Expense Ratio (OER), measuring financial performance with Return on Assets (ROA). The findings showed that CIR and OER have negative and statistically significant effects on ROA, meaning that higher operational costs lower profitability. The results also indicated that lending rates positively impact financial performance, while inflation negatively affects it but is not significant. Overall, the study emphasizes the need for effective operational cost management to improve the financial sustainability of microfinance institutions. Microfinance institutions should improve operational risk management by enhancing cost control and operational efficiency. Using digital technologies and better management practices can help cut operational costs and boost performance. Policymakers should also assist microfinance institutions with supportive regulations and capacity-building programs. Future research should include more risk management variables and larger datasets to provide deeper insights into what affects financial performance in the microfinance sector.

Acknowledgment

Author contributions: The author conceived, designed, analyzed, and wrote this study on operational risk management and financial performance, and approved the final manuscript for publication.

Funding: This research was fully funded by the author.

Informed consent statement: Informed consent was obtained from all subjects involved in the study.

Data availability statement: The data presented in this study are available on request from the corresponding author; however, they are not publicly available due to restrictions.

Conflicts of interest: The author declares no conflict of interest.

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