

Research Article

# Revisiting Funding Strategy-financial Performance Dynamics: The Moderating Influence of Firm Size in Kenya's Microfinance Sector

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## Abstract

The purpose of the study was to examine the moderating effect of firm size on the relationship between funding strategy and the financial performance of deposit-taking microfinance institutions (DT-MFIs) in Kenya. The study was informed by the Modigliani-Miller Theorem and Economies of Scale Theory. The positivist philosophy was adopted, which informed the adoption of a descriptive research design to source data from 13 DT-MFIs in Kenya. The study extracted annual secondary data (2013 – 2022) from the bank supervisory report by the Central Bank of Kenya (CBK). The data sourced was analysed based on a panel generalised least squares (GLS) model that adjusted for group heteroskedasticity, serial correlation and cross-sectional dependence. The panel regression analysis showed that the funding strategy had a significant effect on all proxies of financial performance of DT -MFIs in Kenya. Firm size was a positive moderator on the relationship between funding strategy and the financial performance of DT-MFIs as measured by ROE and Z-score. The research suggests that deposit mobilisation should be reinforced in conjunction with improved risk management, decreasing dependence on expensive wholesale funding, and increasing equity capital to boost profitability and stability. Additionally, it calls on DT-MFIs to aim for strategic growth and capital accumulation, while encouraging policymakers to facilitate consolidation, digital growth, and the establishment of more robust regulatory buffers to strengthen the resilience of the sector.

## Keywords

Funding Strategy, Financial Performance, Firm Size, Deposit Funding, Wholesale Funding, Equity Funding, Return on Equity, Z-Score

## 1. Introduction

Microfinance institutions (MFIs) are crucial in promoting financial inclusion by providing credit, savings, and various financial services to low-income and underserved communities [1, 2]. In developing countries like Kenya, deposit-taking

microfinance institutions (DT-MFIs) support the banking sector by catering to market segments considered too risky or unprofitable for traditional commercial banks [3]. The sustainability and performance of these institutions are significantly

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influenced by the effectiveness of their funding strategies, which determine their liquidity, capital adequacy, cost of capital, and overall risk exposure [4]. As MFIs become more integrated into Kenya's financial system, there is a growing academic and policy interest in understanding how their financing choices affect performance.

The funding strategy, usually represented by the combination of equity, deposits, commercial debt, concessional loans, and retained earnings, remains a key factor in determining the financial performance of microfinance institutions [5]. Empirical studies indicate that the capital structure and funding mix utilised by MFIs significantly influence profitability, operational efficiency, and institutional stability [6, 7]. For example, institutions that rely more on market-based debt instruments may encounter higher interest expenses and financial risks, while those with stronger equity positions generally exhibit greater financial resilience [8]. In Kenya, DT-MFIs function within a competitive environment characterised by diverse funding needs, regulatory challenges, and market dynamics that affect their financial performance trajectories [3].

Nonetheless, the influence of funding strategy on financial performance is not consistent across various institutions. Firm size that represented by metrics such as total assets, customer base, and loan portfolio, has been recognised as a crucial contingency factor that influences the efficiency and results of financial decisions [9]. Larger MFIs generally gain advantages from economies of scale, a variety of revenue sources, and enhanced bargaining power in capital markets, which can improve their performance [10]. In contrast, smaller MFIs may demonstrate increased flexibility in managing costs and mitigating risks but encounter challenges in securing affordable funding [11]. Despite these theoretical anticipations, the current empirical data regarding the impact of size is inconsistent, with some research suggesting that larger firm size leads to improved financial stability, while other studies indicate diminishing returns at elevated scale levels [12]. In the context of Kenya, the moderating role of firm size on the relationship between funding strategy and performance has not been thoroughly investigated. Although research has looked into the factors influencing MFI performance and the significance of financing decisions, there is a scarcity of studies that evaluate whether the effects of funding strategy vary between small and large DT-MFIs [13]. This gap is particularly important considering the diversity within Kenya's microfinance sector, which includes institutions ranging from small community-based MFIs to large national DFIs. Furthermore, regulatory changes such as heightened capital adequacy requirements and more stringent liquidity standards have increased the necessity of comprehending how institutional scale interacts with financial strategy [3].

Considering these dynamics, it is essential to analyse how the size of a firm influences the connection between funding strategy and financial performance, as this is vital for enhancing theory, policy, and practice. Such findings can provide guidance for customised regulatory measures, assist managers

in making informed decisions regarding capital structure, and help foster a more stable and competitive microfinance sector in Kenya. Consequently, this study aimed to address this empirical and conceptual void by assessing the moderating effect of firm size on the relationship between funding strategy and performance among Deposit-Taking Microfinance Institutions (DT-MFIs) in Kenya.

## 1.1. Research Objective

- 1) To establish the nexus between funding strategy and the financial performance of DT-MFIs in Kenya.
- 2) To examine whether firm size is a moderator of the nexus between funding strategy and financial performance of DT-MFIs in Kenya.

## 1.2. Research Hypotheses

$H_{O1}$ : Funding strategy has no effect on the financial performance of DT-MFIs in Kenya.

$H_{O1a}$ : Funding strategy has no effect on Return on Equity of DT-MFIs in Kenya.

$H_{O1b}$ : Funding strategy has no effect on the Z-score of DT-MFIs in Kenya.

$H_{O2}$ : Firm size does not moderate the nexus between funding strategy and financial performance of DT-MFIs in Kenya.

$H_{O2a}$ : Firm size does not moderate the nexus between funding strategy and ROE of DT-MFIs in Kenya.

$H_{O2b}$ : Firm size does not moderate the nexus between funding strategy and Z-Score of DT-MFIs in Kenya.

## 2. Literature Review

### 2.1. Theoretical Review

Modigliani–Miller (MM) Theorem II with Taxes elaborates on the premise that as leverage increases, the firm's cost of equity escalates linearly due to heightened financial risk. However, the overall weighted average cost of capital (WACC) decreases because the advantages of the tax shield surpass the increasing cost of equity [14]. This theorem suggests a trade-off between the advantages of debt financing and the risks linked to elevated leverage. When applying MM II to Kenyan DT-MFIs, the theorem elucidates why the impact of funding strategy on performance may vary among institutions based on their leverage levels. Specifically, as MFIs modify their funding strategies ranging from commercial debt, deposits, development finance, to retained earnings, their cost of capital and risk profiles adjust accordingly. The notable effect of funding strategy on financial performance aligns theoretically with MM II, which positions leverage and risk as fundamental factors influencing return.

Further, the study was informed by Economies of Scale Theory that posits that as companies expand, they experience

reduced average costs due to enhanced operational efficiencies, increased bargaining power, and a more effective distribution of fixed costs [15]. Nevertheless, beyond specific thresholds, increased scale can lead to diseconomies such as bureaucratic inefficiencies, heightened monitoring costs, and delayed decision-making [12]. In the context of financial institutions, economies of scale manifest as lower average operating costs, improved cost-to-income ratios, enhanced risk diversification, and a more robust competitive stance [16]. Regarding the study, the Economies of Scale Theory elucidates the anticipated function of firm size as a moderator between funding strategy and financial performance. It is theoretically anticipated that larger Microfinance Institutions (MFIs) will be able to leverage funding advantages such as access to cheaper debt, superior credit ratings, and diversified income sources, resulting in enhanced financial performance, as they can allocate fixed costs across a broader asset base. In contrast, smaller MFIs may encounter elevated funding costs and diminished bargaining power. However, if diseconomies of scale set in, rather than enhancing the connection between funding strategy and performance, excessive size may diminish it due to escalating complexity and risk exposure.

## 2.2. Empirical Review

The empirical research concerning funding strategies, firm size, and financial performance uncovers several overlapping themes, areas of disagreement, and significant knowledge deficiencies that warrant additional exploration. Within the studies examined, three primary themes are identified: the importance of funding structure in influencing financial performance, the complex and frequently inconsistent impact of firm size, and considerable methodological constraints that limit the generalizability of the results. A prevailing theme in the literature is the reliable effect of funding strategy on financial performance, especially in financial institutions. Many studies concur that deposit funding and equity funding generally have a positive impact on profitability, as indicated by ROA and ROE metrics [17-19]. This implies that funds mobilised internally and stable customer deposits are relatively less expensive and more reliable sources of funding that improve performance. Similarly, various studies indicate that wholesale or external borrowing tends to adversely affect profitability, primarily due to elevated costs and heightened financial risk [20]. Collectively, these findings highlight that the structure and composition of funding, whether it is deposit-based, wholesale-based, or equity-based, are critical in determining financial outcomes [7]. Nevertheless, despite this consensus, contradictions arise. For example, while Berger and Mester identify a positive and significant impact of equity funding on performance, Bogan finds no significant effect of equity funding, pointing to inconsistencies that may stem from variations in models, contexts, or performance metrics utilised across different studies [17, 21].

A second theme pertains to the ambiguous and context-sensitive role of firm size in elucidating financial performance. Numerous studies suggest that an increase in firm size can enhance profitability, primarily through economies of scale and improved operational efficiencies [20, 22, 23]. In contrast, other research indicates that size may have insignificant or even adverse effects on performance. For example, Githaiga and Bitok demonstrate that size does not influence the relationship between revenue diversification and ROA, while John and Nkoro observe no significant difference in profitability linked to firm size among Indonesian banks [13, 24]. Additionally, Chabachib et al uncover only a weak positive correlation between size and profitability, whereas Nsiah emphasize mixed effects when macroeconomic variables are taken into account [25, 26]. These discrepancies highlight that the impact of firm size is neither consistent nor universally predictable; rather, it fluctuates across different markets, measurement techniques, business models, and methodological frameworks. This variability underscores the necessity to investigate not only the direct impact of firm size but also its indirect or moderating effects, which many previous studies have not sufficiently explored.

The studies that have been reviewed reveal significant methodological and conceptual deficiencies, which underscore potential avenues for additional research. Firstly, several studies depend on brief time frames, generally spanning five to eight years, which restricts the capacity to observe structural transformations and long-term funding trends [18, 19]. Secondly, various studies utilise methodologically inadequate designs, such as bivariate regression, cross-sectional analysis, or OLS models that do not adequately address heterogeneity, unobserved effects, and endogeneity that are inherent in panel data [17, 22]. Thirdly, the existing literature mainly concentrates on commercial banks, resulting in microfinance institutions and deposit-taking MFIs being relatively under-researched, despite their unique funding frameworks and risk characteristics. Fourthly, numerous studies analyse the direct correlation between funding strategy and performance but seldom explore the moderating effect of firm size, creating a significant conceptual void regarding whether the scale of an institution enhances or diminishes the impact of funding choices. Only a limited number of studies (e.g., Teimet et al.) consider size as a moderating factor, and even in those instances, the findings are inconsistent and occasionally contradict theoretical expectations [13].

## 2.3. Conceptual Framework

The conceptual framework for this research was based on the assertion that the funding strategy impacts the financial performance of Deposit-Taking Microfinance Institutions (DT-MFIs) in Kenya, with firm size acting as a moderating factor in this relationship. Financial performance is defined as a multidimensional construct and is assessed using Return on Equity (ROE) and Z-score, which together reflect profitability

and financial stability. This is in accordance with previous research that identifies ROE as a crucial measure of shareholder returns and Z-score as a comprehensive indicator of insolvency risk [27].

The Independent Variable was the funding Strategy. Funding strategy is defined through three primary elements: deposit funding, wholesale funding, and equity funding. Deposit funding represents customer deposits gathered internally and is widely considered a low-cost and stable source of funding that enhances profitability [17, 18]. Wholesale funding, which encompasses borrowings from commercial lenders, development finance institutions, and inter-institutional credit lines, is linked to higher costs and liquidity risks, often negatively impacting financial performance [20]. Equity funding, which includes owners' capital and retained earnings, is viewed as a long-term, risk-absorbing funding source that typically enhances performance and financial stability [17], although some conflicting findings indicate that its impact may differ based on institutional characteristics. Within this framework, funding strategy is understood to have a direct causal effect on financial performance, aligning with capital structure theory and empirical findings that suggest funding composition influences profitability, risk-taking behaviour, and institutional resilience [19]. The dependent variable is Financial Performance. Financial performance was evaluated through ROE and Z-score, which together assess both the ability to generate profits and the sustainability of finances. ROE gauges the efficiency of management in producing profits from shareholders' investments, whereas the Z-score indicates the institution's resilience against insolvency by factoring in profitability, leverage, and volatility [27]. Employing these two indicators guarantees a thorough evaluation of both immediate profit results and the long-term stability of the institution.

Firm size is recognised as a moderating variable, acknowledging that the magnitude of an institution can influence how funding strategies affect financial results. Larger institutions may benefit from economies of scale, enhanced market access, and greater bargaining power, which can impact funding costs and performance outcomes [22, 23]. On the other hand, some research suggests that an increase in size may lead to greater bureaucratic inefficiencies or heightened risk exposure, potentially diminishing performance [13]. These varying results indicate that size can either enhance or reduce the influence of funding strategies on performance. Within the conceptual framework, it is proposed that firm size interacts with funding

strategy, suggesting that the effects of deposit funding, wholesale funding, and equity funding on ROE and Z-score are contingent upon whether the institution is categorised as small or large. This is consistent with theoretical viewpoints such as Modigliani and Miller's theories regarding taxes and economies of scale, which contend that the characteristics of a firm affect the optimality and results of financial structure decisions.

### 3. Materials and Methods

This research was based on the positivist research philosophy, which posits that reality is objective and can be measured independently of the researcher. In alignment with positivist principles, the study utilised deductive reasoning to evaluate hypotheses derived from established theories through quantifiable secondary data. This philosophical approach was considered suitable because the variables funding strategy, firm size, and financial performance could be empirically assessed without subjective interpretation [28].

A descriptive research design was employed to analyse ex-post facto data, as the researcher had no control over the historical behaviour of the variables. A descriptive design is fitting when the aim is to observe and document existing relationships or trends, and to infer causal connections among variables in situations where manipulation is not possible. Consequently, the study investigated whether variations in funding strategy and firm size accounted for corresponding changes in the financial performance of DT-MFIs.

The target population consisted of all 13 Deposit-Taking Microfinance Institutions (DT-MFIs) licensed by the Central Bank of Kenya (CBK) and operating continuously from 2013 to 2022. A census approach was adopted due to the limited population size, ensuring complete coverage and eliminating sampling error. Relevant data were purposefully extracted from audited financial statements and CBK supervisory reports, concentrating solely on indicators necessary to calculate the proxies for each study variable. The collected data included: deposits, equity, wholesale borrowings, total assets, gross loans, and net profits after tax. These were utilised to develop indicators for funding strategy (deposit funding, equity funding, and wholesale funding), firm size, and financial performance proxies (ROE and Z-score). The operationalisation of study variables is given in Table 1.

**Table 1.** Operationalization of Study Variables.

| Variable/ Construct   | Measurement / Indicator                                                          | Notation |
|-----------------------|----------------------------------------------------------------------------------|----------|
| Dependent             |                                                                                  |          |
| Financial Performance | Return on Equity (ROE): $\text{Net Profit After Tax} \div \text{Total Equity}$ . | ROA      |
|                       | Z-Score: $(\text{ROA} + \text{Equity/Assets}) \div \text{SD(ROA)}$ .             | Z        |

| Variable/ Construct | Measurement / Indicator                              | Notation |
|---------------------|------------------------------------------------------|----------|
| Independent         |                                                      |          |
|                     | Deposit Funding: Customer Deposits ÷ Total Assets.   | Dfund    |
| Funding Strategy    | Wholesale Funding: Total Borrowings ÷ Total Assets.  | Wfund    |
|                     | Equity Funding: Total Equity ÷ Total Assets.         | Efund    |
| Moderating          |                                                      |          |
| Firm Size           | Firm Size: Natural Logarithm of Total Assets (LnTA). | SIZE     |

The decade-long timeframe (2023-2022) was deemed sufficient for assessing causal relationships and structural dynamics within the sector. The dataset generated was balanced panel data, which facilitated the examination of variations among institutions and across time [29]. Data analysis was performed utilising E-Views 10. Initially, descriptive statistics, including means, standard deviations, skewness, and kurtosis, were calculated. Before conducting inferential analysis, a series of diagnostic tests was executed to confirm the reliability of parameter estimates. Normality was evaluated through skewness-kurtosis metrics and the Jarque-Bera test. Linearity was scrutinised via augmented component-plus-residual plots and correlation coefficients. The presence of multicollinearity was assessed using the Variance Inflation Factor, where values below 10 suggested the absence of detrimental collinearity.

Autocorrelation was evaluated through the Arellano-Bond test, while heteroscedasticity was examined using the Likelihood Ratio test. The stationarity of the variables was investigated using the Levin-Lin-Chu panel unit root test.

For the selection of models, the Breusch-Pagan Lagrange Multiplier test was employed to ascertain the appropriateness of pooled OLS in comparison to panel effect models. In instances where panel modelling was warranted, the Hausman test was utilised to differentiate between the Fixed Effects Model (FEM) and the Random Effects Model (REM). The ultimate estimation strategy was determined based on both statistical validity and theoretical soundness. The study finally adopted a panel Generalised Least Squares (GLS) model for parameter estimation as presented in Table 2.

**Table 2.** Regression Models.

| Sub Hypotheses                                                                                                                                                                                                        | Analysis Model                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            | Decision Rule                                                                                                                                                                                                                        |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <p>HO1a: Funding strategy has no effect on ROE of DT-MFIs in Kenya.</p> <p>HO1b: Funding strategy has no effect on the Z-score of DT-MFIs in Kenya.</p>                                                               | <p>a. <math>ROE_{it} = \beta_0 + \beta_1 Dfund_{it} + \beta_2 Wfund_{it} + \beta_3 Efund_{it} + \epsilon_{it}</math></p> <p>b. <math>Z_{it} = \beta_0 + \beta_1 Dfund_{it} + \beta_2 Wfund_{it} + \beta_3 Efund_{it} + \epsilon_{it}</math></p> <p>Where</p> <p>ROE and Z-score are Financial Performance proxies.</p> <p>Dfund, Wfund and Efund are the funding strategy.</p> <p>i= cross-sectional units= 1, 2, 3.....13.</p> <p>t= Current time</p> <p><math>\epsilon</math> = Composite error term</p> <p><math>\beta_0</math>= Intercept term</p> <p><math>\beta_i</math>= coefficients of explanatory variables</p> | <p>For equations (a-b), if p-values associated with the F test are &lt; 0.05</p> <p>Reject the Null hypotheses</p>                                                                                                                   |
| <p>HO2a: Firm size does not moderate the nexus between funding strategy and ROE of DT-MFIs in Kenya.</p> <p>HO2b: Firm size does not moderate the nexus between funding strategy and Z-Score of DT-MFIs in Kenya.</p> | <p>c. <math>ROE_{it} = \beta_0 + \beta_1 Dfund_{it} + \beta_2 Wfund_{it} + \beta_3 Efund_{it} + \beta_4 SIZE_{it} + \beta_5 SIZE_{it} * (Dfund + Wfund + Efund)_{it} + \epsilon_{it}</math></p> <p>d. <math>Z_{it} = \beta_0 + \beta_1 Dfund_{it} + \beta_2 Wfund_{it} + \beta_3 Efund_{it} + \beta_4 SIZE_{it} + \beta_5 SIZE_{it} * (Dfund + Wfund + Efund)_{it} + \epsilon_{it}</math></p> <p>Where SIZE = Firm size (moderating variable), SIZE (Dfund+Wfund+ Efund) is Interaction terms</p>                                                                                                                         | <p>For equations (c-d), the p-values of <math>\beta_4</math> and <math>\beta_5</math> should be &lt; 0.05</p> <p>If all conditions in equations (a-d) hold, then there is moderation and the Null hypothesis should be rejected.</p> |



## 4. Results

### 4.1. Descriptive Statistics

Descriptive analysis involves summarising and exploring data through various statistical measures and visualisation techniques. It helps in identifying trends, patterns, and relationships within datasets [30]. Commonly used measures include central tendency (mean, median, mode) and variability (range, variance, standard deviation) for numerical data, while frequency counts and percentages are used for categorical data [31]. In this study, the mean, median, minimum, maximum, standard deviation, kurtosis and skewness were adopted as part of the descriptive analysis. The dependent variable in the study was the financial performance of DT MFIs licensed by the Central Bank of Kenya. Financial performance was measured using two proxies, including Return on Equity and Z-score. The descriptive analysis included the mean, median, minimum, maximum, standard deviation, kurtosis and skewness (Table 3).

**Table 3.** Descriptive Analysis for Financial Performance.

|              | ROE    | Z        |
|--------------|--------|----------|
| Mean         | -0.174 | -10.801  |
| Median       | -0.003 | -0.171   |
| Maximum      | 1.538  | 12.844   |
| Minimum      | -4.846 | -263.655 |
| Std. Dev.    | 0.633  | 31.352   |
| Skewness     | -4.700 | -6.088   |
| Kurtosis     | 35.137 | 48.369   |
| Observations | 90     | 90       |

Note: Return on Assets (ROA), Return on Equity (ROE), Loan Loss Provision (LLP) and Z-Score (Z).

The first proxy for the financial performance of DT MFIs was ROE, calculated as the ratio of profit before tax to total equity. The average return on equity for DT MFIs was -0.174, implying that over the 10 years (2013 to 2022), the 9 DT MFIs tended to report losses of about 17.4% of the total equity. The minimum value captured the DT MFI, which had the lowest ROE at -484.6% of the total equity, while the maximum value captured the DT MFI with the highest ROE over the 10 years at 153.8% of the total equity. The standard deviation for ROE was 0.633, implying that the ROE of individual DT MFIs were distributed around the mean ROE by 63.3%. The skewness and Kurtosis were -4.700 and 35.137, respectively, depicting that ROE may not be normally distributed, hence it may need to be transformed before undertaking regression analysis if the

regression residuals also show non-normality. The variable transformation was undertaken in diagnostic tests under test for normality.

The second proxy for financial performance was the Z-score, capturing nearness to financial distress. The mean for Z-score for DT MFIs was -10.80, implying that over the 10 years (2013 to 2022), the 9 DT MFIs tended to be in financial distress, with the value being negative. The minimum value captured the DT MFI that had the lowest Z-Score at -263.65, while the maximum value captured the DT MFI with the highest Z-Score over the 10 years at 12.84. The standard deviation for Z-Score was 31.35, implying that the Z-Scores of individual DT MFIs were distributed around the mean Z-Score by 31.35. The skewness and Kurtosis were -6.088 and 48.369, respectively, depicting that the Z-Score may not be normally distributed, hence it may need to be transformed before undertaking regression analysis if the regression residuals also show non-normality. The variable transformation was undertaken in diagnostic tests under test for normality. The independent variable in the study was the funding strategy. The funding strategy was captured by three proxies, including deposit funding, wholesale funding and equity funding. The descriptive analysis included the mean, median, minimum, maximum, standard deviation, kurtosis and skewness (Table 4).

**Table 4.** Descriptive Analysis for Funding Strategy and Size.

|           | Dfund  | Wfund | Efund  | SIZE     |
|-----------|--------|-------|--------|----------|
| Mean      | 0.467  | 0.151 | 0.275  | 7271.327 |
| Median    | 0.494  | 0.142 | 0.184  | 1771.5   |
| Maximum   | 0.965  | 0.435 | 0.849  | 32153    |
| Minimum   | 0.032  | 0.000 | -0.131 | 80       |
| Std. Dev. | 0.200  | 0.120 | 0.221  | 10749.01 |
| Skewness  | -0.129 | 0.542 | 1.007  | 1.34762  |
| Kurtosis  | 2.667  | 2.441 | 3.187  | 3.061417 |
| Obs.      | 90     | 90    | 90     | 90       |

Note: Deposit Funding (DFUND), Wholesale funding (WFUND), Equity Funding (EFUND), Firm Size (SIZE).

The first proxy for the funding strategy of DT MFIs was deposit funding calculated as a ratio of customer deposits to total assets. Deposit funding captured a funding strategy for DT MFIs derived from customer deposits. The mean for deposit funding for DT MFIs was 0.467, implying that over the study period (2013 to 2022), the assets of the DT MFIs were funded to the tune of 46.7% by customer deposits, with the

rest funded by other sources of funding. The minimum value captured the DT MFI, which had the lowest deposit funding at 3.20% of its total assets, while the maximum value captured the DT MFI with the highest deposit funding over the 10 years at 96.5% of its total assets. The standard deviation for deposit funding was 0.200, implying that deposit funding of individual DT MFIs was distributed around the mean by about 20%. The skewness and Kurtosis were -0.12 and 2.66, respectively, indicating that deposit funding is normally distributed.

The second proxy for the funding strategy of DT MFIs was wholesale funding, capturing funding from short-term borrowing from other financial institutions such as DT MFIs, commercial banks and CBK. Wholesale funding was calculated as a ratio of short-term borrowing to total assets. The mean for wholesale funding for DT MFIs was 0.151, implying that over the study period (2013 to 2022), the assets of the DT MFIs were funded to the tune of 15.1% by wholesale funds, with the rest funded by other sources of funding. The minimum value captured the DT MFI, which had the lowest wholesale funding at 0.0% of its total assets, while the maximum value captured the DT MFI with the highest wholesale funding over the 10 years at 43.5% of its total assets. The standard deviation for wholesale funding was 0.120, implying that wholesale funding of individual DT MFIs was distributed around the mean by about 12%. The skewness and Kurtosis were 0.542 and 2.441, respectively, implying that wholesale funding was fairly normally distributed.

The third proxy for the funding strategy of DT MFIs was equity funding, calculated as a ratio of shareholders' net worth to total assets. Equity funding is a funding strategy for DT MFIs derived from the owner's net worth. The average equity funding for DT MFIs was 0.275, meaning that over the study period, the assets of the DT MFIs were funded to the tune of 27.5% by equity funding, with the rest funded by other sources of funding. The minimum value captured the DT MFI that had the lowest equity funding at -13.1% of its total assets, implying the said DT MFI was insolvent. The maximum value captured by the DT MFI with the highest equity funding over the 10 years was 84.9% of its total assets. The standard deviation for equity funding was 0.221, meaning that equity funding of individual DT MFIs was distributed around the average equity funding for all DT MFIs by about 22.1%. The skewness and Kurtosis were 1.007 and 3.187, respectively, implying that equity funding was positively skewed and would need to be transformed before undertaking regression analysis if the regression residuals also show non-normality. The variable transformation was undertaken in diagnostic tests under test for normality.

The proxy for firm size was total assets in Ksh. Millions. The mean firm size for DT MFIs was Ksh. 7.27 billion. The minimum value captured the smallest DT MFI at Ksh. 80 million, while the maximum value captured the largest DT MFI at Ksh. 32.15 billion. The standard deviation for firm size was Ksh. 10.74 billion, implying that the size of individual DT MFIs was distributed around the mean by Ksh. 10.74 billion.

The skewness and Kurtosis were 1.347 and 3.061, respectively, depicting that the firm size variable data were positively skewed and mesokurtic, hence not normally distributed and may need to be transformed before undertaking regression analysis if the regression residuals also show non-normality. The variable transformation was undertaken in diagnostic tests under test for normality.

## 4.2. Diagnostic Tests

Diagnostic tests were carried out to establish the robustness of the model in the derivation of unbiased parameter estimates that do not significantly vary from population true estimates. The assumptions that lead to diagnostic tests include multicollinearity, serial correlation, heteroscedasticity, normality, linearity, and the panel unit roots test. The research adopted the Variance Inflation Factor (VIF) to examine the presence of multicollinearity. If a VIF is less than 10, then there is no multicollinearity [32]. All the VIF values were less than 10; hence, the study concluded that there was the absence of multicollinearity problem. The VIF values of the explanatory variables included: equity funding (5.110), deposit funding (4.120), wholesale funding (2.150), and firm size (1.930).

Variables in a regression model ought to be stationary such that the mean, variance and covariance of each variable are not time-variant [33]. The study employed the Levin-Lin-Chu unit-root test to determine the existence of unit roots. If P-values are larger than the 5% level of significance, it implies the presence of unit roots. All the regressors and regressands did not have units as depicted by p-values less than 0.05. Therefore, unit roots were not a major issue in the regression models. According to [33], OLS estimates are based on the assumption that the error terms are distributed with a mean of zero and constant variance. The study adopted the Jarque-Bera test to examine the normality of the regression residuals. The regression residuals are said to be normal if the p-value is greater than 0.05 level of significance. The study undertook a JB test on each regression model based on each proxy of financial performance, and all the explanatory variables were included in each of the models. The regression models showed that the residuals were not normally distributed, as given by p-values lower than the 0.05 level of significance. The study thus transformed the non-normal variables based on a zero-skewness log transformation.

After the variable transformation, JB was undertaken on each model. The transformations had resulted in normal regression residuals, hence the OLS assumption of normality of residuals was not violated. Further, the study adopted R with linear models having R-values nearing one (1), signifying strong linearity, and the OLS estimator becomes suitable for parameter estimation (Gujarati, 2008). The findings showed that the models based on explanatory variables were linear, given that R-values were nearing 1.

The study adopted the Likelihood Ratio (LR) Test for examining the presence of group heteroscedasticity. The LR test

for heteroskedasticity is a statistical test used to determine whether the variance of the errors in a regression model is constant across observations or if it varies systematically. The study should conclude with the absence of heteroscedasticity if the p-value generated is greater than the 0.05 level of significance [33]. The findings showed that all the models suffered from the presence of group heteroscedasticity as evidenced by p-values lower than the 0.05 level of significance: ROE ( $p=0.000$ ), Z-score ( $p=0.000$ ). The testing for cross-sectional dependence was determined based on residual-based tests [Breusch-Pagan LM test and Pesaran scaled LM]. The findings showed that ROE and Z-Score models did not suffer from cross-sectional dependence as depicted by p-values greater than the 0.05 level of significance: ROE ( $p=0.095$ ), Z-Score ( $p=0.6070$ ).

The study adopted the Arellano-Bond Serial Correlation Test to evaluate the presence of autocorrelation. Where a probability value greater than 0.05 is taken to imply the absence of autocorrelation, and the null hypothesis fails to be rejected. The findings showed that all the models did not show the presence of serial correlations as evidenced by p-values higher than the 0.05 level of significance under AR(1) and AR(2): ROE ( $p=0.978$ , NA; Z-Score ( $p=0.943$ ,  $p=0.932$ ). However, given that the models suffered from heteroskedasticity, the study adopted the Generalised Least Squares (GLS) model for parameter estimation and hypothesis testing.

### 4.3. Hypotheses Testing

The hypotheses tested were in null form, and given that the financial performance was measured based on four proxies (ROE and Z-Score), the study introduced four null sub-hypotheses for each main null hypothesis.

#### 4.3.1. Effect of Funding Strategy on Financial Performance

The first hypothesis ( $H_{01}$ ) was that the funding strategy has no significant effect on the financial performance of deposit-taking Microfinance Institutions in Kenya. The null sub-hypothesis under hypothesis one included  $H_{01a}$ : *Funding strategy has no effect on Return on Equity of DT-MFIs in Kenya*,  $H_{01b}$ : *Funding strategy has no effect on Z-score of DT-MFIs in Kenya*. The sub null hypotheses would be rejected if the p-values associated with the F test in the multiple regression models are less than 0.05; otherwise, the study would fail to reject the sub null hypotheses. The effect of funding strategy on the financial performance of DT-MFIs in Kenya was examined based on multiple Panel Generalised Least Squares (GLS) regression, where funding strategy was captured by three proxies: deposit funding, wholesale funding and equity funding. Further, the financial performance of DT MFIs was measured based on four proxies, including Return on Assets, Return on Equity, Loan Loss provision and Z-Score. Thus, the four financial performance indicators were regressed against deposit funding proxies, with results presented in Table 5.

**Table 5.** Effect of Funding Strategy on Financial Performance.

| Variable           | ROE                 | Z-Score             |
|--------------------|---------------------|---------------------|
| DFUND              | 0.042**<br>(0.017)  | -0.097<br>(0.201)   |
| WFUND              | -0.026<br>(0.020)   | -0.011<br>(0.181)   |
| EFUND_             | 0.061***<br>(0.011) | 0.134<br>(0.108)    |
| C                  | 0.891<br>(0.009)    | 2.989***<br>(0.063) |
| R <sup>2</sup>     | 0.452               | 0.217               |
| F-statistic        | 23.733              | 7.968               |
| Prob (F-statistic) | 0.000               | 0.000               |
| Observations       | 90                  | 90                  |
| Panels             | 9                   | 9                   |

Standard errors are in parentheses. \*\*\*  $p<0.01$ , \*\*  $p<0.05$ , \*  $p<0.1$   
Note: Deposit Funding (DFUND), Wholesale funding (WFUND), Equity Funding (EFUND), Return on Equity (ROE)

*Sub-Hypothesis ( $H_{01a}$ ) Test:* The findings in Table 5 showed that the model explained 45.3% variation in return on equity of DT MFIs in Kenya ( $R\text{-squared} = 0.45$ ). The residual variation being captured by unobserved variables explained the remaining (54.7%) variation in return on equity. The results further showed that the funding strategy had a significant effect on the return on equity of DT MFIs, given that the probability based on the F-statistic was less than 0.05 ( $p=0.00$ ). The null sub-hypothesis ( $H_{01a}$ ) that *Funding strategy has no significant effect on return on equity of deposit-taking micro-finance institutions in Kenya* was rejected, with the study concluding that, indeed, funding strategy strongly explained return on equity of DT MFIs in Kenya.

The regression coefficients revealed that the effect of deposit funding on return on equity was positive and significant ( $\beta_1 = 0.042$ ,  $p<0.05$ ). The coefficient of deposit funding means that increasing deposit funding by one unit results in increasing ROE by 0.042 units. The effect of wholesale funding on the return on equity of DT MFIs was inverse but not significant ( $\beta_2 = -0.026$ ,  $p>0.05$ ). Therefore, a unitary increase in wholesale funding resulted to 0.02 unit decline in ROE. Finally, the effect of equity funding on the return on equity of DT MFIs was positive and significant ( $\beta_3 = 0.061$ ,  $p<0.05$ ). One unit rise in equity funding for DT-MFIs in Kenya resulted to 0.06 unit increase in ROE. The intercept term  $\beta_0$  captured the return on equity when funding based on deposits, short-term borrowing and shareholders' equity is zero. The regression model in Equation (1) was thus estimated as:



$$ROE_{it} = 0.891 + 0.042 Dfund_{it} - 0.026 Wfund_{it} + 0.061 Efund_{it} + \varepsilon_{it} \quad (1)$$

**Sub-Hypothesis ( $H_{01b}$ ) Test:** The findings depicted in Table 5 showed that the model explained 21.7% variation in the Z-score of DT MFIs in Kenya (R-squared = 0.217505). The residual variation being captured by unobserved variables explained the remaining (79.3%) variation in Z-Score. The results further showed that the funding strategy had a significant effect on the Z-score of DT MFIs, given that the probability based on the f-statistic was less than 0.05 ( $p=0.000$ ). The null sub-hypothesis one ( $H_{01d}$ ) that *funding strategy has no significant effect on Z-Score of deposit-taking microfinance institutions in Kenya* was rejected, with the study concluding that funding strategy strongly explained Z-Score of DT MFIs in Kenya.

The regression coefficients revealed that the effect of deposit funding on Z-Score was inverse and not significant ( $\beta_1 = -0.097$ ,  $p>0.05$ ). Therefore, a unitary increase in deposit funding led to 0.09 unit decline in Z-score. The effect of wholesale funding on Z-Score was inverse and not significant ( $\beta_2 = -0.011$ ,  $p>0.05$ ). Further, one unit increase in wholesale funding led to 0.011 units decline in the Z-score of DT-MFIs. Finally, the effect of equity funding on Z-Score was direct and not significant ( $\beta_3 = 0.134$ ,  $p>0.05$ ). Hence, a unitary increase in equity finding resulted in 0.13 unit increase in Z-Score. The intercept term  $\beta_0$  captured the Z-score when funding based on deposits, short-term borrowing and shareholders' equity is zero. The regression model in Equation (2) was thus estimated as:

$$Z_{it} = 2.989 - 0.097 Dfund_{it} - 0.011 Wfund_{it} + 0.134 Efund_{it} + \varepsilon_{it} \quad (2)$$

#### 4.3.2. Moderating Effect of Firm Size on Funding Strategy and Financial Performance

The second hypothesis ( $H_{02}$ ) was that firm size has no significant moderating effect on the relationship between funding strategy and financial performance of deposit-taking microfinance institutions in Kenya. The null sub-hypotheses under hypothesis two included:  $H_{02a}$ : *Firm size has no significant moderating effect on the relationship between funding strategy and return on equity of deposit-taking microfinance institutions in Kenya*.  $H_{02b}$ : *Firm size has no significant moderating effect on the relationship between funding strategy and Z-score of deposit-taking microfinance institutions in Kenya*. The null sub hypotheses two were examined based on a moderated regression model. If p-values of  $\beta_4$  and  $\beta_5$  in regression models 3-4 are less than 0.05, then there is some form of moderation and null sub-hypothesis four is rejected. The findings on the moderation process are presented in Tables 6, 7.

**Table 6.** Moderating effect of Firm Size on the relationship between funding strategy and Return on Equity of DT-MFIs in Kenya.

| Variable | ROE                 | ROE                 |
|----------|---------------------|---------------------|
| DFUND    | 0.042**<br>(0.017)  | 0.763***<br>(0.101) |
| WFUND    | -0.026<br>(0.020)   | 0.567***<br>(0.102) |
| EFUND_   | 0.061***<br>(0.011) | 0.395***<br>(0.068) |
| SIZE     | -                   | 0.185***<br>(0.061) |

| Variable           | ROE                 | ROE                 |
|--------------------|---------------------|---------------------|
| INTE               | -                   | 0.395***<br>(0.051) |
| C                  | 0.891***<br>(0.009) | -0.521**<br>(0.230) |
| R <sup>2</sup>     | 0.452               | 0.606               |
| F-statistic        | 23.733              | 25.858              |
| Prob (F-statistic) | 0.000               | 0.000               |
| Observations       | 90                  | 90                  |
| Panels             | 9                   | 9                   |

Standard errors are in parentheses. \*\*\*  $p<0.01$ , \*\*  $p<0.05$ , \*  $p<0.1$   
Note: Deposit Funding (DFUND), Wholesale funding (WFUND), Equity Funding (EFUND), Firm Size (SIZE), Return on Equity (ROE), Interaction term (INTE).

**First Step of Moderation ( $H_{02a}$ ):** In the first step of moderating the effect of firm size on the relationship between funding strategy and return on equity of deposit-taking microfinance institutions in Kenya, the GLS regression model was adopted. The results in Table 6 revealed that the funding strategy had a significant effect on the return on equity of DT MFIs ( $p=0.000$ ). The first condition for rejection of the null sub-hypothesis ( $H_{02a}$ ) was satisfied. **Second Step of Moderation ( $H_{02a}$ ):** In the second step of moderating the effect of firm size on the relationship between funding strategy and return on equity of deposit-taking microfinance institutions in Kenya, the research evaluated whether return on equity was significantly affected by funding strategy, firm size and interaction term. The panel GLS regression model findings presented in Table 6 revealed that the model at hand explained 60.6% of the

changes in ROE ( $R^2 = 0.606$ ), with the remaining variation of 39.4% being captured by unobserved variables in the model. Additionally, firm size, interaction term and funding strategy had a significant effect on return on equity of DT MFIs, given that the probability based on the f-statistic was less than 0.05 ( $p=0.000$ ). Moreover, the individual proxies of funding strategy, firm size and interaction term had a significant effect on return on equity ( $p$  values were less than 0.05). The second condition for rejection of the null sub-hypothesis ( $H_{O2a}$ ) was thus satisfied. The study thus concluded that firm size moderated the relationship between funding strategy and return on equity of DT MFIs in Kenya. Further, given that the coefficient of the interaction term was positive, firm size enhanced the relationship between funding strategy and return on equity. Further, the regression coefficients examined the individual effect of funding strategy proxies, firm size and the interaction term on return on equity. The effect of deposit funding on return on equity was positive and significant ( $\beta_1 = 0.763$ ,  $p < 0.05$ ).

Therefore, a unitary increase in deposit funding led to 0.76 unit increase in ROE. The effect of wholesale funding on return on equity was positive and significant ( $\beta_2 = 0.567$ ,  $p < 0.05$ ). Hence, one unit increase in wholesale funding resulted in 0.56 unit increase in ROE. The study also established that equity funding had a direct and significant effect on return on equity ( $\beta_3 = 0.395$ ,  $p < 0.05$ ). Meaning that 100% increase in equity funding led to 39.5% increase in ROE. The effect of firm size on return on equity was positive and significant ( $\beta_4 = 0.185$ ,  $p < 0.05$ ). Implying that a change in firm size by one unit led to 0.185 units responsive change in ROE. Finally, the effect of the interaction term on return on equity was positive and significant ( $\beta_5 = 0.395$ ,  $p < 0.05$ ). Hence, a unitary increase in the interaction term resulted in 0.395 units increase in ROE. The intercept term  $\beta_0$  captured the return on equity when firm size, interaction terms and funding strategy is held constant at zero. The regression model in Equation (3) was thus estimated as:

$$ROE_{it} = -0.521 + 0.763 Dfund_{it} + 0.567 Wfund_{it} + 0.395 Efund_{it} + 0.185 SIZE_{it} + 0.395 SIZE (Dfund+Wfund+ Efund)_{it} + \varepsilon_{it} \quad (3)$$

**Table 7.** Moderating Effect of Firm Size on Funding Strategy and Z-Score.

| Variable           | Z-Score             | Z-Score              |
|--------------------|---------------------|----------------------|
| DFUND              | -0.097<br>(0.201)   | 2.256***<br>(0.271)  |
| WFUND              | -0.011<br>(0.181)   | 1.628***<br>(0.237)  |
| EFUND_             | 0.134<br>(0.108)    | 1.712***<br>(0.160)  |
| SIZE               | -<br>-              | 1.913***<br>(0.127)  |
| INTE               | -<br>-              | 1.439***<br>(0.129)  |
| C                  | 2.989***<br>(0.063) | -4.144***<br>(0.523) |
| $R^2$              | 0.217               | 0.736                |
| F-statistic        | 7.968274            | 47.028               |
| Prob (F-statistic) | 0.000095            | 0.000                |
| Observations       | 90                  | 90                   |
| Panels             | 9                   | 9                    |

Standard errors are in parentheses.\*\*\*  $p < 0.01$ , \*\*  $p < 0.05$ , \*  $p < 0.1$

Note: Deposit Funding (DFUND), Wholesale funding (WFUND), Equity Funding (EFUND), Firm Size (SIZE), Interaction term (INTE).

*First Step of Moderation ( $H_{O2b}$ ):* In the first step of moderating the effect of firm size on the relationship between fund-

ing strategy and Z-Score of deposit-taking microfinance institutions in Kenya, the study examined the effect of funding strategy on Z-Score based on the GLS regression model. The findings presented in Table 7 showed that the funding strategy had a significant effect on the Z-score of DT MFIs ( $p=0.000$ ). Therefore, the first condition for rejection of the null sub-hypothesis ( $H_{02b}$ ) was satisfied.

**Second Step of Moderation ( $H_{02b}$ ):** In the second step of moderating the effect of firm size on the relationship between funding strategy and Z-score of deposit-taking microfinance institutions in Kenya, the study adopted the GLS regression model. The findings in Table 7 revealed that the model at hand captured 73.6% of the variation in Z-Score ( $R^2=0.736$ ), and the remaining variation of 26.4% was captured by unobserved factors in the model. Additionally, firm size, interaction term and funding strategy had a significant effect on Z-Score of DT MFIs, given that the probability based on the f-statistic was less than 0.05 ( $p=0.000$ ). Moreover, the individual proxies of funding strategy, firm size and interaction term had a significant effect on Z-Score ( $p < 0.05$ ). The second condition for rejection of the null sub-hypothesis ( $H_{02b}$ ) was thus satisfied. The study thus concluded that firm size moderated the relationship between funding strategy and Z-score of DT MFIs in Kenya. Further, the coefficient of the interaction term was

positive, implying that firm size enhanced the relationship between funding strategy and Z-score of DT-MFIs in Kenya.

Further, the regression coefficients examined the individual effect of funding strategy proxies, firm size and the interaction term on Z-Score. The effect of deposit funding on Z-Score was direct and significant ( $\beta_1=2.256$ ,  $p<0.05$ ). Therefore, one unit increase in deposit funding led to 2.25 unit increase in Z-Score. The effect of wholesale funding on Z-Score was positive and significant ( $\beta_2=1.628$ ,  $p<0.05$ ). Hence, unitary change in wholesale funding resulted to 1.62 unit increase in Z-Score. The study also established that equity funding had a direct and significant effect on Z-Score ( $\beta_3=1.712$ ,  $p<0.05$ ). Therefore, one unit rise in equity funding led to 1.71 units rise in Z-score.

The effect of firm size on Z-Score was positive and significant ( $\beta_4=1.913$ ,  $p<0.05$ ). The finding means that increasing firm size by one unit resulted to increase in Z-Score by 1.91 units. Finally, the effect of the interaction term on Z-Score was positive and significant ( $\beta_5=1.439$ ,  $p<0.05$ ). Therefore, a unitary increase in the interaction term resulted to 1.43 unit increase in Z-Score. The intercept term  $\beta_0$  captured the Z-Score when firm size, interaction terms and funding strategy is held constant at zero. The regression model in Equation (4) was estimated as:

$$Z_{it} = -4.144 + 2.256 Dfund_{it} + 1.628 Wfund_{it} + 1.712 Efund_{it} + 1.913 SIZE_{it} + 1.439 SIZE (Dfund+Wfund+Efund)_{it} + \varepsilon_{it} \quad (4)$$

## 5. Discussion

### 5.1. Effect of Funding Strategy on Financial Performance

The study established that the funding strategy combined had a significant effect on all proxies of financial performance of DT microfinance institutions in Kenya. This was evidenced by p-values associated with the f-statistic being less than the 0.05 level of significance ( $p<0.05$ ). The study therefore rejected the null hypothesis ( $H_{01}$ ) and sub null hypotheses ( $H_{01a}$ ,  $H_{01b}$ ), implying that indeed, funding strategy has a significant effect on the financial performance of microfinance institutions in Kenya. Further, the study examined the effect of individual funding strategy proxies (deposit funding, wholesale funding and equity funding) on financial performance proxies (Return on Equity and Z-Score). The findings showed that deposit funding had a significant and positive effect on ROE ( $\beta_1=0.042$ ,  $p=0.0194$ ). The positive effect implies that increasing customer deposits among DT microfinance institutions, holding other factors constant, resulted in increasing profitability (as the ratio of total equity), given that more funds are available for lending to borrowers, which in turn results in increased interest income and profitability. The findings agree with empirical literature showing that deposit funding has a direct effect on financial performance measured by ROA and

ROE [18]. Ofori-Sasu et al., while agreeing with the findings, showed that the link between deposit funding and technical efficiency was strong [19]. The study findings also agree with the MM capital relevant theory that holds that firms (i.e., MFIs), depending on leverage (i.e., deposit funding), enjoy high value and financial performance since levered firms enjoy a tax shield on debts (i.e., interest on deposits) of the company.

Further, the effect of deposit funding on Z-Score was inverse ( $\beta_1=-0.097$ ,  $p=0.630$ ). The finding implies that increasing deposit funding from customer deposits was leading to declining Z-score, implying that DT MFIs in Kenya were heading towards financial distress, especially when there is increased lending to poor-quality borrowers. This agrees with Shibutse et al., who showed that leverage was inversely related to financial performance [20].

Wholesale funding had an inverse effect on profitability captured by ROE ( $\beta_2=-0.026$ ,  $p=0.203$ ). The inverse effect means that increasing short-term borrowing in relative terms to other funding sources among DT microfinance institutions, holding other factors constant, resulted in declining profit before tax as a ratio of total equity. The inverse link can be emerging from the rationale that a wholesale funding source is an expensive funding source in terms of the interest rate charged in comparison to funding sources such as deposits. Therefore, relying more on wholesale funding relative to other funding sources may eat into the profits of the DT MFIs in Kenya. The finding, however, was contrary to an

empirical study by Nwankwo and Agbo, who established that loans are directly related to financial performance measured by net interest income [17]. Further, the effect of wholesale funding on Z-Score was inverse and not significant ( $\beta_2 = -0.011$ ,  $p = 0.948$ ). The findings imply that using more wholesale funding among DT MFIs leads to a declining Z-score. Wholesale funding being a costly funding source, it may negatively impact the Z-score, hence pushing the DT-MFIs towards financial distress.

Finally, the study revealed that the effect of equity funding on the financial performance of DT MFIs measured by ROE and Z-score was direct ( $\beta_3 = 0.061$ ,  $p = 0.000$ ;  $\beta_3 = 0.134$ ,  $p = 0.2150$ ), respectively, even though the effect on ROE was significant. The funding implies that increased use of equity funding sources towards DT-MFIs resulted in increasing profitability before tax as a ratio of total equity. The positive link may be explained by the fact that equity funding is a less costly funding source. Further, the use of more equity funding relative to other funding sources results in increasing Z-Score, hence declining risk of financial distress, given that more equity funding lowers the solvency risk and is associated with lower cost of capital. The finding on the direct effect of equity funding on financial performance as measured by ROE and Z-score was in agreement with Nwankwo and Agbo, who established that equity funding was directly related to financial performance measured by net interest income [17].

## 5.2. Effect of Firm Size on the Link Between Funding Strategy and Financial Performance

The second objective sought to establish the moderating effect of firm size on the relationship between funding strategy and the financial performance of DT-microfinance institutions in Kenya. For the first step of the moderating process, the p-values associated with the F-statistic in regression equations were less than 0.05 ( $p < 0.05$ ). The first condition for rejection of the null hypothesis ( $H_{02}$ ) and null sub-hypotheses ( $H_{02a}$ ,  $H_{02b}$ ) was satisfied. In the second step of the moderating effect of firm size on the relationship between funding strategy and financial performance of DT-MFIs in Kenya, the study examined the effect of firm size, funding strategy and the interaction term on the financial performance of DT-MFIs in Kenya. The findings showed that the effect of the interaction term on the financial performance of DT-MFIs as measured by ROE and Z-score was positive and significant ( $\beta_5 = 0.395$ ,  $p = 0.000$ ;  $\beta_5 = 1.439$ ,  $p = 0.00$ ) respectively. Therefore, the null hypothesis ( $H_{02}$ ) and sub-hypotheses ( $H_{02a}$ ,  $H_{02b}$ ) were thus rejected. The finding thus implied that firm size was a positive mediator in the relationship between funding strategy and financial performance as measured by ROE and Z-score of DT-MFIs in Kenya. Therefore, increasing firm size to accompany increased funding resulted in increased financial performance among DT-MFIs as measured by ROE and Z-score.

The finding was in agreement with John and Nkoro, who established that ROE was a direct function of asset size [23]. Budhathoki et al. also agreed with the findings, with their results showing that higher bank size had a major direct effect on profitability [22]. Further, Caliskana and Lecunab found that banking sector variables, including total assets, efficiency and liquidity, had a major effect on profitability [26]. The finding is also in congruence with the economies of scale theory. The theory implies that larger DT-MFIs enjoy economies of scale in terms of asset size, hence cost advantages. The larger DT-MFIs are in a position to recruit more loanable deposit funding and other funding sources for eventual lending at lower cost, thereby leading to increased financial performance.

## 6. Conclusions

The study examined the moderating effect of firm size on the nexus between funding strategy and the financial performance of DT-MFIs in Kenya. The study concluded that the funding strategy that included deposit funding, wholesale funding and equity funding strongly explained the financial performance of DT- microfinance institutions in Kenya. The use of deposit funding among DT microfinance institutions in Kenya resulted in increased profitability. This is explained by the fact that more funds are available for lending to borrowers, which in turn results in increased interest income and profitability. However, rising deposit funding implies that DT MFIs in Kenya were heading towards financial distress, especially when there is increased lending to poor-quality borrowers. The increasing use of wholesale funding relative to other funding sources among DT microfinance institutions resulted in declining profit before tax, given the high interest rate charged on wholesale funds. Moreover, wholesale funding among DT MFIs leads to declining Z-Score as wholesale funding is a costly financial source, which negatively impacts Z-score as it pushes the DT-MFIs towards financial distress. Finally, the use of equity funding resulted in increasing profitability before tax as a ratio of total equity. The positive link may be explained by the fact that equity funding is a less costly funding source. Further, the use of more equity funding relative to other funding sources results in increasing Z-Score, hence declining risk of financial distress, given that more equity funding lowers the solvency risk and is associated with lower cost of capital. Further, firm size was a positive mediator on the relationship between funding strategy and the financial performance of DT-MFIs as captured by ROE and Z-score. Therefore, the study concluded that increasing firm size to accompany increased funding resulted in increasing financial performance among DT-MFIs in terms of ROE and Z-score. Increasing firm size (in terms of total assets) when funding increases means that there is a high likelihood of increasing loan growth, given that advances to customers take the lion's share of the total assets of MFIs. So, increasing firm size implies increasing loan growth by extension. Increasing loan

growth implies that interest income also rose, resulting in increasing profitability as a ratio of shareholders' equity. Further, increasing profitability resulted in reduced chances of financial distress, thus rising Z-Score for the DT-MFIs.

Since deposit funding improves ROE but reduces Z-score, DT-MFIs ought to enhance deposit mobilisation while concurrently strengthening risk-management practices to mitigate emerging solvency risks. The CBK should emphasise consumer protection initiatives, fortify deposit insurance mechanisms, and improve financial literacy programs. Stable and well-informed depositors mitigate liquidity shocks and allow MFIs to utilise deposit funding more securely. Additionally, considering that wholesale funding diminishes both ROE and Z-score, MFIs should reduce their dependence on costly and unstable external borrowings from banks and development partners. The CBK ought to implement prudent exposure limits or stress-testing requirements for DT-MFIs that exhibit high wholesale leverage ratios. Further, as equity funding enhances profitability and institutional resilience, DT-MFIs should focus on capital accumulation via retained earnings, strategic equity injections, and long-term capital partnerships. Policymakers should explore tax incentives, capital grants, or co-investment schemes to facilitate the accumulation of equity capital in DT-MFIs. Given that larger DT-MFIs are more adept at transforming funding into profitability and stability, institutions need to implement intentional growth strategies such as expanding branches, enhancing digital capabilities, and diversifying portfolios to boost total assets and operational capacity. The CBK ought to strengthen minimum capital requirements that encourage MFIs to grow responsibly. More robust capital thresholds guarantee that institutions possess sufficient buffers to handle risks associated with increased deposit mobilisation and funding diversification. The study should be interpreted with caution, as occasioned by a number of limitations. The research relied solely on secondary data obtained from the supervisory reports of the Central Bank of Kenya. While this approach may pose risks concerning accuracy or variations in institutional reporting [28]. Secondary data sourced from a regulated environment like the CBK is generally regarded as highly credible and standardised. The ten-year timeframe (2013–2022) may not adequately reflect long-term structural changes or prolonged credit cycles, and shorter durations might hinder the detection of structural breaks [33]. Nevertheless, the decade-long period is sufficiently extensive for financial panel analysis and aligns with empirical research in banking and microfinance that frequently employs 5–10-year timeframes [7].

## Abbreviations

|       |                                                    |
|-------|----------------------------------------------------|
| AR(1) | Arellano Bond First-order Serial Correlation Test  |
| AR(2) | Arellano Bond Second-order Serial Correlation Test |
| CBK   | Central Bank of Kenya                              |

|         |                                          |
|---------|------------------------------------------|
| CBK     | Central Bank of Kenya Bank               |
| DFUND   | Deposit Funding                          |
| DT-MFIs | Deposit-Taking Microfinance Institutions |
| EFUND   | Equity Funding                           |
| FEM     | Fixed Effects Model                      |
| GLS     | Generalised Least Squares                |
| JB      | Jarque Bera Test                         |
| LLP     | Loan Loss Provision                      |
| LnTA    | Natural Logarithm of Total Assets        |
| LR      | Likelihood Ratio Test                    |
| MFIs    | Microfinance Institutions                |
| MM      | Modigliani Miller                        |
| OLS     | Ordinary Least Squares                   |
| REM     | Random Effects Model                     |
| ROA     | Return on Assets                         |
| ROE     | Return on Equity                         |
| SIZE    | Firm Size                                |
| VIF     | Variance Inflation Factor                |
| WACC    | Weighted Average Cost of Capital         |
| WFUND   | Wholesale Funding                        |
| Z       | Z-Score                                  |

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## Author Contributions

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## Data Availability Statement

The data that support the findings of this study can be found at:

<https://www.centralbank.go.ke/reports/bank-supervision-and-banking-sector-reports/> (a publicly available repository url).

## Conflicts of Interest

The authors declare no conflicts of interest.



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**Michael Ndwiga Jairo** is a lecturer in the Department of Economics and Development Studies at Nairobi University. Dr. Michael Ndwiga is a distinguished Environmental Economist and Researcher with a PhD in Environmental Economics and over eleven years of experience in economic analysis and research. He specialises in environmental and resource economics, impact evaluation, and applied econometrics, focusing on assessing the effectiveness of environmental policies and regulations. His research leverages econometric modelling and microeconomic analysis to evaluate trade-offs between environmental sustainability, economic growth, and social well-being. Currently, Dr. Ndwiga serves as the Centre Director of Environment for Development (EfD) Kenya, a leading research institution

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## Research Field

**Vincent Otieno Osewe:** Corporate Finance, Financial Markets, Risk modelling, Banking and Finance.

**Duncan Elly Ochieng:** Corporate Finance, Development Finance, Entrepreneurship and Innovation, Infrastructure Financing and Corporate Governance.

**Winnie Iminza Nyamute:** Finance and Accounting, Management and Quantitative Methods; Leadership and Management; Strategic Planning.

**Michael Ndwiga Jairo:** Econometric modelling, microeconomic analysis, trade-offs between environmental sustainability, economic growth, and social well-being.