# Efficiency of Microfinance Institutions in Africa

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# Abstract

This study examines the levels and the drivers of financial efficiency, social efficiency, and joint financial and social efficiency of Microfinance institutions (MFIs) in Africa. The results show a decline in social performance over time. The legal status of an MFI does not significantly influence financial performance but does drive social performance and combined financial and social performance. Operating expenses to assets ratio, capital to assets ratio, asset structure, and education are significant drivers of efficiency while leverage, donations, and age are not. Operating expense to assets ratio relates negatively with financial efficiency and positively with social efficiency and combined financial and social efficiency. Capital asset ratio relates positively to financial performance, social performance, and collective financial and social performance, while asset structure shows the opposite. Lastly, education varies negatively with financial performance but positively with social and combined social and financial performance. The results illustrate that while access to commercial capital does enhance overall efficiency, the quest for profitability hurts social efficiency while boosting financial efficiency. Mission drift is a corporate governance issue.

**Key Words:** Microfinance, Efficiency, Social, Financial, Performance, Africa

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## Introduction

This article examines the levels and drivers of the financial and social efficiency of microfinance institutions (MFIs) in Africa considering the transformation of MFIs from not-for-profit ventures to commercial entities. Specifically, the research examines the drivers of social efficiency on the one hand, and critically, the drivers of the joint financial and social efficiency of MFIs in Africa on the other. MFIs have a dual mission. First, they derive legitimacy by availing financial services to the poor and other financially excluded members of society (Marconatto et al., 2016). To achieve this social goal, MFIs have in the past mostly relied on private donations and government subsidies (D’Espallier et al., 2017). However, with the rise of neo-liberalism (Bateman, 2010), donors and stakeholders increasingly presume that MFIs should be financially self-sustaining- which is the second goal of MFIs (Beisland et al., 2017). Besides, political and economic uncertainties surrounding donations and subsidies reinforce the need for MFIs to be financially independent (Armendáriz et al., 2013, Garmaise and Natividad, 2013).

If MFIs are to be financially sustainable, they must not do so by neglecting their social mission. MFIs operate in peculiar commercial environments, yet their hybrid nature requires them to pursue and achieve an additional, core social objective. It is notable though that purely commercial firms are also under increasing pressure to also maximise on social welfare- primarily through corporate social responsibility (CSR) interventions and the rise of the Environmental, Social and Governance (ESG) accounting (Van Duuren et al., 2016). However, the expectation for exclusively business firms to meet social goals may not be as elevated as that for social and hybrid enterprises like MFIs, whose mission achievement draws mainly from meeting their social mandate.

In this study, we utilise Data Envelopment Analysis (DEA) to generate an index of efficiency scores for financial performance, social performance, and the joint financial and social performance of MFIs in Africa. In examining efficiency, we focus on the extent to which MFIs optimise their output for a given level of inputs using the output-oriented DEA approach. The alternative input-oriented approach deals with the ability of MFIs to minimise inputs for a given level of output. The choice of the output-oriented method derives from the functions of MFIs- reaching out to the financially excluded sustainably meaning that although the optimisation of inputs is also desirable, it is in the outputs that are more relevant to this study. The inputs are liabilities and equity and operating expense to assets ratio. The metric for the financial outcome is operational self-sufficiency (OSS). At the same time, the average loan balance per borrower, per cent of women borrowers and the percentage of the gross loan portfolio to total assets are the social performance indicators.

This research extends existing knowledge in three primary ways. First, the article sheds light on the determinants of the simultaneous drivers of the financial and social efficiency of MFIs, especially in Africa, where data challenges hinder potential research. Secondly, as noted, the paradigm shift towards the commercial approach means that MFIs should meet both financial and social objectives (D’Espallier et al., 2017, Chahine and Tannir, 2010). However, the extant research on the drivers of financial and social efficiency tends to examine each objective separately instead of being two sides of the same coin (Efendic and Hadziahmetovic, 2017, Gutiérrez-Nieto et al., 2009).

What is more, research on the social and financial efficiency of MFIs is principally in the context of the transformation from NGOs to commercial firms, and the post-conversion presence or absence of mission drift (Wassie et al., 2019, D’Espallier et al., 2017, Mersland and Strøm, 2010, Mia and Lee, 2017, Ramus and Vaccaro, 2017). While some researchers find that better financial performance harms social outreach (Dacin et al., 2002, Kent and Dacin, 2013), others find the opposite to be true (Kar, 2013, Abeysekera et al., 2014). Researchers such as Leite et al. (2019) find mixed outcomes- with better financial performance harming depth of outreach while improving the breadth of outreach. Thus, by simultaneously examining both financial and social efficiency of MFIs, this study presents novel insights that extend the abundant literature on the financial and social performance of MFIs.

The final contribution of the research is on the drivers of social efficiency of MFIs. This contribution is paramount as it informs decision making to enhance outreach to the financially excluded. Researchers can, to an extent, infer the determinants of the financial performance of MFIs from the abundant research in corporate finance. That is not the case for social performance. Nason et al. (2018) note that unlike financial performance which has specific reference points, the criterion for evaluating social performance is ambiguous. Firms must then negotiate with stakeholders on suitable standards for assessing social performance.

For this reason, some researchers gauge social performance using the percentage of female borrowers, the proportion of rural borrowers, and the average loan size, all of which have their shortcomings. Much of the research in this domain dwells on the extent and causes of social failure based on individual MFIs social performance metrics without explicitly quantifying total social efficiency (Lebovics et al., 2016, Louis and Baesens, 2013, Louis et al., 2013) with the noted exception of Gutiérrez-Nieto et al. (2009). The subsequent research output is hard to compare.

Overall, little research investigates the socio-economic factors that enable or hinder the achievement of the dual objectives by MFIs. This absence of studies is especially glaring in Africa, the continent with the lowest rates of financial inclusion. For the stakeholders of MFIs, this could be a significant oversight. The Management of MFIs may not tell the optimal strategies to adapt to fulfil the twin missions. The donors may mistime their exit while regulators could set policies that hinder rather than enhance the efficacy of MFIs in fulfilling their dual mandate. Accordingly, this research will inform the management of MFIs, policymakers, donors, and stakeholders on interventions necessary to enable MFIs to reach the financially excluded sustainably.

The setting of the study is in Africa. We take all formal MFIs as the population, with the sampling frame being the MFIs that submit their data to the Microfinance Information Exchange (MIX) pooled database. MIX pools data from over 2000 MFIs across the globe that represents 20% of all formal MFIs across the world which in their assessment avail 80% of the microcredit and incidental financial services (The Microfinance Information Exchange, 2017). A significant issue is that a substantial number of financially excluded people mostly rely on informal financial services – from family and friends to neighbourhood kiosks to shylocks. There is also a rise of fintech firms that use mobile phones and the internet to offer financial services. However, the data for these equally essential portions of MFIs is hard to capture at scale. Hence, in this study, we will deal exclusively with the MFIs listed on MIX.

The rest of the research proceeds as follows. In section 2, we review the empirical literature and layout the theoretical basis for the financial and social efficiency of MFIs. The proceeding section provides a summary of the results of the study. Part 4 is on the empirical methods adopted for the research, while part 5 describes the data and data sources. Next, in section 6, we detail the results. Section 7 concludes.

## Theory and Empirical Literature

In *Microfinance Schism,* Morduch (2000) urges caution about the win-win approach to microfinance. The win-win school posits that MFIs can simultaneously pursue and achieve both financial sustainability and social goals without trade-offs. This school seeks to reconcile the welfare approach that views financial sustainability and social performance to be incompatible, and the financial sustainability school that, while recognising the need for meeting social goals, emphasises financial sustainability. Morduch calls for the accommodation of multiple, hybrid MFI models- on the continuum of those that seek profits while serving the poor and those that strictly focus social goals like NGOs reliant on donations and subsidies. The broad array of microfinance programs, Morduch argued, would then serve diverse populations and contexts instead of privileging some MF models over others (Marconatto et al., 2016).

Nonetheless, much of the ensuing research has compared the financial sustainability model with the welfare model, with empirical support on either side (Kodongo and Kendi, 2013). For instance, some research examines the extent to which different models of MFIs fare both financially and socially (Abeysekera et al., 2014, Bédécarrats et al., 2012). Socially, considerable research finds NGOs to be better at reaching out to the poor than commercial models- that is, more socially efficient. However, other researchers counter that commercial MFIs are better at outreach to the poor without much reliance on donations and subsidies (Abeysekera et al., 2014, Kar, 2013, Roberts, 2013). For instance, Dorfleitner et al. (2017) and Bos and Millone (2015) finds that MFIs that have better portfolio quality have a greater depth of outreach- outlining again the variety of metrics used to gauge the financial and social performance of MFIs.

However, as Morduch further points out, MFI social performance could be dependent on the segments of the population served and regional and country-level contexts. Consequently, the definitions of poor and, by extension, social performance must expand to the different profiles and economic activities among poor people themselves as MFIs could generally not be reaching out to the "core" indigent. Also, the differing views on the levels social performance could result from the diverse meanings that different stakeholders- employees, managers, MFI clients, donors- attach to the term social performance (Marti and Scherer, 2016). As the metrics for social performance are ambiguous (Nason et al., 2018), it is hard to reconcile the different views on the extent to which MFIs achieve their social objectives relative to financial goals.

As a case in point, Beisland et al. (2020) examine the determinants of social performance using data from social rating agencies. The researchers conclude that different rating agencies place different weights to social indicators. Nevertheless, they find financial performance, rural outreach, objectives, service quality and customer service as critical determinants of MFI social performance. A related study by Hermes and Hudon (2018) identify firm-specific and economic factors that drive the social efficiency of MFIs by conducting a meta-analysis of published papers. Key among the factors are age, size, institutional type, and the funding sources of an MFI, collaborating earlier findings by Gutiérrez-Nieto et al. (2009). However, social ratings as a measure of social performance may not apply well in Africa where data is a challenge. Again, the importance of each indicator could vary by context. The variance motivates the need for context-specific research- in this case, Africa.

Much of the research that addresses both financial performance and social performance as stand-alone without addressing the conditions under which it is possible to achieve or fail to achieve the objectives simultaneously. Gutiérrez-Nieto et al. (2009) quantified financial and social performance using DEA. Nonetheless, their study does not seek the drivers of financial efficiency, social efficiency, and combined social and financial efficiency, as is the case in this study. Instead, the researchers examine the relationships between social performance on the one hand, and profitability, location, age, and legal type of MFI. This study goes beyond that of Gutiérrez-Nieto et al. (2009) by examining the drivers of the joint financial and social efficiency, with a focus on Africa. Also, their data consisted of a narrower set of 89 MFIs and did not focus on a specific region for better insights, as D'Espallier et al. (2017) propose. In addition to being dated, the study uses a notably different set of inputs and outputs for the DEA analysis.

The dominant debate has been on the extent to which commercial MFIs can balance between financial sustainability and social performance- the mission drift hypothesis. Some researchers argue that the pursuit of financial sustainability is incompatible with outreach to the poor. (Cobb et al., 2016, Mia and Lee, 2017). The argument draws from the agency theory and the inherent profit incentive where the objectives of equity and debt holders would conflict with the strategic goal of serving the poor. It is agency theory that forms the bedrock of the arguments from the welfare school in arguing that MFIs cannot pursue both financial sustainability while at the same time reaching the financially excluded. They say that MFIs are likely to shift their emphasis from outreach to the poor to generate returns for the investors due to pressure from equity holders and pressure to make required interest payments on debt. () argue that restrictive covenants inherent in debt funding could push managers away from social targeting to emphasising on making financial returns. Armendáriz et al. (2013) attribute mission drift to the need for MFIs to build up precautionary fund reserves as a cushion against uncertainties in subsidies and donations.

However, other researchers argue that mission drift cannot happen to which Morduch and Ogden (2019) plausibly counter that if this were the case, then NGO MFIs would not exist or their numbers should rapidly diminish. It is notable that NGOs that rely on donations and subsidies still form a substantial number of MFIs (D’Espallier et al., 2013) which to some extent validates the concern about mission drift even among funders. Despite these reservations, considerable literature finds that commercial MFIs can achieve both financial and social objectives (Kodongo and Kendi, 2013). Other researchers have found that the quest for financial sustainability lowers the chances of meeting social goals (Hishigsuren, 2006).

However, some scholars also argue that mission drift is often confused with progressive lending and cross-subsidisation (Abeysekera et al., 2014). Notable among these studies is the mission expansion thesis by Mersland and Strøm (2010), which claims that financially sustainable MFIs can achieve better outreach through cross-subsidisation – lending at market rates to the relatively well-off and using the proceeds to subsidise interest payments for the poor. Finally, Campion and White (1999) argue that mission expansion could occur not as a result of the commercialisation of MFIs but due to a failure of corporate governance. Hence mission drift could be resolved at governance levels without affecting the financial positioning or social orientation of an MFI (Ramus and Vaccaro, 2017).

Lastly, a closely relates study by Lam et al. (2020) finds that MFIs exhibit no evidence of mission drift. However, they find that financial performance is positively associated with subsequent social performance in for-profit MFIs relative to not-for-profit MFIs. In contrast, the social performance of not-for-profit MFIs varies positively with subsequent financial performance compared to for-profit MFIs. It means that for-profit MFIs are more efficient at translating financial performance to social goals while nonprofits are better at translating social objectives to financial goals. For nonprofits, part of the reason could be the goodwill generated by meeting social goals leading to more support from donors, the state and other stakeholders. MFIs that are profit-based, however, must first generate profit to enable them to address social goals.

## Hypotheses

While these studies examine aspects of efficiency, this study goes further by looking into the collective financial and social performance. Hence, in addition to examining the drivers of financial and social efficiency of MFIs, we hypothesise as follows.

**Hypothesis 1:** *MFIs that follow the commercial model exhibit better financial performance than NGOs.*

**Hypothesis 2:** *The social performance of NGO is better than that of commercial MFIs.*

**Hypothesis 3:** *The joint financial and social performance of commercial MFIs differs from that of NGOs.*

In these hypotheses, we note that most NGOs are also shifting to the commercial model but continue to rely substantially on donor funds, government subsidies and guarantees that allow access to low-cost commercial funds (D’Espallier et al., 2013). Also, the mission of NGOs may defer markedly from that of commercial MFIs, meaning that even when pursuing profits, they are less likely to abandon the social goals (Louis et al., 2013). The section that follows summarises the results of the study. 3.

## Summary of Results

This section highlights the levels and drivers of social efficiency, financial efficiency, and combined social and financial efficiency of MFIs in Africa. The inputs for the DEA analysis constitute measures for financial performance and social performance. We capture financial performance using the operational self-sufficiency (OSS). For social performance, we use three metrics. To measure the depth of outreach, we use the per cent of women borrowers and average loan balance per borrower. These metrics capture the ability of MFIs to reach the most financially excluded people like women and other people that typically demand small loans sizes. The gross loan portfolio to assets measures the breadth of outreach – the sheer number of people the MFI can reach. The discussion captures both the individual inputs and the overall DEA score.

### 4.1 Social Efficiency

MFIs exhibit a high level of social efficiency, consistent with their mission of providing financial services to the financially excluded, mostly the poor. On a scale of zero to one, the mean and median DEA social efficiency score is 0.92, with substantial variation across legal forms of MFIs. NGOs top with a median social efficiency score of 0.96, followed by NBFIs, commercial banks, rural banks, and cooperatives with median scores of 0.92, 0.91, 0.90, and 0.89, respectively. These results show that legal status, and by extension, the profit orientation matters in the social performance of MFIs. However, capital structure- the debt-equity mix and donations are not significant drivers of social efficiency. The ratio of operating expense to assets relates negatively to social efficiency. Given that operating expense is a significant factor in profitability, it points to a potential conflict between financial performance and social performance. Capital asset ratio relates positively with social performance while asset structure exhibits a negative relationship. Lastly, education relates positively with social efficiency of MFIs a result that could hold given that awareness could allow poor and financially excluded people to regularly engage with the providers of financial services.

### 4.2 Financial efficiency

MFIs in Africa are barely financially sustainable, with marginal disparities between the legal types. On a scale of zero to one, the mean and median financial efficiency scores are 0.42 and 0.41, respectively. Rural banks have the highest median financial efficiency score (0.419), followed by cooperatives (0.415) and NGOs (0.408), while commercial banks (0.406) and Non- Bank Financial Institutions (NBFIs) (0.402) trail. Again, the capital structure is not a significant driver of financial efficiency. Instead, the drivers of financial efficiency are operating expense to assets ratio, capital to assets ratio, asset structure and education. Operating expenses, asset structure and education all vary negatively with financial performance. Operating expenses dominate the expense item on the income statement, while higher asset structure means the MFI dedicates a substantial amount cash to finance non-current assets which takes time to recoup. Capital asset ratio varies positively with financial performance, social performance, and joint financial and social performance. Education would proxy the customer base, with the more exposed the populace, the less they get financial services from MFIs, preferring the mainstream financial system instead. These results are in line with some line of research on the financial sustainability of MFIs across the globe (Bayai and Ikhide, 2016).

### 4.3 Social and Financial Efficiency

The joint financial and social efficiency scores follow those of social efficiency. The mean and median efficiency score is 0.92 but varies with the legal type of MFI. NGOs lead with a median efficiency score of 0.959, followed by NBFIs (0.915), Commercial Banks (0.908), Rural Banks (0.897), and Cooperatives/ Credit Unions (0.890). As with social efficiency, capital structure- the debt-equity mix and donations are not significant drivers of social efficiency. The ratio of operating expense to assets relates negatively to social efficiency. Lastly, education relates positively with social efficiency of MFIs.

## Method

The study adopts a quantitative approach with the model specified next.

### 5.1 The Empirical Model

We primarily use the random-effects model as per the results of the Hausman Test (see Appendix 2 and 3). For robustness, however, we also run fixed effects, the pooled OLS, the between estimator, the first difference. We estimate the following model.

<1>

represents the dependent variable which takes the form of efficiency scores from the data envelopment analysis (DEA) model. In computing DEA, we follow the intermediation approach, where the inputs are net fixed assets, operating expenses to assets ratio, deposits to total assets ratio, liabilities and equity, and donations. The outputs comprise of the per cent of female borrowers, average loan balance per borrower, gross loans to total assets ratio, and the operational self-sufficiency (OSS). These input and output variables are described in more detail in section 5.1, together with the mechanics of the DEA model in part 5. on the other hand, represents the set of independent variables as follows described in Table 1 below.

### 5.2 Data, Data Sources and Description of Variables

We source our data from the Microfinance Information Exchange (MIX) pooled database. The dataset used in this article consists of 705 MFIs across Africa. While the MIX data is not a comprehensive representation of the microfinance industry in Africa, it does provide general trends in the sector (Jarotschkin, 2013).

Table **: Description of variables for the regression model**

|  |
| --- |
| **INDICATOR NAME, DESCRIPTION, AND DATA SOURCE**  Most of the data is from the Microfinance Information Exchange (MIX) pooled database (See note 1) unless otherwise stated. Again, unless otherwise indicated, the bulk of the data is at firm (MFI) level. We explicitly state the country-level variables. |
| 1. **DEPENDENT VARIABLE** |
| **Efficiency scores:** The efficiency scores derive from the Data Envelopment Analysis (DEA) model where each of the MFIs is a decision-making unit (DMU) that converts multiple inputs into outputs. The efficiency scores derive from the relative annual configuration of inputs and outputs per MFI in the sample, as listed below.  **Inputs for the DEA efficiency scores:** Following the intermediation approach, we use the following variables as inputs,   * Liabilities and equity/ Assets: Liabilities and equity, an equivalent of total assets capture all the sources of funding for the MFI- including debt, equity, deposits, donations, and subsidies at the end of the reporting period. Liabilities and equity is a prominent input for DEA analysis, for instance in studies on efficiency summarised by Fethi and Pasiouras (2010), Paradi et al. (2017), and Fall et al. (2018). * Operating expenses to total assets ratio: This ratio capture the portion of assets per annum used to fund the operations of the MFI that directly generates the financial and social outputs described next. Staff numbers are the main input in several DEA models. In this study, we take operating costs as also subsuming the number of staff.   **Outputs for the DEA efficiency scores:** We classify outputs in both financial and social terms. Social outputs proxy the extent to which MFIs avail financial services to the poor and the financially excluded. Other outputs measure financial sustainability by MFIs. Accordingly, outputs consist of the following variables,  **Social Performance outputs**   * Depth Measures: Percent of female borrowers and average loan size per borrower: The percentage of women borrowers as a measure of social efficiency draws from the fact that women form the bulk of the population that is extremely poor and hence financially excluded. Researchers have used the average loan size to proxy social performance as poor people will often borrow small amounts regularly to run their businesses and settle bills. In this case, the lower the average loan balance per borrower, the deeper the outreach (D’Espallier et al., 2017). * Breadth measure: Gross loan portfolio to Total Assets: It is not only enough that an MFI reaches the poorest but also that it does so in scale. For this reason, we include the ratio of the gross loan portfolio to total assets as a measure of the breadth of outreach.   **Financial sustainability output**   * Operational self-sufficiency (OSS): Operational self-sufficiency (OSS): The OSS captures the extent to which an MFI meets its financial objectives by generating financial returns that can cover all the expenses. MIX defines the OSS as follows, |
| 1. **INDEPENDENT VARIABLES**   The independent variables are as follows, |
| **Age:** The period in which the MFI has been in operation. MIX classifies MFIs into three groups: new, young, and mature. The variable enters the model as a dummy. We hypothesise that older, and hence larger MFIs are more likely to be more efficient given they can draw from economies of scale, hire better managers, and have a long experience in running microfinance programs. |
| **Asset structure:** Asset structure is the ratio of non-current (fixed) assets to total assets of an MFI. Firms with a lower ratio are likely to release more funds for lending and hence better social and financial performance. |
| **Current Legal Status:** We create a dummy with the MFIs following the NGO Model getting a code of zero, and consecutive numbers from one in the case of non-bank financial institutions (NBFIs), rural banks, and credit unions/ cooperatives and others. |
| **Donations:** The variable captures the donations that an NFI receives per annum. We propose that MFIs that get more donations and subsidies have higher social performance metrics and lower financial performance metrics. Donors and governments usually would stress outreach to the poor, although the paradigm shift to the institutional approach is taking root where financial sustainability is also gaining prominence. |
| **Governance/ Institutional Quality (KKM):** We take the first principal component of the WGI developed by Kaufmann et al. (2011)(KKM) (See note 3). The proposition is that MFIs located in countries with better governance are also likely to have better internal governance which translates to better financial and social performance.  **Leverage:** We use the following measures of leverage; debt to equity ratio and the square of debt to equity ratio to allow for non-linearity. |
| **Size:** We proxy the size of MFI with the natural logarithm of total assets. We propose that larger firms should be more efficient due to economies of scale and scope. |
| **Operating expense to total assets ratio:** This ratio shows the operating expense to total assets ratio (Gutiérrez-Nieto et al., 2009). A lower ratio relative to the financial and social outputs raises the overall efficiency of an MFI but could negatively lower financial efficiency.  **Capital to Assets Ratio:** The ratio captures the equity contribution as a proportion of the total assets of an MFI. |
| **Notes:**   1. The Microfinance Information Exchange (MIX) data on microfinance institutions across the globe, [www.themix.org](http://www.themix.org). 2. The World Development Indicators (WDI) database of the World Bank is available at, <https://databank.worldbank.org/source/world-development-indicators>. 3. The Worldwide Governance Indicators (WGI), of the World Bank, is available at <https://databank.worldbank.org/source/worldwide-governance-indicators>. 4. Global Financial Development Database of the World Bank available at <https://www.worldbank.org/en/publication/gfdr/data/global-financial-development-database> |

**Source: Authors' Constructions**

## Estimation of Efficiency Scores

In this section, we begin, by highlighting the DEA model, followed by a description of the inputs and outputs for the model in section 5.2. Next, we detail the outputs for the DEA model.

*6.1 The DEA Model*

The study adopts the Data Envelopment Analysis (DEA) technique to estimate both the financial and social efficiencies for a given MFI in each period. Charnes et al. (1978), Charnes et al. (1981) formulated the traditional data envelopment analysis (DEA) by following the ideas of Farrell (1957). Unlike the other measures of financial and social performance of MFIs, DEA quantifies the (inverse) agency costs without being confounded by factors that are not related to agency costs (Berger and Bonaccorsi di Patti, 2006). A significant advantage of DEA is that it is not prone to the standard econometric problems because it is a deterministic and non-parametric enveloping technique. In DEA, for instance, the researcher does not have to specify a functional form, estimate parameters, or define an error term. Finally, DEA makes no distinction between dependent and independent variables (Zhou et al., 2007).

DEA requires the resolution of the following linear programming model.

*≤1*

In this case, n is the output number, and m the output number. is the weight of n and is the weight of n. Besides, and represent the weight of m and output of m, respectively.

When researchers run DEA assuming constant returns to scale (CRS), the resulting output represents the technical efficiency (TE). Technical efficiency stands for the efficiencies due to input-output configurations and size of operations. Under variable returns to scale, the output is the score is the pure technical efficiency (PTE)- the efficiency arising from input-output configuration while ignoring the scale of operations (Staub et al., 2010, Ulas and Keskin, 2015). Additionally, input-oriented DEA seeks to minimise inputs for a given level of output, while in the case of output-oriented DEA, the goal is to maximise outputs for a given level of inputs with the choice of the orientations based on the variables- inputs or outputs- that managers have the most control over (Huguenin, 2012).

* 1. *The Inputs and Outputs for the DEA model*

We have three sets of output metrics: social efficiency, financial efficiency, and joint financial and social efficiency. We have two levels social efficiency; depth of outreach, that is, outreach to the poor and the financially excluded, and the breadth of outreach. We use the per cent of female borrowers and average loan size to capture the depth of outreach. Gross loans capture the breadth of outreach. Finally, we use operational self-sufficiency (OSS) to capture financial sustainability (see Table 1).

Table 2 shows the summary statistics and correlation matrices for the inputs and outputs of the DEA model. Table 2 captures the raw data for the inputs and outputs for the DEA. However, these data cannot be applied to DEA as they are. Hence, in line with Avkiran (2006), we take logarithms of the data. To eliminate zeros and negatives, we add a significantly large number to each variable that has zeros or negatives. Specifically, to eliminate zeros, we add three (3) to each variable (Ataullah and Le, 2006). We then run the DEA model on the transformed variables. In the next section, we describe the levels of efficiency observed among MFIs in Africa. We also discuss the results of the regression model on the drivers of the efficiency of MFIs in Africa.

Table **: Summary Statistics for Raw Inputs and Outputs of the DEA Model**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Variable | N | % Complete | Mean | SD | Min | Q1 | Median | Q3 | Max | 1 | 2 | 3 | 4 | 5 | 6 |
| 1 | Liabilities and Equity | 4550 | 0.95 | 46996628.53 | 338862995.9 | 0 | 778964.25 | 2978655 | 14207431 | 9538256131 | 1 |  |  |  |  |  |
| 2 | Operating Expense to Assets | 4227 | 0.88 | 0.23 | 0.2 | 0 | 0.12 | 0.18 | 0.29 | 2.52 | -0.05 | 1 |  |  |  |  |
| 3 | Per cent of Female Borrowers | 4128 | 0.86 | 0.58 | 0.25 | 0 | 0.39 | 0.57 | 0.77 | 1 | -0.08 | 0.31 | 1 |  |  |  |
| 4 | Average Loan Balance per Borrower | 4476 | 0.94 | 895 | 7332.11 | 0 | 142 | 335 | 776.5 | 400764 | 0.14 | -0.01 | -0.05 | 1 |  |  |
| 5 | Gross Loan Portfolio to Total Assets | 4678 | 0.98 | 0.65 | 0.71 | 0 | 0.5 | 0.65 | 0.78 | 27.42 | 0 | 0.01 | 0.08 | 0 | 1 |  |
| 6 | Operational Self-Sufficiency | 4487 | 0.94 | 1.09 | 0.89 | -1.31 | 0.81 | 1.06 | 1.25 | 31.96 | 0.04 | -0.19 | -0.03 | 0 | 0.07 | 1 |
| Notes:   1. We use liabilities and equity and operating expense to assets as inputs. The other variables are outputs. 2. Liabilities and equity capture all the capital components - equity, short term and long-term debt, and donations. 3. The transformation of the variables for DEA analysis involved (i) putting the data on a similar scale as suggested by Holod and Lewis (2011). 4. We eliminate zeros and negatives by adding a sufficiently large value, in our case, three. 5. For data scaling, we adjusted the data by taking the logarithm of all the values. 6. Note that there are no highly correlated variables. We hence include all the inputs and outputs in the DEA analysis. | | | | | | | | | | | | | | | | |

## Results

### 7.1 The Performance of MFIs in Africa

We examine the indicators of financial and social performance by MFIs in Africa. Here, we take the individual measures of performance- per cent of female borrowers, average loan balance per borrower, gross loans to assets and operational self-sufficiency. While the examination of variables does not explicitly measure efficiency (we do this in a later section using DEA), they illustrate the extent to which MFIs fare in their mission. First, Table 2 (above) represents the descriptive statistics. We visualise the data and describe the scope of both financial and social performance, followed by a discussion of the results of the DEA efficiency scores. Next, we discuss the levels of efficiency by MFIs based on the DEA scores. Finally, we then layout and describe the results of the regression model.

#### 7.1.1 The Financial Performance of MFIs in Africa

Figure 1 shows the bean plot (Kampstra, 2008) on the operational self-sufficiency (OSS) among MFIs in Africa. The results indicate that most there are as many MFIs that are financially sustainable as there are those that are not sustainable with significant variations in the among legal types and regions. Based on the median, rural banks, and commercial banks, respectively, exhibit a higher level of operational self-sufficiency followed by NGOs. Cooperatives and NBFIs have the lowest median OSS in that order.

Cooperatives followed by NGOs and NBFIs exhibit the highest disparities in the level of OSS going by the tails of the plots. For instance, cooperatives have both the highest and the lowest MFIs in terms of OSS, followed by other legal types. Overall, there is not a marked difference in the median OSS among the legal types of MFIs. The observation is peculiar. If the proposition by the welfare school were correct, then we expect a significant difference in financial performance between NGOs and other legal types, and not the present scenario where NGOs lie second in terms of median OSS. The visualisation of the data is then supportive of the win-win school- MFIs can successfully pursue both financial and social goals without many trade-offs, as the discussion on the social performance of MFIs that follows shows.

#### 7.1.2 The Social Performance of MFIs in Africa by Legal Status

The proportion of female borrowers is one of the critical metrics that researchers use to proxy social performance. NGOs have the highest median proportions of female borrowers, followed by NBFIs (Figure 2). The shape of the violins displays the distribution, in this case, among women borrowers. The distribution of the proportion of female borrowers' skews towards unity for NGOs relative to other legal types and hence the funnel shape.

The finding collaborates the observation that the highest median percentage of female borrowers is in North Africa, which is represented by NGOs in the sample (see figure 6). From this perspective, it appears like the concerns of the welfare school are warranted. If mission drift were to occur upon conversion of NGOs to commercial entities, it would be a hammer blow to financial inclusion to women in this scenario. Commercial banks and Rural banks have roughly equal median proportions of female borrowers. Credit unions have the least proportion of female borrowers, perhaps indicative of their nature of lending to closed groups of people with common occupations or geographic backgrounds and hence less emphasis on social performance. Notable though is that there exist MFIs that lend almost exclusively to males or females only.

Another metric that researchers often use to measure the social impact of MFIs is the average loan balance per borrower. In this case, the lower the balance, the better the MFI reaches the poorest and the financially excluded, who often borrow tiny amounts to carry their informal businesses or settle bills (Demirguc-Kunt et al., 2018). A criticism of the average loan balance as a measure of social performance is its indirectness (Morduch, 2000), the failure to address the clients who get better off progressively and hence demand larger loans. Again, the average loan balance gets affected by extreme values of loans (Goedecke et al., 2016, Beisland et al., 2020). A case in point is where big firms, which form 0.1 % of MFI clients access 14% of the gross loan portfolio (Microfinance Information Exchange (MIX), 2019).

Figure 3 below shows the average loan balances by the legal status of MFIs in Africa. The figure is in ascending order. The lowest median average balances are those of NGOs and other forms of MFIs indicating higher social efficiency. On the extreme, commercial banks have the highest average loan balances, followed by cooperatives/ credit unions and then NBFIs. These results are consistent with those of social efficiency measured using the per cent of female borrowers where commercial banks and credit unions serve a lower proportion of women.

We now turn to the breadth of outreach measured by the gross loan portfolio advanced by MFIs (Figure 4). Note that we take the logarithm of the gross loans to total assets for all MFIs. The means and the medians for each of MFI legal types are roughly equal. Across the legal types, there is not much disparity in the mean and median loan sizes. However, cooperatives exhibit a wide variation in the gross loans provided, probably due to their differing sizes based on their membership or geographic location. NGOs come second in terms of disparity of loan sizes followed by NBFIs and commercial banks. Rural banks and other forms of MFIs exhibit the least deviation.

Figure : Financial and Social Performance

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|  |  |

#### 7.1.3 DEA Efficiency Scores

We run the efficiency scores using bootstraps as proposed by Fethi and Pasiouras (2010). Table 3 shows a summary output of the efficiency scores for MFIs in Africa. Given that the model is output-oriented, the interpretation is as follows; given a set of inputs, to what extent are MFIs able to maximise output? Given the nature of MFIs as hybrid enterprises, we take the maximisation of outputs as more relevant for this study as we examine the extent to which MFIs reach the financially excluded sustainably. The first column represents the social efficiency scores- measured using average loan balance and per cent of women borrowers. The second column also measures social efficiency but also incorporates the breadth of outreach measured via gross loans to total assets. Column three measures financial efficiency captured using operational self-sufficiency. Column four measures social and financial efficiency- without including breadth of outreach, while the last column measures social and financial efficiency but also includes the breadth of outreach.

Overall, financial efficiency appears to have the highest range. Also, the combined social and financial efficiency does not improve much from the social efficiency alone, meaning that financial efficiency does not add much to the overall efficiency. Similarly, the inclusion of the breadth of outreach does not improve the overall efficiency. The correlation coefficients also show that financial and social performance metrics are not tightly coupled.

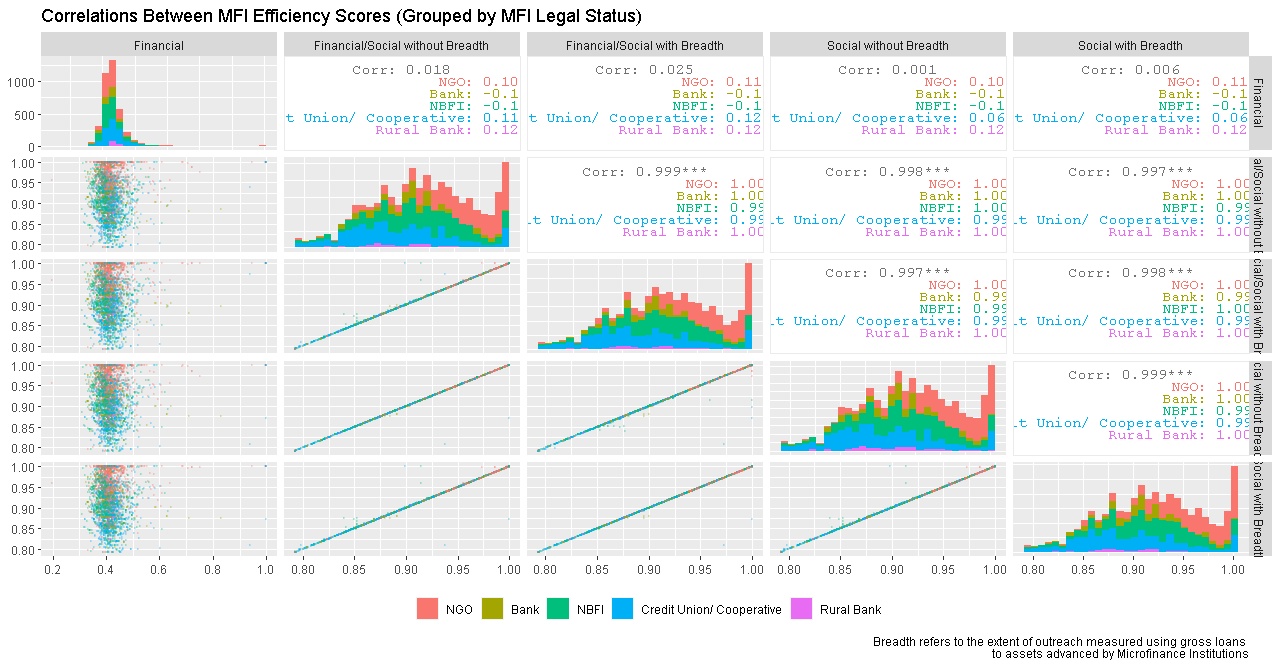
Further, Figure 2 -6 below show the visualisations for the efficiency metrics. Figure 2 shows the correlation coefficients between financial efficiency, social efficiency and combined financial and social efficiency faceted by legal status of MFIs. Social efficiency and joint financial and social efficiency are highly correlated. Financial efficiency is not highly correlated with the rest. Except for NGOs and rural banks, the correlation between financial efficiency on one hand, and social efficiency and joint financial and social efficiency on the other hand, is negative. The results suggest NGOs and rural banks strike a better balance between financial and social goals, although the relationship is weak.

In Figure 4, we plot the median financial and social performance of MFIs faceted by age. Across all age groups, NGOs fare better socially. Credit unions and rural banks fare better financially but fare the worst socially, as Figure 3 also shows. NBFIs consistently fare the worst financially. NGOs appear better placed in balancing between financial performance and social performance while the trade-off between financial and social performance is apparent. Finally Figure 5 and Figure 6 shows a worsening financial and social positioning of MFIs, except for commercial banks. It means that embracing neo-liberalism may be harming social performance while not helping improve financial performance either.

Table **: Summary Statistics and Pairwise correlations: Dependent and Independent Variables**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | Variable | Complete Rate | Mean | SD | Min | Q1 | Median | Q3 | Max | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 |
| 1 | Financial Efficiency | 80% | 0.42 | 0.05 | 0.20 | 0.39 | 0.41 | 0.43 | 1.00 | 1.00 |  |  |  |  |  |  |  |  |  |  |  |
| 2 | Social Efficiency (No Breadth) | 80% | 0.92 | 0.05 | 0.79 | 0.88 | 0.92 | 0.96 | 1.00 | -0.04 | 1.00 |  |  |  |  |  |  |  |  |  |  |
| 3 | Social Efficiency (With Breadth) | 80% | 0.92 | 0.05 | 0.79 | 0.88 | 0.92 | 0.96 | 1.00 | -0.03 | 1.00 | 1.00 |  |  |  |  |  |  |  |  |  |
| 4 | Financial and Social Efficiency (No Breadth) | 80% | 0.92 | 0.05 | 0.79 | 0.88 | 0.92 | 0.96 | 1.00 | -0.02 | 1.00 | 1.00 | 1.00 |  |  |  |  |  |  |  |  |
| 5 | Financial and Social Efficiency (With Breadth) | 80% | 0.92 | 0.05 | 0.79 | 0.88 | 0.92 | 0.96 | 1.00 | -0.02 | 1.00 | 1.00 | 1.00 | 1.00 |  |  |  |  |  |  |  |
| 6 | Operating Expense to Assets | 88% | 0.23 | 0.20 | 0.00 | 0.12 | 0.18 | 0.29 | 2.52 | -0.30 | 0.31 | 0.31 | 0.31 | 0.31 | 1.00 |  |  |  |  |  |  |
| 7 | Debt to Equity Ratio | 95% | 3.22 | 60.13 | -3567.28 | 0.84 | 2.39 | 5.01 | 585.24 | -0.01 | 0.01 | 0.01 | 0.01 | 0.01 | 0.03 | 1.00 |  |  |  |  |  |
| 8 | Donations to Assets Ratio | 90% | 0.05 | 0.15 | 0.00 | 0.00 | 0.00 | 0.02 | 2.60 | -0.09 | 0.20 | 0.20 | 0.20 | 0.19 | 0.38 | -0.01 | 1.00 |  |  |  |  |
| 9 | Capital to Asset Ratio | 98% | 0.32 | 0.61 | -18.35 | 0.15 | 0.27 | 0.49 | 12.15 | 0.08 | 0.18 | 0.20 | 0.18 | 0.20 | 0.11 | -0.05 | 0.17 | 1.00 |  |  |  |
| 10 | Asset Structure | 87% | 0.08 | 0.07 | 0.00 | 0.03 | 0.06 | 0.10 | 0.86 | -0.11 | 0.00 | 0.00 | 0.00 | 0.00 | 0.13 | -0.02 | 0.10 | 0.01 | 1.00 |  |  |
| 11 | Institutional Quality - KKM | 94% | 0.01 | 2.06 | -5.23 | -1.40 | -0.21 | 1.72 | 7.37 | 0.08 | -0.15 | -0.15 | -0.15 | -0.15 | -0.09 | -0.04 | -0.03 | 0.03 | -0.08 | 1.00 |  |
| 12 | Education | 90% | 0.39 | 0.15 | 0.07 | 0.27 | 0.38 | 0.49 | 1.05 | 0.03 | 0.12 | 0.12 | 0.12 | 0.12 | -0.08 | 0.04 | -0.08 | -0.07 | -0.09 | -0.25 | 1.00 |
| Notes:  We capture efficiency using the output-oriented data envelopment analysis (DEA) technique. The inputs and outputs used in generating DEA scores are listed below.  (%) The inputs in all cases are liabilities and equity and operating expense to assets ratio.  (#) For financial efficiency, the output is operational self-sufficiency (OSS).  (\*) For social efficiency, the outputs are measures of depth of outreach- the proportion of female borrowers, and average loan balance per borrower.  ($) The computation of DEA scores in this case also includes gross loans as a score for the breadth of outreach in addition to the measures of depth. | | | | | | | | | | | | | | | | | | | | | |

Figure : Correlation Table for DEA Efficiency Scores



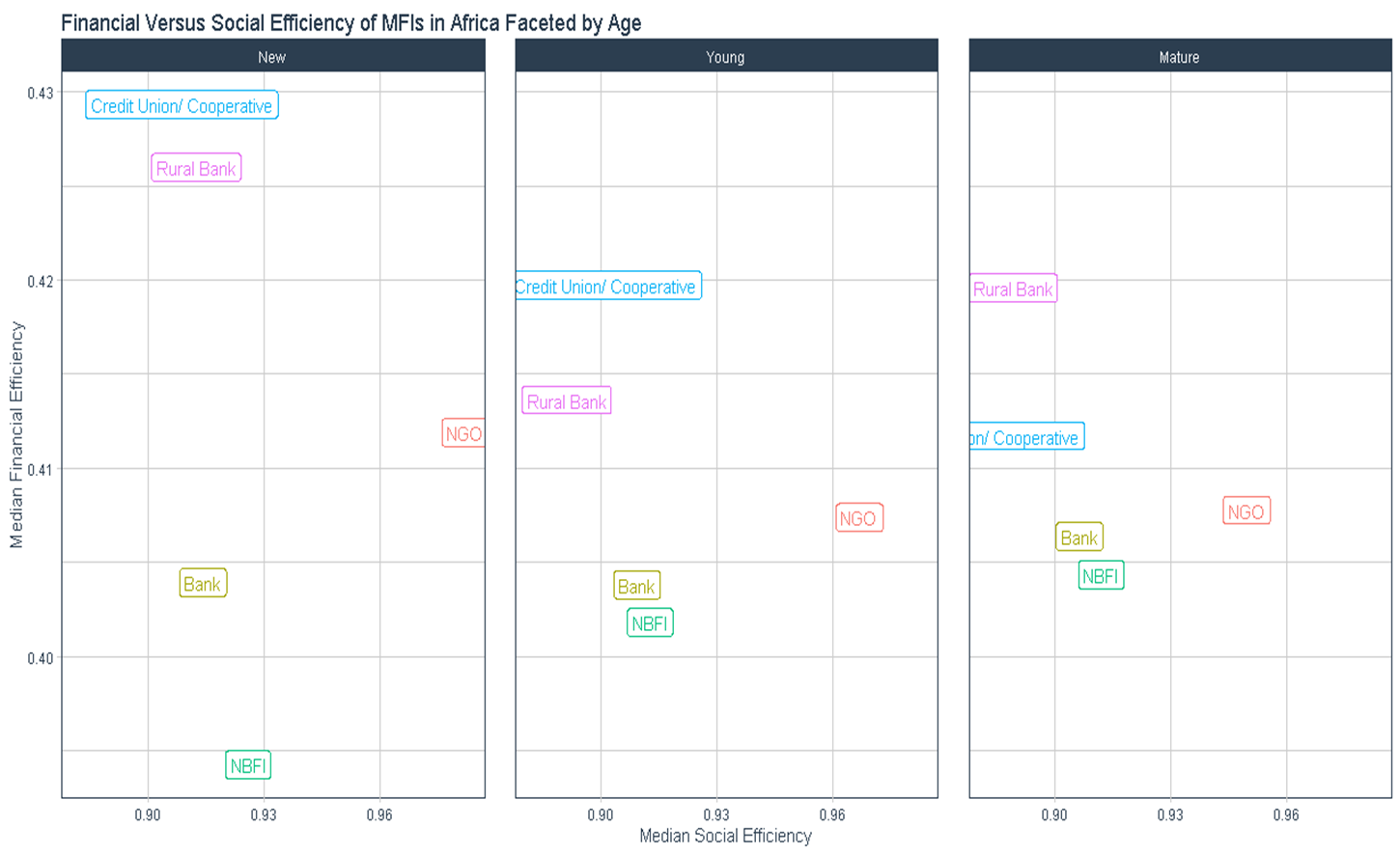
Source: Authors’ construction from the MIX data

Figure : Financial and Social Efficiency (DEA Scores)

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|  |  |

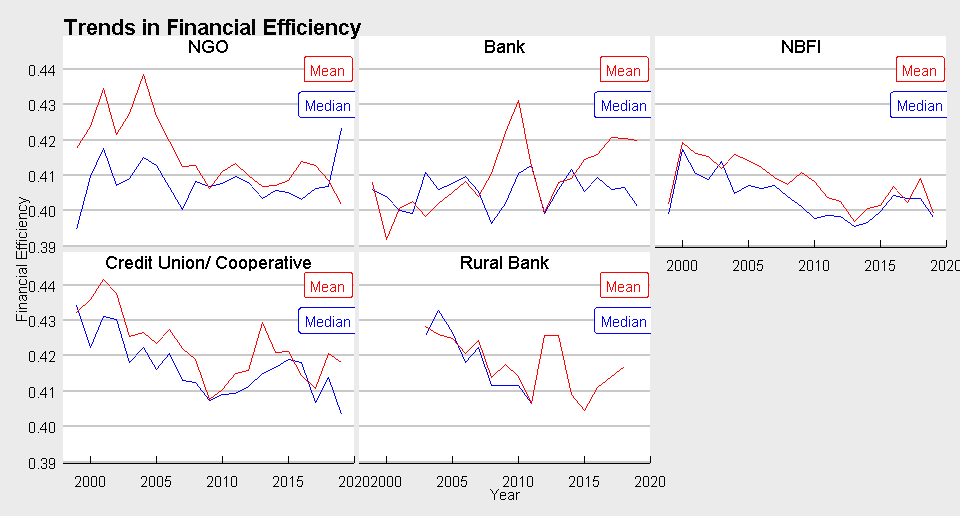
Source: Authors’ construction from the MIX data

Figure : Comparative Financial and Social Performance of MFIs by Legal Status

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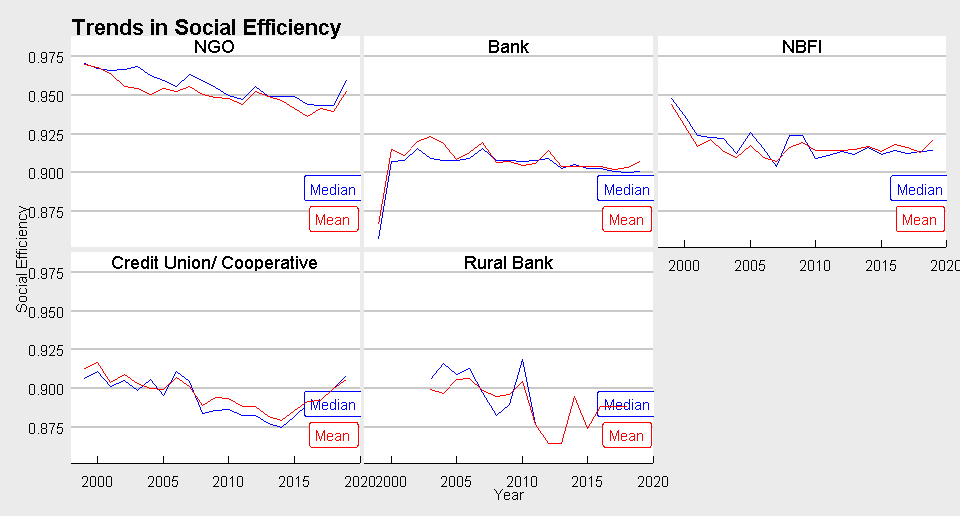
Source: Authors’ construction from the MIX data

Figure : Trends in Financial Efficiency (1999 – 2019)



Source: Authors’ construction from the MIX data

Figure : Trends in Social Efficiency (1999 – 2019)



Source: Authors’ construction from the MIX data

Figure 5 shows a trend of declining financial performance over time for all but commercial banks while figure 6 shows a similar trend for social performance. The results may point to the harm that neo-liberalism, commercialization, or other unidentified macro-economic factors have on the financial and social output of MFIs. Figure 9 shows that NGOs have the highest levels of social efficiency followed by NBFIs and other forms of MFIs, while rural banks and credit unions respectively are the least efficient going by the median efficiency scores. The literature on the welfare theory of microfinance supports this observation. The bell shape of the NGO plot indicates that NGOs overwhelmingly emphasise social performance. Again, figure 10 visualises social performance with the breadth of outreach using gross loans included. Again, NGOs dominate pointing to their focus both in terms of breadth and depth of outreach.

In figure 11, we combine the social and financial metrics- with the social metric excluding gross loans, the measure of the breadth of outreach, a similar pattern where NGOs dominate repeats. When we use both the breadth and depth of outreach and operational self-sufficiency to generate a social and financial efficiency metric, NGOs still dominate. Again, Figure 13 below shows that the median financial efficiency metric is highest for NGOs, which is an oddity given that we would expect commercial firms to dominate.

It is also possible that donations and subsidies play a significant role in upping the financial health exhibited by NGOs relative to other legal forms of MFIs. It is worth noting that on an absolute level, MFIs are hardly financially sustainable regardless of their legal form- but NGOs are relatively better off (see Figure 1). Overall, these results are not supportive of the mission drift hypothesis so far. In the next section, we detail the regression output from the drivers of the efficiency of MFIs in Africa.

### Drivers of the Financial and Social Efficiency of MFIs in Africa

This section provides results from the regression models on the drivers of financial and social efficiency.

7.2.1 Drivers of Social Efficiency of MFIs

Table 4 (below) shows the regression results. In this section, we focus on the social efficiency. Social efficiency has two dimensions, breadth, and depth. In computing DEA scores for depth, we used percent of female borrowers and average loan balance per borrower. An MFI has deeper outreach if it reaches more women given that they form the majority of the financial excluded due to social and cultural conditions in Africa. Researchers use the average loan balance to proxy depth with a lower value associated with deeper outreach although some scholars are critical of the metric. To capture breadth, we use the gross loans to total assets which shows the scale of outreach (Beisland et al., 2020). An MFI with greater gross loans to assets reaches more people by offering more loans or offering loans of larger values or both. Given that both depth and breadth are desirable we combine the metrics to capture social efficiency including breadth.

The significant drivers of social efficiency are legal status, operating expense to assets, capital to assets ratio, and education. All else held constant, NGOs have the highest level of social performance both in terms of depth and breadth. NBFIs, commercial banks and rural banks follow, while credit unions trail. The results are consistent with the data visualizations. Credit unions have the set objective of serving subscribed members within a set geographic location or common professional background and it is not their mission to explicitly target social performance (Mathuva et al., 2017). The issue here is between NGOs and the other commercial entities excluding credit unions. Although the gaps in social performance are not wide, the results illustrate that MFIs that exclusively target social performance tend to achieve more in that respect. Hence the role of the mission of an MFI is central to achieving social objectives in line with research by Berbegal-Mirabent et al. (2019).

Operating expense to assets ratio positively relates to social performance – which appears trivial given that MFIs must spend more to be able to reach to the financially excluded. As the literature shows, serving the poor is expensive as they are in remote geographic location and often dispersed (Armendáriz and Morduch, 2010). However, as we discuss later (section), operating expenses have a direct bearing on profits and hence higher operating expenses conflict with financial sustainability which implies mission drift.

Capital to assets ratio, captured using the equity capital to assets ratio, also positively relates to social performance. The implication is that firms that are better capitalized better achieve social objectives. However, to increase equity capital MFIs ought to enter mainstream capital markets where financial performance plays a key role is successful securities subscription. Lastly, education positively drives social performance, meaning that a better educated MFI consumer base benefits more from the MFI programs.

Financial literacy could be the key. However, the objective of MFIs is not to serve the already well-off financially, but rather to uplift the poor and financially excluded to be able to participate in the formal economic system. Nevertheless, education appears an important catalyst which points to the need for a multifaceted approach to tackling financial exclusion that involves MFIs, governments, and other stakeholders involved in development to deliver not just financial inclusion products but a broader set of services for sustainable development. The result is largely consistent with prior research although age and size do not appear as important in Africa (Hermes and Hudon, 2018, Gutiérrez-Nieto et al., 2009).

Table : Random Effects Model

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Full Data |  |  |  | Years >= 3 | | | | | Years >= 5 | | | | |
| Variable | Financial  Eff | Finsoc  No Breadth | Finsoc  With Breadth | Social Eff  With Breadth | Social Eff  No Breadth | Financial  Eff | Finsoc  No Breadth | Finsoc  With Breadth | Social Eff  With Breadth | Social Eff  No Breadth | Financial  Eff | Finsoc  No Breadth | Finsoc  With Breadth | Social Eff  With Breadth | Social Eff  No Breadth |
| (Intercept) | 0.4308\*\*\* | 0.9271\*\*\* | 0.9249\*\*\* | 0.9275\*\*\* | 0.9254\*\*\* | 0.4315\*\*\* | 0.9275\*\*\* | 0.9253\*\*\* | 0.9279\*\*\* | 0.9257\*\*\* | 0.4323\*\*\* | 0.9279\*\*\* | 0.925\*\*\* | 0.9279\*\*\* | 0.9249\*\*\* |
|  | (0.014) | (0.014) | (0.014) | (0.014) | (0.014) | (0.014) | (0.014) | (0.014) | (0.014) | (0.014) | (0.012) | (0.014) | (0.014) | (0.014) | (0.014) |
| Current Legal Status: Bank | 0.0044 | -0.0413\*\*\* | -0.0408\*\*\* | -0.0414\*\*\* | -0.0411\*\*\* | 0.0045 | -0.0405\*\*\* | -0.04\*\*\* | -0.0406\*\*\* | -0.0403\*\*\* | -0.0062 | -0.0397\*\*\* | -0.0393\*\*\* | -0.0397\*\*\* | -0.0393\*\*\* |
|  | (0.007) | (0.009) | (0.009) | (0.009) | (0.009) | (0.007) | (0.009) | (0.009) | (0.009) | (0.009) | (0.005) | (0.009) | (0.009) | (0.009) | (0.009) |
| Current Legal Status: NBFI | -0.006 | -0.0351\*\*\* | -0.0343\*\*\* | -0.035\*\*\* | -0.0343\*\*\* | -0.0075 | -0.0335\*\*\* | -0.0327\*\*\* | -0.0335\*\*\* | -0.0327\*\*\* | -0.0093\*\* | -0.0336\*\*\* | -0.033\*\*\* | -0.0336\*\*\* | -0.033\*\*\* |
|  | (0.005) | (0.006) | (0.006) | (0.006) | (0.006) | (0.005) | (0.006) | (0.006) | (0.006) | (0.006) | (0.004) | (0.007) | (0.007) | (0.007) | (0.007) |
| Current Legal Status: Credit Union | 0.003 | -0.0505\*\*\* | -0.0496\*\*\* | -0.051\*\*\* | -0.0502\*\*\* | 0.0027 | -0.0497\*\*\* | -0.0488\*\*\* | -0.0502\*\*\* | -0.0494\*\*\* | -0.0046 | -0.0479\*\*\* | -0.0472\*\*\* | -0.0479\*\*\* | -0.0472\*\*\* |
|  | (0.005) | (0.006) | (0.006) | (0.006) | (0.006) | (0.005) | (0.006) | (0.006) | (0.006) | (0.006) | (0.004) | (0.007) | (0.007) | (0.007) | (0.007) |
| Current Legal Status: Rural Bank | -0.0005 | -0.0494\*\*\* | -0.0487\*\*\* | -0.0493\*\*\* | -0.0487\*\*\* | -0.0002 | -0.0462\*\*\* | -0.0455\*\*\* | -0.0461\*\*\* | -0.0454\*\*\* | -0.0014 | -0.0544\*\*\* | -0.0535\*\*\* | -0.0544\*\*\* | -0.0535\*\*\* |
|  | (0.011) | (0.013) | (0.013) | (0.013) | (0.013) | (0.011) | (0.014) | (0.014) | (0.014) | (0.014) | (0.011) | (0.019) | (0.019) | (0.019) | (0.019) |
| Age: Young | 0.0035 | -0.0018 | -0.0016 | -0.0018 | -0.0015 | 0.0042 | -0.0016 | -0.0014 | -0.0016 | -0.0014 | 0.0051\* | -0.0018 | -0.0016 | -0.0018 | -0.0016 |
|  | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) |
| Age: Mature | 0.0024 | -0.0008 | -0.0004 | -0.0008 | -0.0004 | 0.0033 | -0.0007 | -0.0003 | -0.0007 | -0.0003 | 0.0063\*\* | -0.0006 | -0.0002 | -0.0006 | -0.0002 |
|  | (0.004) | (0.004) | (0.004) | (0.004) | (0.004) | (0.004) | (0.004) | (0.004) | (0.004) | (0.004) | (0.003) | (0.004) | (0.004) | (0.004) | (0.004) |
| Region: Africa | 0.0076 | 0.0196\* | 0.0198\* | 0.0194\* | 0.0194\* | 0.0071 | 0.0187\* | 0.0188\* | 0.0184 | 0.0185\* | 0.0047 | 0.0202\* | 0.0204\* | 0.0202\*\*\* | 0.0204\* |
|  | (0.010) | (0.011) | (0.011) | (0.011) | (0.011) | (0.010) | (0.011) | (0.011) | (0.011) | (0.011) | (0.007) | (0.012) | (0.012) | (0.012) | (0.012) |
| Operating Expense to Assets | -0.0646\*\*\* | 0.0213\*\*\* | 0.0202\*\*\* | 0.0211\*\*\* | 0.0199\*\*\* | -0.0658\*\*\* | 0.0219\*\*\* | 0.0208\*\*\* | 0.0217\*\*\* | 0.0205\*\*\* | -0.065\*\*\* | 0.0218\*\*\* | 0.0204\*\*\* | 0.0218\*\*\* | 0.0205\*\*\* |
|  | (0.008) | (0.007) | (0.007) | (0.007) | (0.007) | (0.008) | (0.008) | (0.007) | (0.008) | (0.008) | (0.007) | (0.008) | (0.008) | (0.008) | (0.008) |
| Donations to Assets Ratio | -0.0062 | -0.0019 | -0.0023 | -0.0019 | -0.0023 | -0.0055 | -0.002 | -0.0023 | -0.0019 | -0.0023 | -0.0018 | -0.0016 | -0.0021 | -0.0016 | -0.002 |
|  | (0.008) | (0.007) | (0.007) | (0.007) | (0.007) | (0.008) | (0.007) | (0.007) | (0.007) | (0.007) | (0.008) | (0.007) | (0.007) | (0.007) | (0.007) |
| Debt to Equity Ratio | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
|  | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Capital to Asset Ratio | 0.0061\*\*\* | 0.0005 | 0.0037\*\* | 0 | 0.0032\*\* | 0.0060\*\*\* | 0.0005 | 0.0038\*\* | 0.0001 | 0.0033\*\* | 0.0049\*\*\* | -0.001 | 0.0035\* | -0.001 | 0.0035\* |
|  | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |
| Asset Structure | -0.079\*\*\* | -0.0025 | -0.0035 | 0.0004 | 0.0002 | -0.0800\*\*\* | -0.0012 | -0.0022 | 0.0017 | 0.0016 | -0.0715\*\*\* | 0.0032 | 0.0021 | 0.0032 | 0.0021 |
|  | (0.017) | (0.017) | (0.017) | (0.017) | (0.016) | (0.017) | (0.017) | (0.017) | (0.017) | (0.017) | (0.015) | (0.018) | (0.018) | (0.018) | (0.018) |
| Institutional Quality (KKM) | 0.0003 | -0.0007 | -0.0006 | -0.0006 | -0.0006 | 0.0005 | -0.0007 | -0.0007 | -0.0007 | -0.0007 | 0.0003 | -0.001 | -0.0009 | -0.001 | -0.0009 |
|  | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Education | -0.0115 | 0.0377\*\*\* | 0.0385\*\*\* | 0.0374\*\* | 0.0381\*\*\* | -0.0129 | 0.0361\*\* | 0.0369\*\* | 0.0357\*\* | 0.0365\*\* | -0.0176 | 0.0362\*\* | 0.037\*\* | 0.0362\*\* | 0.0371\*\* |
|  | (0.013) | (0.015) | (0.015) | (0.015) | (0.015) | (0.013) | (0.015) | (0.015) | (0.015) | (0.015) | (0.011) | (0.015) | (0.015) | (0.015) | (0.015) |
| Year Effects | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| R-squared | 0.5975 | 0.82455 | 0.8250 | 0.8242 | 0.82467 | 0.5687 | 0.8011 | 0.8017 | 0.8007 | 0.8012 | 0.5406 | 0.6883 | 0.6895 | 0.6881 | 0.6892 |
| Adj.R.squared | 0.5930 | 0.8226 | 0.8231 | 0.8223 | 0.8227 | 0.5638 | 0.7988 | 0.7994 | 0.7984 | 0.7990 | 0.5350 | 0.6845 | 0.6857 | 0.6843 | 0.6854 |
| statistic | 249.8\*\*\* | 238.9\*\*\* | 242.9\*\*\* | 240.5\*\*\* | 243.3\*\*\* | 257.8\*\*\* | 230.3\*\*\* | 234.6\*\*\* | 231.9\*\*\* | 234.9\*\*\* | 324.1\*\*\* | 207.2\*\*\* | 208.7\*\*\* | 207.2\*\*\* | 208.5\*\*\* |
| deviance | 2.4885 | 1.7336 | 1.7374 | 1.7238 | 1.7227 | 2.4617 | 1.7224 | 1.7261 | 1.7127 | 1.7115 | 1.7434 | 1.6341 | 1.6328 | 1.6348 | 1.6347 |
| df.residual | 3078 | 3078 | 3078 | 3078 | 3078 | 3046 | 3046 | 3046 | 3046 | 3046 | 2792 | 2792 | 2792 | 2792 | 2792 |
| nobs | 3113 | 3113 | 3113 | 3113 | 3113 | 3081 | 3081 | 3081 | 3081 | 3081 | 2827 | 2827 | 2827 | 2827 | 2827 |

*Note: \* 10%, \*\* 5%, and \*\*\* 1% significance levels*

*Note: Standard errors in brackets*

\*\*\*There is a strong negative time trend for social efficiency- where social efficiency, joint financial and social efficiency gets worse compared to base year 1999.

Table : Fixed Effects Model

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Financial  Eff | Finsoc  No Breadth | Finsoc  With Breadth | Social  With Breadth | Social  No Breadth |
| Current Legal Status: Credit Union/ Cooperative | -0.0008 | 0.0193 | 0.0191 | 0.0192 | 0.019 |
|  | (0.0218) | (0.0254) | (0.0255) | (0.0254) | (0.0254) |
| Age: Young | 0.0067\*\* | -0.0012 | -0.001 | -0.0012 | -0.001 |
|  | (0.0028) | (0.0026) | (0.0026) | (0.0026) | (0.0026) |
| Age: Mature | 0.0088\*\* | 0.0007 | 0.0011 | 0.0007 | 0.0011 |
|  | (0.0036) | (0.0037) | (0.0037) | (0.0037) | (0.0037) |
| Operating Expense to Assets | -0.0595\*\*\* | 0.0139\* | 0.0126 | 0.0138\* | 0.0125 |
|  | (0.0080) | (0.0077) | (0.0077) | (0.0077) | (0.0077) |
| Donations to Assets Ratio | -0.0039 | -0.0033 | -0.0036 | -0.0033 | -0.0036 |
|  | (0.0080) | (0.0068) | (0.0068) | (0.0068) | (0.0068) |
| Debt to Equity Ratio | 0 | 0 | 0 | 0 | 0 |
|  | (0.0000) | (0.0000) | (0.0000) | (0.0000) | (0.0000) |
| Capital to Assets Ratio | 0.0054\*\*\* | -0.001 | 0.0026\* | -0.0016 | 0.0018 |
|  | (0.0015) | (0.0015) | (0.0015) | (0.0015) | (0.0015) |
| Asset Structure | -0.0977\*\*\* | 0.0055 | 0.0044 | 0.009 | 0.0088 |
|  | (0.0181) | (0.0174) | (0.0174) | (0.0174) | (0.0174) |
| Institutional Quality: KKM | -0.0007 | -0.0002 | -0.0002 | -0.0002 | -0.0002 |
|  | (0.0014) | (0.0015) | (0.0015) | (0.0015) | (0.0015) |
| Education | -0.0398\*\* | 0.0374\*\* | 0.0386\*\* | 0.0371\*\* | 0.0382\*\* |
|  | (0.0187) | (0.0188) | (0.0188) | (0.0188) | (0.0187) |
|  | (0.0114) | (0.0072) | (0.0071) | (0.0072) | (0.0071) |
| Year Effects | Yes\*\*\* | Yes\*\*\* | Yes\*\*\* | Yes\*\*\* | Yes\*\*\* |
| R Squared | 0.0814 | 0.0365 | 0.0369 | 0.0372 | 0.0368 |
| Adjusted R Squared | -0.0445 | -0.0955 | -0.095 | -0.0947 | -0.0951 |
| Statistic | 8.0821\*\*\* | 3.4589\*\*\* | 3.4974\*\*\* | 3.5253\*\*\* | 3.4879\*\*\* |
| Deviance | 2.0408 | 1.512 | 1.5178 | 1.5008 | 1.5022 |
| DF Residual | 2737 | 2737 | 2737 | 2737 | 2737 |
| N | 3113 | 3113 | 3113 | 3113 | 3113 |

*Note: \* 10%, \*\* 5%, and \*\*\* 1% significance levels*

*Standard errors in brackets*

#### 7.2.2 Financial Efficiency of MFIs

The financial efficiency of MFIs shows some markedly different pattern from social performance and the joint social and financial performance of MFIs. First, unlike social performance where the efficiency score has a median of 0.92 on a scale of zero to one, financial efficiency is relatively low with a median of 0.41. Thus, most MFIs place emphasis on social performance or struggle to balance social and financial performance (Mersland and Strøm, 2010).

As in prior results, the debt-equity mix, and donations do not affect financial performance significantly. The significant drivers of financial efficiency are operating expenses to assets ratio, capital to assets ratio, and asset structure. Operating expenses relate negatively to financial efficiency, which is expected as expenses drive down profitability. The inverse operating expense- financial efficiency relationship contradicts with the positive link between social performance and operating expenses. The relation implies that mission drift is inevitable. However, as previous literature shows, the extent of mission drift also depends on internal governance mechanisms (Campion and White, 1999, Abeysekera et al., 2014).

As in social efficiency, capital to assets ratio relates positively with financial efficiency. One of the main reasons for commercialization is access to commercial capital. That more capital enhances both financial and social performance is a good thing. It could be that external capital allows MFIs to scale their operations or that the discipline induced due to monitoring by shareholders pushes managers to be more efficient, which in this case could lead to mission drift where managers focus less on social mission and more on financial objectives of the MFI (Serrano-Cinca and Gutiérrez-Nieto, 2014). Lastly, financial performance of an MFI varies negatively with asset structure. The observation is in line with the diseconomies of scale associated with serving dispersed, low income clients where physical infrastructure may take long to pay back (Kodongo and Kendi, 2013).

Lastly, asset structure has a negative relationship with financial performance which highlights the diseconomies of scale associated with serving poor borrowers. However, technology and adoption of agency banking is reducing the need for brick and mortar branches which may allow MFIs to expand outreach without incurring costs of physical infrastructure (Iman, 2018, Demirguc-Kunt et al., 2018). However, given that most financially excluded people also suffer from financial illiteracy, MFIs still must deploy field workers or mobile banking units in targeted areas. Lastly, education has a negative but insignificant effect on financial performance which could hold given that as human capacity increases, people resort to the mainstream financial system (Allen et al., 2014).

#### 7.2.3 Social and Financial Efficiency of MFIs

Like social efficiency, the drivers of joint social and financial efficiency are legal status, operating expenses to assets, capital to assets ratio, and education. Also, capital structure and donations are not a significant driver of joint social and financial efficiency. These results may indicate that the pressure from the providers of funding does not influence the depth of outreach. The Implication is that the extent of social performance may primarily be the domain of MFIs management and indeed a corporate governance issue as Abeysekera et al. (2014) note. These results also disapprove the welfare school on the existence of an inverse relationship between commercial capital and social outreach. The results do support the financial sustainability, as we see a significant positive relationship between social performance and commercial funding – capital to assets ratio. Overall, it shows that there would be no harm in supplementing commercial funding with donations and subsidies if the effects on social performance are muted (Armendáriz and Szafarz, 2011).

### 7.3 Robustness Tests

For robustness, we first run the fixed effects model for the full dataset with the results in table 5. Secondly, we check for influential observations by winsorising the data. We remove the top 10% and the bottom 10% observations of the independent variables and run the fixed and random effects regressions. The results are in appendix 6. In all cases the results remain similar with changes in regression coefficients but not the direction and significance levels. Appendix 7 is a plot for the normality of residuals for the regression outputs in table 4. The results show slight deviations from normality which may not be an issue given the large sample size.

### Diagnostics

Given the panel structure of data, there is possibility of cross-sectional dependence and serial correlation. We correct the standard errors – presenting the panel corrected standard errors to deal with these problems. Appendix 7 shows the QQ-plots for the residuals. Except for the regression with financial efficiency as the dependent variable, the rest do not depart much from normality.

## Conclusion

The study examined the levels and drivers of financial efficiency, social efficiency, and joint financial and social efficiency of MFIs in Africa. NGOs have the highest levels of social efficiency and joint financial/ social efficiency while cooperatives have the least. Financially, cooperatives and rural banks do best while NBFIs trail. The drivers of social efficiency and joint financial and social efficiency are legal status, operating expense to assets ratio, capital to assets ratio, asset structure and education. For financial efficiency, the drivers are like those of social efficiency except that education is not a significant driver. Notably, capital structure positively influences both financial and social efficiency which supports the need to MFIs to seek external capital. However, operating expenses positively relate to social performance and negatively to financial performance, pointing to a possibility of mission drift. The legitimacy of transformed MFIs rests with how well they balance the need to access commercial capital and the profit motive that may negatively impact social performance.

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Appendix : Stationarity Tests (Fisher Type) for Regressions Dependent and Independent Variables

|  |  |
| --- | --- |
| **Variable** | **Inverse Chi** |
| Liabilities and Equity | 1176.0120\*\* |
| Operating Expense to Assets | 2148.6249\*\*\* |
| Per Cent of Female Borrowers | 1665.9344\*\*\* |
| Average Loan Balance per Borrower | 1900.3447\*\*\* |
| Gross Loan Portfolio to Total Assets | 2772.4998\*\*\* |
| Operational Self-Sufficiency | 2219.5990\*\*\* |
| Debt to Equity Ratio | 2431.1774\*\*\* |
| Donations to assets Ratio | 2685.6443\*\*\* |
| Assets Structure | 1590.1210\*\*\* |
| KKM | 1330.6530\*\*\* |
| Education | 2033.6820\*\*\* |
| Financial Efficiency | 1816.5719\*\*\* |
| Social Efficiency (No Breadth) | 1732.9054\*\*\* |
| Social Efficiency (With Breadth) | 2091.3119\*\*\* |
| Financial and Social Efficiency (With Breadth) | 2207.7045\*\*\* |
| Financial and Social Efficiency (No Breadth) | 1734.8425\*\*\* |

Appendix : Hausmann Test Results for Regressions Using Full Dataset

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | **Dependent Variables** | | | | |
| Variable | Financial  Efficiency | Social Efficiency  (No Breadth) | Social Efficiency  (With Breadth) | Financial & Social  Eff (No Breadth) | Financial & Social  Eff (With Breadth) |
| Statistic | 56.82205\*\*\* | 52.33667\*\*\* | 43.82743\*\* | 44.81863\*\* | 99.53754\*\*\* |
| Parameter | 30 | 30 | 30 | 30 | 30 |
| Alternative | One model is inconsistent | One model is inconsistent | One model is inconsistent | One model is inconsistent | One model is inconsistent |

Appendix : Hausmann Test Results for Regressions Using Winsorized Dataset

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
|  | Financial  Efficiency | Social Efficiency  (No Breadth) | Social Efficiency  (With Breadth) | Financial & Social  Eff (No Breadth) | Financial & Social  Eff (With Breadth) |
| Statistic | 52.8358\*\*\* | 41.61148\*\* | 41.48535\*\* | 41.92511\*\* | 41.64321\*\* |
| Parameter | 26 | 26 | 26 | 26 | 26 |
| Alternative | One model is inconsistent | One model is inconsistent | One model is inconsistent | One model is inconsistent | One model is inconsistent |

Appendix : Random Effects Model including coefficiencts for Time

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | Full Data |  |  |  |  | Years >= 3 | | | | |  | Years >= 5 | | | | |
| Variable | Financial  Eff | Finsoc  No Breadth | Finsoc  With Breadth | Social  With Breadth | Social  No Breadth |  | Financial  Eff | Finsoc  No Breadth | Finsoc  With Breadth | Social  With Breadth | Social  No Breadth |  | Financial  Eff | Finsoc  No Breadth | Finsoc  With Breadth | Social  With Breadth | Social  No Breadth |
| (Intercept) | 0.4308\*\*\* | 0.9271\*\*\* | 0.9249\*\*\* | 0.9275\*\*\* | 0.9254\*\*\* |  | 0.4315\*\*\* | 0.9275\*\*\* | 0.9253\*\*\* | 0.9279\*\*\* | 0.9257\*\*\* |  | 0.4323\*\*\* | 0.9279\*\*\* | 0.925\*\*\* | 0.9279\*\*\* | 0.9249\*\*\* |
|  | (0.014) | (0.014) | (0.014) | (0.014) | (0.014) |  | (0.014) | (0.014) | (0.014) | (0.014) | (0.014) |  | (0.012) | (0.014) | (0.014) | (0.014) | (0.014) |
| Current Legal Status: Bank | 0.0044 | -0.0413\*\*\* | -0.0408\*\*\* | -0.0414\*\*\* | -0.0411\*\*\* |  | 0.0045 | -0.0405\*\*\* | -0.04\*\*\* | -0.0406\*\*\* | -0.0403\*\*\* |  | -0.0062 | -0.0397\*\*\* | -0.0393\*\*\* | -0.0397\*\*\* | -0.0393\*\*\* |
|  | (0.007) | (0.009) | (0.009) | (0.009) | (0.009) |  | (0.007) | (0.009) | (0.009) | (0.009) | (0.009) |  | (0.005) | (0.009) | (0.009) | (0.009) | (0.009) |
| Current Legal Status: NBFI | -0.006 | -0.0351\*\*\* | -0.0343\*\*\* | -0.035\*\*\* | -0.0343\*\*\* |  | -0.0075 | -0.0335\*\*\* | -0.0327\*\*\* | -0.0335\*\*\* | -0.0327\*\*\* |  | -0.0093\*\* | -0.0336\*\*\* | -0.033\*\*\* | -0.0336\*\*\* | -0.033\*\*\* |
|  | (0.005) | (0.006) | (0.006) | (0.006) | (0.006) |  | (0.005) | (0.006) | (0.006) | (0.006) | (0.006) |  | (0.004) | (0.007) | (0.007) | (0.007) | (0.007) |
| Current Legal Status: Credit Union | 0.003 | -0.0505\*\*\* | -0.0496\*\*\* | -0.051\*\*\* | -0.0502\*\*\* |  | 0.0027 | -0.0497\*\*\* | -0.0488\*\*\* | -0.0502\*\*\* | -0.0494\*\*\* |  | -0.0046 | -0.0479\*\*\* | -0.0472\*\*\* | -0.0479\*\*\* | -0.0472\*\*\* |
|  | (0.005) | (0.006) | (0.006) | (0.006) | (0.006) |  | (0.005) | (0.006) | (0.006) | (0.006) | (0.006) |  | (0.004) | (0.007) | (0.007) | (0.007) | (0.007) |
| Current Legal Status: Rural Bank | -0.0005 | -0.0494\*\*\* | -0.0487\*\*\* | -0.0493\*\*\* | -0.0487\*\*\* |  | -0.0002 | -0.0462\*\*\* | -0.0455\*\*\* | -0.0461\*\*\* | -0.0454\*\*\* |  | -0.0014 | -0.0544\*\*\* | -0.0535\*\*\* | -0.0544\*\*\* | -0.0535\*\*\* |
|  | (0.011) | (0.013) | (0.013) | (0.013) | (0.013) |  | (0.011) | (0.014) | (0.014) | (0.014) | (0.014) |  | (0.011) | (0.019) | (0.019) | (0.019) | (0.019) |
| Age: Young | 0.0035 | -0.0018 | -0.0016 | -0.0018 | -0.0015 |  | 0.0042 | -0.0016 | -0.0014 | -0.0016 | -0.0014 |  | 0.0051\* | -0.0018 | -0.0016 | -0.0018 | -0.0016 |
|  | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) |  | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) |  | (0.003) | (0.003) | (0.003) | (0.003) | (0.003) |
| Age: Mature | 0.0024 | -0.0008 | -0.0004 | -0.0008 | -0.0004 |  | 0.0033 | -0.0007 | -0.0003 | -0.0007 | -0.0003 |  | 0.0063\*\* | -0.0006 | -0.0002 | -0.0006 | -0.0002 |
|  | (0.004) | (0.004) | (0.004) | (0.004) | (0.004) |  | (0.004) | (0.004) | (0.004) | (0.004) | (0.004) |  | (0.003) | (0.004) | (0.004) | (0.004) | (0.004) |
| Region: Africa | 0.0076 | 0.0196\* | 0.0198\* | 0.0194\* | 0.0194\* |  | 0.0071 | 0.0187\* | 0.0188\* | 0.0184 | 0.0185\* |  | 0.0047 | 0.0202\* | 0.0204\* | 0.0202\*\*\* | 0.0204\* |
|  | (0.010) | (0.011) | (0.011) | (0.011) | (0.011) |  | (0.010) | (0.011) | (0.011) | (0.011) | (0.011) |  | (0.007) | (0.012) | (0.012) | (0.012) | (0.012) |
| Operating Expense to Assets | -0.0646\*\*\* | 0.0213\*\*\* | 0.0202\*\*\* | 0.0211\*\*\* | 0.0199\*\*\* |  | -0.0658\*\*\* | 0.0219\*\*\* | 0.0208\*\*\* | 0.0217\*\*\* | 0.0205\*\*\* |  | -0.065\*\*\* | 0.0218\*\*\* | 0.0204\*\*\* | 0.0218\*\*\* | 0.0205\*\*\* |
|  | (0.008) | (0.007) | (0.007) | (0.007) | (0.007) |  | (0.008) | (0.008) | (0.007) | (0.008) | (0.008) |  | (0.007) | (0.008) | (0.008) | (0.008) | (0.008) |
| Donations to Assets Ratio | -0.0062 | -0.0019 | -0.0023 | -0.0019 | -0.0023 |  | -0.0055 | -0.002 | -0.0023 | -0.0019 | -0.0023 |  | -0.0018 | -0.0016 | -0.0021 | -0.0016 | -0.002 |
|  | (0.008) | (0.007) | (0.007) | (0.007) | (0.007) |  | (0.008) | (0.007) | (0.007) | (0.007) | (0.007) |  | (0.008) | (0.007) | (0.007) | (0.007) | (0.007) |
| Debt to Equity Ratio | 0 | 0 | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 | 0 |  | 0 | 0 | 0 | 0 | 0 |
|  | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |  | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |  | (0.000) | (0.000) | (0.000) | (0.000) | (0.000) |
| Capital to Asset Ratio | 0.0061\*\*\* | 0.0005 | 0.0037\*\* | 0 | 0.0032\*\* |  | 0.0060\*\*\* | 0.0005 | 0.0038\*\* | 0.0001 | 0.0033\*\* |  | 0.0049\*\*\* | -0.001 | 0.0035\* | -0.001 | 0.0035\* |
|  | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |  | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |  | (0.002) | (0.002) | (0.002) | (0.002) | (0.002) |
| Asset Structure | -0.079\*\*\* | -0.0025 | -0.0035 | 0.0004 | 0.0002 |  | -0.0800\*\*\* | -0.0012 | -0.0022 | 0.0017 | 0.0016 |  | -0.0715\*\*\* | 0.0032 | 0.0021 | 0.0032 | 0.0021 |
|  | (0.017) | (0.017) | (0.017) | (0.017) | (0.016) |  | (0.017) | (0.017) | (0.017) | (0.017) | (0.017) |  | (0.015) | (0.018) | (0.018) | (0.018) | (0.018) |
| Institutional Quality (KKM) | 0.0003 | -0.0007 | -0.0006 | -0.0006 | -0.0006 |  | 0.0005 | -0.0007 | -0.0007 | -0.0007 | -0.0007 |  | 0.0003 | -0.001 | -0.0009 | -0.001 | -0.0009 |
|  | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |  | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |  | (0.001) | (0.001) | (0.001) | (0.001) | (0.001) |
| Education | -0.0115 | 0.0377\*\*\* | 0.0385\*\*\* | 0.0374\*\* | 0.0381\*\*\* |  | -0.0129 | 0.0361\*\* | 0.0369\*\* | 0.0357\*\* | 0.0365\*\* |  | -0.0176 | 0.0362\*\* | 0.037\*\* | 0.0362\*\* | 0.0371\*\* |
|  | (0.013) | (0.015) | (0.015) | (0.015) | (0.015) |  | (0.013) | (0.015) | (0.015) | (0.015) | (0.015) |  | (0.011) | (0.015) | (0.015) | (0.015) | (0.015) |
|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| Year Effects | Yes\*\*\* | Yes\*\*\* | Yes\*\*\* | Yes\*\*\* | Yes\*\*\* | Yes\*\*\* | Yes\*\*\* | Yes\*\*\* | Yes\*\*\* | Yes\*\*\* | Yes\*\*\* |  | Yes\*\*\* | Yes\*\*\* | Yes\*\*\* | Yes\*\*\* | Yes\*\*\* |
| R-squared | 0.5975 | 0.82455 | 0.8250 | 0.8242 | 0.82467 |  | 0.5687 | 0.8011 | 0.8017 | 0.8007 | 0.8012 |  | 0.5406 | 0.6883 | 0.6895 | 0.6881 | 0.6892 |
| Adj.R.squared | 0.5930 | 0.8226 | 0.8231 | 0.8223 | 0.8227 |  | 0.5638 | 0.7988 | 0.7994 | 0.7984 | 0.7990 |  | 0.5350 | 0.6845 | 0.6857 | 0.6843 | 0.6854 |
| statistic | 249.8\*\*\* | 238.9\*\*\* | 242.9\*\*\* | 240.5\*\*\* | 243.3\*\*\* |  | 257.8\*\*\* | 230.3\*\*\* | 234.6\*\*\* | 231.9\*\*\* | 234.9\*\*\* |  | 324.1\*\*\* | 207.2\*\*\* | 208.7\*\*\* | 207.2\*\*\* | 208.5\*\*\* |
| deviance | 2.4885 | 1.7336 | 1.7374 | 1.7238 | 1.7227 |  | 2.4617 | 1.7224 | 1.7261 | 1.7127 | 1.7115 |  | 1.7434 | 1.6341 | 1.6328 | 1.6348 | 1.6347 |
| df.residual | 3078 | 3078 | 3078 | 3078 | 3078 |  | 3046 | 3046 | 3046 | 3046 | 3046 |  | 2792 | 2792 | 2792 | 2792 | 2792 |
| nobs | 3113 | 3113 | 3113 | 3113 | 3113 |  | 3081 | 3081 | 3081 | 3081 | 3081 |  | 2827 | 2827 | 2827 | 2827 | 2827 |

*Note: \* 10%, \*\* 5%, and \*\*\* 1% significance levels*

*Note: Standard errors in brackets*

Appendix : Fixed Effects Model Output using Full Dataset (Includes time effects)

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| Variable | Financial  Eff | Finsoc  No Breadth | Finsoc  With Breadth | Social  With Breadth | Social  No Breadth |
| Current Legal Status: Credit Union/ Cooperative | -0.0008 | 0.0193 | 0.0191 | 0.0192 | 0.019 |
|  | (0.0218) | (0.0254) | (0.0255) | (0.0254) | (0.0254) |
| Age: Young | 0.0067\*\* | -0.0012 | -0.001 | -0.0012 | -0.001 |
|  | (0.0028) | (0.0026) | (0.0026) | (0.0026) | (0.0026) |
| Age: Mature | 0.0088\*\* | 0.0007 | 0.0011 | 0.0007 | 0.0011 |
|  | (0.0036) | (0.0037) | (0.0037) | (0.0037) | (0.0037) |
| Operating Expense to Assets | -0.0595\*\*\* | 0.0139\* | 0.0126 | 0.0138\* | 0.0125 |
|  | (0.0080) | (0.0077) | (0.0077) | (0.0077) | (0.0077) |
| Donations to Assets Ratio | -0.0039 | -0.0033 | -0.0036 | -0.0033 | -0.0036 |
|  | (0.0080) | (0.0068) | (0.0068) | (0.0068) | (0.0068) |
| Debt to Equity Ratio | 0 | 0 | 0 | 0 | 0 |
|  | (0.0000) | (0.0000) | (0.0000) | (0.0000) | (0.0000) |
| Capital to Assets Ratio | 0.0054\*\*\* | -0.001 | 0.0026\* | -0.0016 | 0.0018 |
|  | (0.0015) | (0.0015) | (0.0015) | (0.0015) | (0.0015) |
| Asset Structure | -0.0977\*\*\* | 0.0055 | 0.0044 | 0.009 | 0.0088 |
|  | (0.0181) | (0.0174) | (0.0174) | (0.0174) | (0.0174) |
| Institutional Quality: KKM | -0.0007 | -0.0002 | -0.0002 | -0.0002 | -0.0002 |
|  | (0.0014) | (0.0015) | (0.0015) | (0.0015) | (0.0015) |
| Education | -0.0398\*\* | 0.0374\*\* | 0.0386\*\* | 0.0371\*\* | 0.0382\*\* |
|  | (0.0187) | (0.0188) | (0.0188) | (0.0188) | (0.0187) |
| Year Effects | Yes\*\*\* | Yes\*\*\* | Yes\*\*\* | Yes\*\*\* | Yes\*\*\* |
| R Squared | 0.0814 | 0.0365 | 0.0369 | 0.0372 | 0.0368 |
| Adjusted R Squared | -0.0445 | -0.0955 | -0.095 | -0.0947 | -0.0951 |
| Statistic | 8.0821\*\*\* | 3.4589\*\*\* | 3.4974\*\*\* | 3.5253\*\*\* | 3.4879\*\*\* |
| Deviance | 2.0408 | 1.512 | 1.5178 | 1.5008 | 1.5022 |
| DF Residual | 2737 | 2737 | 2737 | 2737 | 2737 |
| N | 3113 | 3113 | 3113 | 3113 | 3113 |

*Note: \* 10%, \*\* 5%, and \*\*\* 1% significance levels*

*Note: Standard errors in brackets*

Appendix : Fixed and Random Effects Model Output using Winsorized Dataset

|  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | RANDOM EFFECTS MODEL | | | | | FIXED EFFECTS MODEL | | | | |
| Variable | Financial  Eff | Finsoc  No Breadth | Finsoc  With Breadth | Social  With Breadth | Social  No Breadth | Financial  Eff | Finsoc  No Breadth | Finsoc  With Breadth | Social  With Breadth | Social  No Breadth |
| (Intercept) | 0.4384\*\*\* | 0.9113\*\*\* | 0.9110\*\*\* | 0.9112\*\*\* | 0.9109\*\*\* |  |  |  |  |  |
|  | 0.0078 | 0.0154 | 0.0155 | 0.0155 | 0.0155 |  |  |  |  |  |
| Current Legal Status: Bank | -0.0017 | -0.0240\*\* | -0.0241\*\* | -0.0240\*\* | -0.0241\*\* |  |  |  |  |  |
|  | 0.0043 | 0.0106 | 0.0106 | 0.0106 | 0.0106 |  |  |  |  |  |
| Current Legal Status: NBFI | -0.0072\*\* | -0.0321\*\*\* | -0.0317\*\*\* | -0.0321\*\*\* | -0.0317\*\*\* |  |  |  |  |  |
|  | (0.0029) | 0.0068 | 0.0068 | 0.0068 | 0.0068 |  |  |  |  |  |
| Current Legal Status: Credit Union | -0.0040 | -0.0406\*\*\* | -0.0405\*\*\* | -0.0406\*\*\* | -0.0405\*\*\* | 0.0017 | 0.0191 | 0.0188 | 0.0191 | 0.0189 |
|  | 0.0032 | 0.0072 | 0.0072 | 0.0072 | 0.0072 | 0.0148 | 0.0209 | 0.0211 | 0.0210 | 0.0212 |
| Current Legal Status: Rural Bank | 0.0013 | -0.0408\*\*\* | -0.0413\*\*\* | -0.0408\*\*\* | -0.0413\*\*\* |  |  |  |  |  |
|  | 0.0053 | 0.0123 | 0.0123 | 0.0123 | 0.0124 |  |  |  |  |  |
| Age: Young | 0.0063\*\*\* | -0.0029 | -0.0028 | -0.0029 | -0.0028 | 0.0063\*\*\* | -0.0018 | -0.0016 | -0.0018 | -0.0017 |
|  | 0.0022 | 0.0033 | 0.0033 | 0.0033 | 0.0033 | 0.0022 | 0.0033 | 0.0033 | 0.0033 | 0.0033 |
| Age: Mature | 0.0060\*\* | 0.0001 | 0.0004 | 0.0000 | 0.0004 | 0.0063\*\* | 0.0020 | 0.0024 | 0.0020 | 0.0024 |
|  | 0.0027 | 0.0043 | 0.0043 | 0.0043 | 0.0043 | 0.0028 | 0.0045 | 0.0045 | 0.0045 | 0.0045 |
| Region: Africa | 0.0018 | 0.0147 | 0.0149 | 0.0147 | 0.0149 |  |  |  |  |  |
|  | 0.0051 | 0.0122 | 0.0122 | 0.0122 | 0.0123 |  |  |  |  |  |
| Operating Expense to Assets | -0.1224\*\*\* | 0.0200 | 0.0174 | 0.0201 | 0.0175 | -0.1268\*\*\* | 0.0021 | -0.0006 | 0.0022 | -0.0005 |
|  | 0.0084 | 0.0151 | 0.0151 | 0.0151 | 0.0151 | 0.0102 | 0.0164 | 0.0164 | 0.0165 | 0.0164 |
| Donations to Assets Ratio | -0.7129\*\*\* | 0.3940 | 0.3767 | 0.3976 | 0.3805 | -0.5710\*\*\* | 0.2628 | 0.2485 | 0.2662 | 0.2522 |
|  | 0.1689 | 0.2565 | 0.2567 | 0.2569 | 0.2570 | 0.1739 | 0.2586 | 0.2587 | 0.2590 | 0.2590 |
| Debt to Equity Ratio | 0.0001 | 0.0002 | 0.0003 | 0.0002 | 0.0003 | 0.0000 | 0.0002 | 0.0002 | 0.0002 | 0.0002 |
|  | 0.0003 | 0.0004 | 0.0004 | 0.0004 | 0.0004 | 0.0003 | 0.0004 | 0.0004 | 0.0004 | 0.0004 |
| Capital to Asset Ratio | 0.0208\*\*\* | 0.0168\*\*\* | 0.0180\*\*\* | 0.0168\*\*\* | 0.0180\*\*\* | 0.0182\*\*\* | 0.0135\*\* | 0.0148\*\* | 0.0135\*\* | 0.0148\*\* |
|  | 0.0040 | 0.0063 | 0.0063 | 0.0063 | 0.0063 | 0.0044 | 0.0065 | 0.0065 | 0.0065 | 0.0065 |
| Asset Structure | -0.1083\*\*\* | -0.0031 | -0.0025 | -0.0030 | -0.0025 | -0.1165\*\*\* | 0.0208 | 0.0216 | 0.0208 | 0.0217 |
|  | 0.0171 | 0.0294 | 0.0294 | 0.0294 | 0.0294 | 0.0193 | 0.0309 | 0.0309 | 0.0310 | 0.0310 |
| Institutional Quality (KKM) | 0.0000 | -0.0006 | -0.0006 | -0.0006 | -0.0006 | -0.0005 | 0.0004 | 0.0004 | 0.0004 | 0.0004 |
|  | 0.0006 | 0.0012 | 0.0012 | 0.0012 | 0.0012 | 0.0010 | 0.0016 | 0.0016 | 0.0016 | 0.0016 |
| Education | -0.0182\*\*\* | 0.0308\* | 0.0309\* | 0.0307\* | 0.0309\* | -0.0403\*\*\* | 0.0276 | 0.0279 | 0.0276 | 0.0280 |
|  | 0.0089 | 0.0172 | 0.0173 | 0.0173 | 0.0173 | 0.0139 | 0.0219 | 0.0219 | 0.0219 | 0.0219 |
| Year Effects | Yes\*\*\* | Yes\*\*\* | Yes\*\*\* | Yes\*\*\* | Yes\*\*\* | Yes\*\*\* | Yes\*\*\* | Yes\*\*\* | Yes\*\*\* | Yes\*\*\* |
| r.squared | 0.7723 | 0.7715 | 0.7710 | 0.7712 | 0.7707 | 0.2057 | 0.0378 | 0.0384 | 0.0377 | 0.0383 |
| adj.r.squared | 0.7694 | 0.7685 | 0.7681 | 0.7683 | 0.7678 | 0.1051 | -0.0840 | -0.0834 | -0.0842 | -0.0835 |
| statistic | 690.6288\*\*\* | 161.9266\*\*\* | 160.9185\*\*\* | 161.6427\*\*\* | 160.6809\*\*\* | 20.7640\*\*\* | 3.1515\*\*\* | 3.2012\*\*\* | 3.1376\*\*\* | 3.1910\*\*\* |
| p.value | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 | 0.0000 |
| deviance | 0.6036 | 1.3866 | 1.3871 | 1.3910 | 1.3906 | 0.5281 | 1.2214 | 1.2220 | 1.2254 | 1.2252 |
| df.residual | 2319 | 2319 | 2319 | 2319 | 2319 | 2085 | 2085 | 2085 | 2085 | 2085 |
| nobs | 2350 | 2350 | 2350 | 2350 | 2350 | 2350 | 2350 | 2350 | 2350 | 2350 |

*Note: \* 10%, \*\* 5%, and \*\*\* 1% significance levels*

*Note: Standard errors in brackets*

Appendix : Normality of Residuals for Model Using Full Dataset

