Efficiency of Microfinance Institutions in Africa

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Abstract {#centermydoc}

We examine the drivers as well as levels of financial efficiency, social efficiency, and joint socio-financial efficiency of microfinance institutions (MFIs) in Africa for the period 2000-2019. Broadly, our results show a decline in social performance over time but no discernible trend in financial performance. The legal status of an MFI mainly drives its social and socio-financial performance. Specifically, operating efficiency, capital adequacy, asset structure, and education are significant drivers of our target efficiencies. More specifically, operating costs relate negatively to financial efficiency and relate positively to social efficiency and socio-financial efficiency. Capital adequacy relates positively to financial, social and socio-financial efficiencies, whereas asset structure relates negatively to these three efficiency variables. Education relates negatively to financial efficiency but negatively to social and socio-financial efficiencies. These results suggest that while access to commercial capital enhances the overall efficiency, the quest for profitability (and financial efficiency by extension) diminishes social efficiency. Importantly, our analysis shows a trade-off between financial efficiency on the one hand and social efficiency and social-financial efficiency on the other. Our results remain robust after excluding outliers in the analysis..[1][2]

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

JEL Classification: G210, G230

1 Introduction

This work examines the drivers and levels of microfinance institutions' financial and social efficiencies (MFIs) in Africa, considering the transformation of MFIs from not-for-profit ventures to commercial entities. Specifically, the research examines the drivers of social efficiencies on the one hand. It critically examines the drivers of the joint financial and social efficiency (socio-financial efficiency) of MFIs in Africa on the other hand. MFIs have a dual mission. First, they derive legitimacy by availing financial services to the poor and other often financially excluded members of society (Marconatto, Cruz, and Pedrozo 2016). To achieve this social goal, MFIs have in the past primarily 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, D'Espallier, and Mersland 2019). Besides, political and economic uncertainties surrounding donations and subsidies reinforce the need for MFIs to be financially independent (Armendariz and Szafarz 2011; Garmaise and Natividad 2013).

If MFIs are to be financially sustainable, they should not do so by neglecting their social mission—the social mission of MFIs centres around providing appropriate and affordable financial services to the financially excluded. In Africa, the financially excluded comprises mainly women, youth and rural dwellers. When MFIs convert to the commercial model, they have to attain the financial objective of making profits over and above the social mission. The pursuit of financial and social objectives makes MFIs hybrid organisations. 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 social welfare primarily through corporate social responsibility (CSR) interventions and the rise of the Environmental, Social and Governance (ESG) accounting (Van Duuren, Plantinga, and Scholtens 2016). However, the expectation for business firms to exclusively meet social goals may not be as elevated as the expectations for social and hybrid enterprises, like MFIs. Their mission achievement predicated on 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 socio-financial performance of MFIs in Africa. In examining efficiency,

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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, that is, reaching out to the financially excluded sustainably. Although the optimisation of inputs is also desirable, the outputs are more relevant to this study. The DEA inputs are liabilities and equity, and operating expense to assets ratio. The output metric for the financial outcome is operational self-sufficiency (OSS). Simultaneously, the average loan balance per borrower, per cent of women borrowers, and the gross loan portfolio percentage to total assets are the social performance output indicators.

This research extends existing knowledge in three primary ways. First, the work sheds light on the determinants of the simultaneous drivers of the financial and social efficiencies of MFIs, especially in Africa, where data challenges had hitherto hindered relevant research. Secondly, as noted earlier, 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 efficiencies tends to examine each objective separately instead of viewing them as two sides of the same coin (Efendic and Hadziahmetovic, 2017, Gutiérrez-Nieto et al., 2009).

What is more noteworthy is that 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. Therefore, by simultaneously examining both financial and social efficiencies of MFIs, this study presents novel insights that extend the abundant literature on the financial and social performance of MFIs.

The final contribution of our work is in respect of the drivers of social efficiency of MFIs. This contribution is paramount because it particularly informs decision making that would enhance outreach to the teeming population of the financially excluded. Researchers can, to an extent, infer the determinants of the financial performance of MFIs from insights of the plenty of extant research in corporate finance. That is not the case for the social performance of MFIs and other financial institutions, for that matter. 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 by 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 MFI 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 difficult to compare.

Overall, little research investigates the socio-economic factors that enable or hinder the achievement of the dual objectives of MFIs. This absence of pertinent research is especially glaring in Africa, the continent with the lowest financial inclusion rates. For the stakeholders of MFIs, this could be a significant oversight. Therefore, the management of MFIs may not know 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 enlighten the management of MFIs, policymakers, donors, and stakeholders on interventions necessary to enable MFIs to reach the financially excluded sustainably.

We take all formal MFIs in Africa 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 provide 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 often rely on informal financial services ranging from family and friends to neighbourhood kiosks and shylocks. There is also a rise of fintech firms that use mobile phones and the internet to offer inclusive financial services. However, the data for these equally essential portions of MFIs activities is hard to capture at scale. Hence, in this study, we will rely exclusively on the MFIs listed on the MIX database.

The remainder of the research proceeds as follows. In section 2, we review the empirical literature and lay out the theoretical basis for the financial and social efficiency of MFIs. The following section provides a summary of the results of the study. Part 4 states the hypothesis and describes the empirical methods deployed in the research. In contrast, part 5 focuses on the data used in computing the efficiency scores and that serve as variables in the regression. Next, in section 6, we detail the results and the associated robustness checks, and Section 7 concludes.

2 Theory and Empirical Literature

In Microfinance Schism, Morduch (2000) urges caution about the win-win view of microfinance. The win-win view posits that MFIs can simultaneously pursue and achieve financial sustainability and social goals without trade-offs. This perspective seeks to reconcile the welfare approach that views financial sustainability and social performance to be incompatible and the financial sustainability perspective, which, while recognising the need for meeting social goals, emphasises financial sustainability. Morduch calls for the accommodation of multiple, hybrid MFI models as being on the continuum that includes those that seek profits while serving the poor and those that strictly focus on social goals like NGOs that are reliant on donations and subsidies. The broad array of microfinance programs, Morduch (2000) argued, would then serve diverse populations and contexts instead of prioritising or rating 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, ample research finds NGO-oriented MFIs to be better at reaching out to the poor than commercial based MFI models, that is, more socially efficient. However, other researchers counter that commercial oriented 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) find that MFIs with better portfolio quality have a greater depth of outreach. This finding again highlights the variety of metrics used to gauge the financial and social performance of MFIs.

However, as Morduch(2000) further points out, MFI social performance could depend on the segments of the population served and regional and country-level contexts. Consequently, by extension, the definitions of poor and social performance must expand to the different profiles and economic activities of poor people as MFIs may not be effectively reaching out to the “core” indigent. Also, the differing views on the levels of social performance could result from the diverse meanings that different stakeholders, that is, employees, managers, MFI clients, and 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 of 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 on social indicators. Nevertheless, they find financial performance, rural outreach, 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 identified are age, size, institutional type, and the funding sources of an MFI, thus collaborating earlier findings by Gutiérrez-Nieto et al. (2009). However, social ratings as a measure of social performance may not be feasible in the African context, where data is challenging. Again, the importance of each indicator could vary by context. The variance motivates the need for context-specific research.

Much of the research 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 these two, respectively. Gutiérrez-Nieto et al. (2009) quantified financial and social performance using the DEA efficiency estimation technique. Nonetheless, their study does not ascertain the drivers of financial efficiency, social efficiency, and combined socio-financial efficiency, as is the case in this study. Instead, these researchers examine the relationships between social performance, on the one hand, profitability, location, age, and legal type of MFI. This study goes beyond Gutiérrez-Nieto et al. (2009) by examining the drivers of joint socio-financial efficiency and focusing on Africa. Moreover, their data consisted of a narrower set of 89 MFIs and did not focus on a specific region for richer and potentially generalisable insights, as D'Espallier et al. (2017) propose. In addition to being dated, their study also uses a notably different set of inputs and outputs data for the DEA analysis.

Heretofore, the dominant debate has been on how commercial MFIs can strike a balance between financial sustainability and social performance objectives, which attempts to mitigate the mission drift. 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 its inherent profit incentive. The objectives of equity and debt holders would conflict with the strategic social goal of serving the poor. It is the agency theory that forms the bedrock of arguments from the welfare school in that MFIs cannot pursue financial sustainability while at the same time reaching out to the financially excluded. These views 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 debt servicing requirements of creditors.

[@] argue that restrictive covenants inherent in debt funding could push managers away from social targets to emphasise 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 like Im and Sun (2015), Lutzenkirchen et al. (2012), and Quayes (2012) argue that for transformed MFIs, mission drift cannot occur. However, Morduch and Ogden (2019) sensibly counter this point of view by arguing that NGO MFIs would be few in number or non-existent. 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, some works find 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).

Further, some scholars 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. Interestingly, Campion and White (1999) and Ramus and Vaccaro (2017) argue that mission expansion could occur not due to 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.

Lastly, a closely related study by Lam et al. (2020) finds that MFIs exhibit no evidence of mission drift. Instead, they find that financial performance is positively associated with subsequent social performance in for-profit MFIs relative to not-for-profit MFIs. Moreover, in contrast, the social performance of not-for-profit MFIs varies positively with subsequent financial performance compared to for-profit MFIs. Therefore, these authors surmise 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, which leads 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.

3 Hypotheses

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

- Hypothesis 1: MFIs that follow the commercial model exhibit better financial performance than MFIs that follow the NGO model.
- Hypothesis 2: The social performance of NGO based MFIs is better than that of commercial model based MFIs.
- Hypothesis 3: The joint socio-financial performance of commercial MFIs differs from that of NGO model-based MFIs.

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). Further, the mission of NGO MFIs 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.

4 Summary of Results from Data Analysis

This section highlights the results of the data analysis on the levels and drivers of social efficiency, financial efficiency, and combined socio-financial efficiency of MFIs in Africa. The section also elucidates our hypothesised relations vis-a-vis MFI types. The inputs for the DEA analysis constitute measures for financial performance and social performance. We capture financial performance using 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 the average loan balance per borrower. These metrics capture the ability of MFIs to reach the most financially excluded people such as women, rural dwellers, and other people that require and would typically make do with small loans sizes. The gross loan portfolio to assets measures the breadth of outreach – the relative number of people the MFI can reach. The discussion captures the individual inputs and overall DEA score that researchers have documented in the literature.

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 about 0.92, with substantial variation across legal forms of MFIs. NGO-based MFIs 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 the level of donations, are not significant drivers of social efficiency. The ratio of operating expense to total assets relates negatively to social efficiency. Given that operating expense is a significant driver of profitability, these results point to a potential conflict between financial performance and social performance. Capital to total assets ratio relates positively with social performance while asset structure exhibits a negative relationship. Lastly, education relates positively to the social efficiency of MFIs. This outcome suggests the plausibility that awareness could allow poor and financially excluded people to productively engage with the providers of financial services, such as MFIs.

4.2 Financial efficiency

MFIs in Africa are barely financially sustainable, with marginal disparities between MFIs 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 (the ratio of fixed assets to total assets) and education all vary negatively with financial performance. Operating expenses dominate the expenses items on the income statement. Simultaneously, a higher asset structure means the MFI dedicates a substantial amount of cash to finance non-current assets, which takes time to recoup. Capital to total assets ratio varies positively with financial performance, social performance, and joint socio-financial performance. Education would proxy the customer base, with the more exposed populace less likely to 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 trend follow those of social efficiency. The mean and median socio-financial 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, that is, the debt-equity mix and the level of donations, are not significant drivers of socio-financial efficiency. The ratio of operating expense to assets relates negatively to socio-financial efficiency. Lastly, education relates positively to the social-financial efficiency of MFIs.

5 Methodology and Data

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

5.1 The Empirical Model

We primarily use the fixed and random-effects model regression as per the result of the Hausman test (see Appendix 2 and 3). Specifically, we estimate the following model.

$$Y_{it} = \beta_0 + \beta_1 X_{it} + \mu_{it}$$

Where Y_{it} represents the dependent variable, which takes efficiency scores derived from the data envelopment analysis (DEA) model. X_{it} on the other hand, represents the set of independent variables as described in Table 1 below. 5.2. We compute three measure of efficiency that take turns as the dependent variables: social efficiency, financial efficiency, and socio-financial efficiency. Section () describes in detail the DEA model.

5.2 Data, Data Sources and Description of Variables.

We source our data from the Microfinance Information Exchange (MIX) pooled database [^1], the World Development Indicators [^2], the Global Financial Development Database [^3], and the Worldwide Governance Indicators [^4]. 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).

5.3 The DEA Model

As noted earlier, the study adopts the Data Envelopment Analysis (DEA) technique to estimate both the financial and social efficiency scores for a given MFI in each period. Charnes et al. (1978) and 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 confounding 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. For instance, in running the DEA model, the researcher does not have to specify a functional form, estimate parameters, or define an error term. Importantly, DEA makes no distinction between dependent and independent variables (Zhou et al., 2007).

DEA requires the resolution of the following linear programming model.

$$\frac{\sum_{r=1}^{n} u_r v_r}{\sum_{i=1}^{m} v_i x_i} <= 1$$

for

$$u_r, v_r >= 0$$

In this case, n is the output number while m the input number. Also, u_r is the weight of n and v_i is the weight of m. Hence, v_i and x_i represent the weight of m and output of m, respectively. Similarly, u_r and y_r represent the weight and amount of input in that order.

When researchers run DEA assuming constant returns to scale (CRS), the resulting output represents 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 pure technical efficiency (PTE), that is, 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 input or output variables that managers have the most control over (Huguenin, 2012).

5.3.1 Inputs and Outputs for the DEA Model

In this section, we first describe the inputs and outputs for the DEA efficiency model. We derive the efficiency scores 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 show the relative annual configuration of inputs and outputs per MFI in the sample, as listed below. The output from the DEA forms the dependent variables. After describing the inputs and outputs for the DEA model, we describe the independent variables for the regression analysis.

5.3.1.1 Inputs for the DEA efficiency scores: Following the intermediation approach, we use the following variables as inputs.

- Liabilities and equity to total assets ratio: Liabilities and equity, an equivalent of total assets, capture all the funding sources 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 captures 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 primary input in several DEA models. In this study, we take operating costs by subsuming the number of staff (labour cost).

5.3.1.2 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 indigent population 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 Performance outputs

- 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;

$OSS =$

Table 1 presents summary statistics for the DEA input and output variables.

Before running the DEA analysis, we start by transforming the inputs and outputs. We add a significantly large number to eliminate zeros and negatives (Ataullah and Le, 2006). In line with Avkiran (2006), we also mean normalize the data. Figure () shows that there is very low correlation between the inputs and outputs. Hence, collinearity will not adversely affect the DEA scores.

Table 1: Summary Statistics: Inputs and Outputs for the DEA Model

Variable	Mean	SD	Min	Q1	Median	Q3	Max
Liabilities/Equity	4.472e+07	3.307e+08	0	5.843e+05	2.618e+06	1.322e+07	9.538e+09
Operating Expense/Assets	2.269e-01	1.848e-01	0	1.241e-01	1.807e-01	2.695e-01	2.517e+00
Female borrowers (%)	5.689e-01	2.366e-01	0	4.206e-01	5.500e-01	7.478e-01	1.000e+00
Average Loan	8.675e+02	7.094e+03	0	1.502e+02	3.510e+02	7.240e+02	4.008e+05
Gross Loans/Assets	6.547e-01	7.040e-01	0	5.074e-01	6.536e-01	7.746e-01	2.742e+01

Source: Authors construction from the data

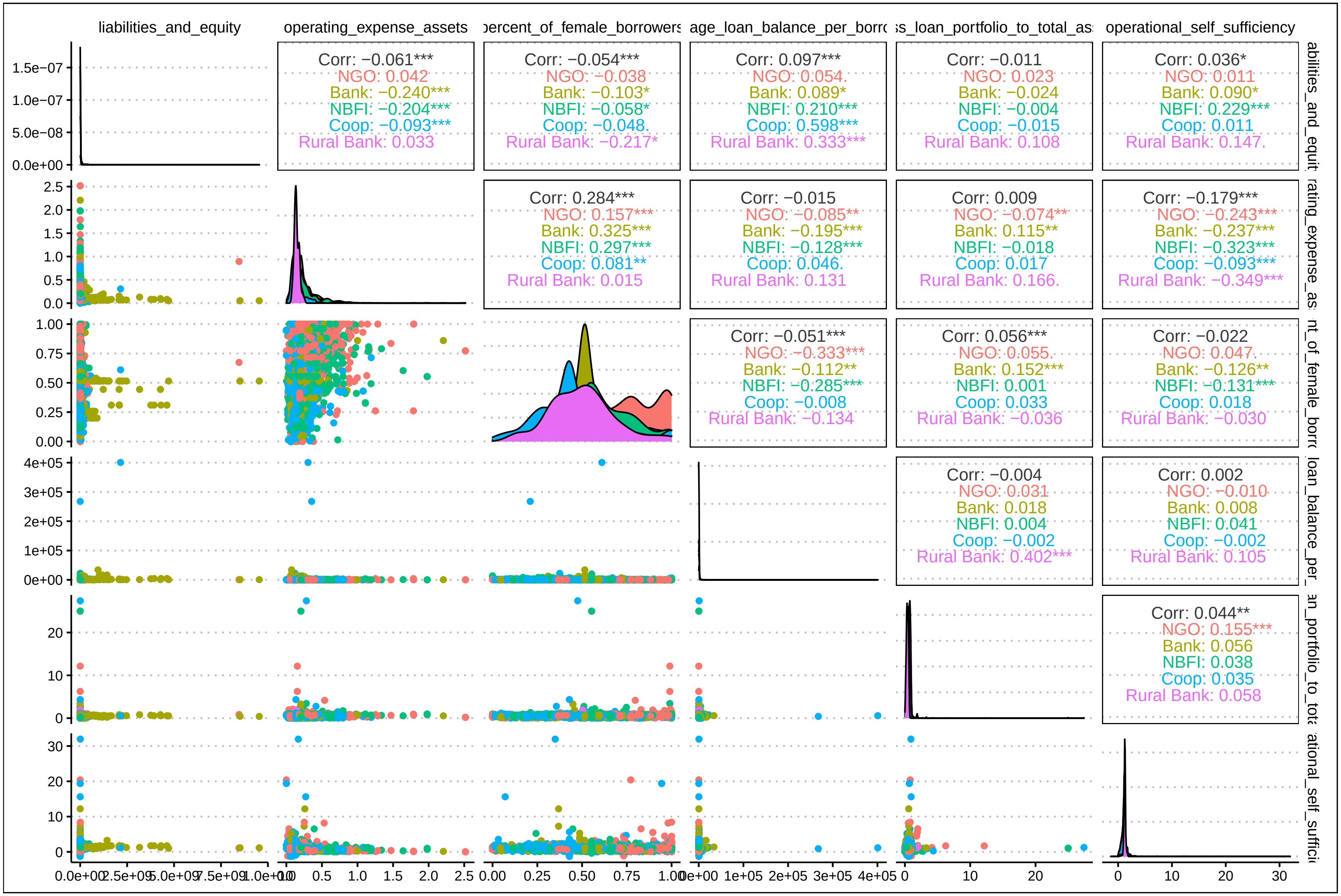

Figure 1: Correlation Matrix for DEA Inputs and Outputs

5.4 Independent Variables

Table 2 presents a summary of the independent variables applied in the study.

Table 2: Description of Variables

Variable_Description
1. Current Legal Status: The legal forms of registration of an MFI are as follows; Commercial Bank, Non-Bank Financial Institution (NBFI), Non-Governmental Organization (NGO), Credit Union/ Cooperative, or Rural Bank. The legal status may dictate the profit orientation and sources of capital for the MFIs. The legal status of an MFI may impact the financing structure in several ways. First, legal status or form typically restricts NGOs from taking deposits, which lowers the debt-equity ratio and deposits to assets, raising the capital asset ratio. Also, NGOs may not venture into capital markets for funds, given their mostly not-for-profit orientation. The opposite is the case for MFIs of commercial banks legal form whose legal status allows for deposits.
2. Age: MIX classifies MFIs into three categories depending on the time that has elapsed since the MFI started operations- new (0-4 years), young (4-8 years) and mature (over eight years). The variable is hence a dummy. Older firms are likely better established, have a solid reputation and hence likely to attract more debt and deposits. The institutional life cycle view of Bayai and Ikhide (2016) captures the correspondence between age and debt.
3. Legal Tradition (Legal): The indicator is a dummy variable with common law countries coded 0, civil law countries 1, and 2 otherwise as per the classification by Oto-Peralías and Romero-Ávila (2014). Typically, common law countries have relatively better financial infrastructure that allows firms to access financial markets easily. Hence, MFIs in common law countries may exhibit higher debt and equity ratios in their capital structures than those in common law and other legal traditions. (Schnyder, Gerhard, Mathias Siems, & Ruth V. Aguilera, 2018)
4. Size (Log of Total Assets): We proxy the size of MFI with the natural logarithm of total assets, again using MIX data. Assets are supported by the sum of capital and liabilities or, equivalently, the total value of resources owned or controlled by the MFI resulting from past and current activities and from which the MFI derives future benefits. We expect firms with more assets to have a higher debt capacity and more debt-to-equity ratios, and lower capital to equity ratios. Large firms draw their strength from holding diversified investments and hence higher capacity to absorb risk. Besides, they have easy access to debt markets(Kurshev & Strebulaev, 2015). Furthermore, these firms are likely to attract more deposits, given the trust they inspire in depositors and their marketing reach (Kimmel et al., 2018). We hypothesise that donations vary positively with the size of MFI, as large, older firms have established a reputation with donors.
5. Governance/ Institutional Quality (KKM): We create the country level KKM index using the first principal component of the WGI available in the World Bank databases. The index captures the institutional quality in corruption control, government effectiveness, political stability, the rule of law, and voice and accountability (Kaufmann, Kraay, & Mastruzzi, 2011). Firms in countries with better governance can quickly raise debt finance due to ease of contract enforcement — the result, a high debt-equity ratio and a low capital asset ratio. Similarly, the level of deposits mobilisation may be higher in better-governed countries arising from consumer confidence in legislation relating to deposits protection (La Porta, Lopez-de-Silanes, & Shleifer, 2013; Allen et al., 2014). Lastly, MFIs in countries with low KKM may have higher donations as donors opt to circumvent corrupt government channels. We use the terms institutional quality and governance interchangeably throughout the text

6. Private Credit to GDP: We capture the total amount of credit advanced to the private sector by financial intermediaries as a proxy for capital markets development concerning the banking sector following Ito and Kawai (2018). The data source is the Global Financial Development Database, GFDD, of the World Bank (See note 4). Private credit to GDP represents the financial resources provided to the private sector by domestic money banks as a share of GDP. Domestic money banks comprise commercial banks and other financial institutions that accept transferable deposits, such as demand deposits. The data is available in WDI. Financial sector development is central to the acquisition of both equity and debt financing. We hypothesise a high debt to equity ratio, and deposits to assets ratios in countries with more robust financial sectors as financial institutions tend to be highly leveraged.

7. Stock market capitalisation to GDP: We capture the extent of stock market development using the ratio of stock market capitalisation to GDP to proxy how firms can raise equity capital. Although Africa's equity markets are thin, some relatively large stock markets like South Africa, Kenya, and Ghana exist. The data are from the GFDD.

8. Asset Structure (Tangibility): Asset structure is is measured as the ratio of non-current assets to total assets of an MFI (Microfinance Information Exchange (MIX), 2019). The ratio indicates the extent of investment in physical infrastructure, a significant issue in constraining banking for the poor due to the perceived lack of scale economies to warrant the erection, for instance, of brick and mortar branches (Ledgerwood, 1998). MFIs with a more significant physical presence are likely to attract more deposits. Therefore, they also have a higher capacity to borrow and service debt. Further, tangible assets serve as collateral to protect lenders from the moral hazard problem (Jensen & Meckling, 1976), and hence a positive relationship between debt and asset tangibility (Titman & Wessels, 1988; Kyereboah-Coleman, 2007a).

9. Profit Margin: The profit margin is the net operating income divided by financial revenue. The ratio represents the ability of MFIs to generate income from the core mandate of offering financial services like lending, savings, insurance, and so on. Profitability may enhance the capacity of an MFI to secure debt, thus leading to a higher debt to equity ratio and low capital to assets ratio. The opposite is the case when an MFI retains earnings and hence raises the level of equity.

Source:

Authors' construction from the literature

Notes

[1] MIX Database on www.themix.org and https://datacatalog.worldbank.org/dataset/mix-market

[2] WDI on https://databank.worldbank.org/source/world-development-indicators.

[3] WGI/ KKM on https://databank.worldbank.org/source/worldwide-governance-indicators.

[4] GFDD on https://www.worldbank.org/en/publication/gfdr/data/global-financial-development-database

6 Results

6.1 Exploratory Data Analysis

We examine the indicators of financial and social performance by MFIs in Africa. Here, we focus on taking the individual measures of performance, the proportion of female borrowers, average loan balance per borrower, gross loans to assets and operational self-sufficiency. While the examination of indicator 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) presents the descriptive statistics. We visualise the data and describe the scope of both financial and social performance, followed by a discussion of the DEA efficiency scores. Next, we discuss the levels of efficiency by MFIs types based on the DEA scores. Finally, we layout and describe the results of the regression model.

Table 3: Summary Statistics for Efficiency Scores

Variable	Mean	SD	Min	Q1	Median	Q3	Max
financial Efficiency	0.1572	0.1892	0.0292	0.0944	0.1079	0.1272	1
Social Efficiency	0.7862	0.1186	0.5000	0.7126	0.7767	0.8750	1
Financial and Social Efficiency	0.7947	0.1228	0.5000	0.7146	0.7767	0.8938	1

6.1.1 DEA Efficiency Scores

Table 3 shows a summary statistics 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, the maximisation of outputs is more relevant for this study.

6.1.1.1 Financial Efficiency Table () shows a summary of the efficiency scores. The mean and median financial efficiency scores are 0.16 and 0.11 respectively.[3] Taken together with Figure 2, the results show that the financial efficiency scores are heavily skewed to the right. Critically, MFIs are hardly financially sustainable regardless of their legal form, in spite of the paradigm shift towards commercialization. This observation begs the two questions; do commercially oriented legal forms of MFIs perform better than NGOs? Further, do newer MFIs that took root when donors put emphasis on the financial sustainability of MFIs do better financially than older MFIs?

Figure 2, panel C shows that only cooperatives and rural banks have higher median financial efficiency scores than NGOs. These results do not support the supposition that commercialisation raises the level of financial sustainability given that commercial banks and NBFIs fare worse financially. The poor financial performance by banks and NBFIs can only further worsen their outreach to the financially excluded. This is contrary to the “mission expansion” hypothesis where commercial MFIs generate profits that they then use to reach more financially excluded clients. Further, Figure 2, panel D shows that newer MFIs have higher financial sustainability scores relative to older MFIs. These results could mean that newer MFIs focus more on financial sustainability at the expense of social goals or are better at balancing financial sustainability with social goals.

Figure (), panel () shows the trends in median financial efficiency scores of MFIs for the period 1999-2020. Cooperatives consistently do better financially than other legal forms. Surprisingly, NGOs and rural banks follow, while NBFIs and commercial banks have the lowest median financial efficiency scores, with commercial banks showing wide variability. The results indicate that commercialization does not necessarily raise financial sustainability, especially in the absence of grants and state subsidies. What is concerning is the observation that financial efficiency is on a downward spiral, meaning that the goals of financial sustainability of MFIs may not be met. The worsening trend in financial performance by MFIs may point to the harm that neo-liberalism, commercialisation, or other unidentified macro-economic factors have on MFIs.

[3] The DEA scores range between zero and one, with zero indicating the worst performance and one the best.

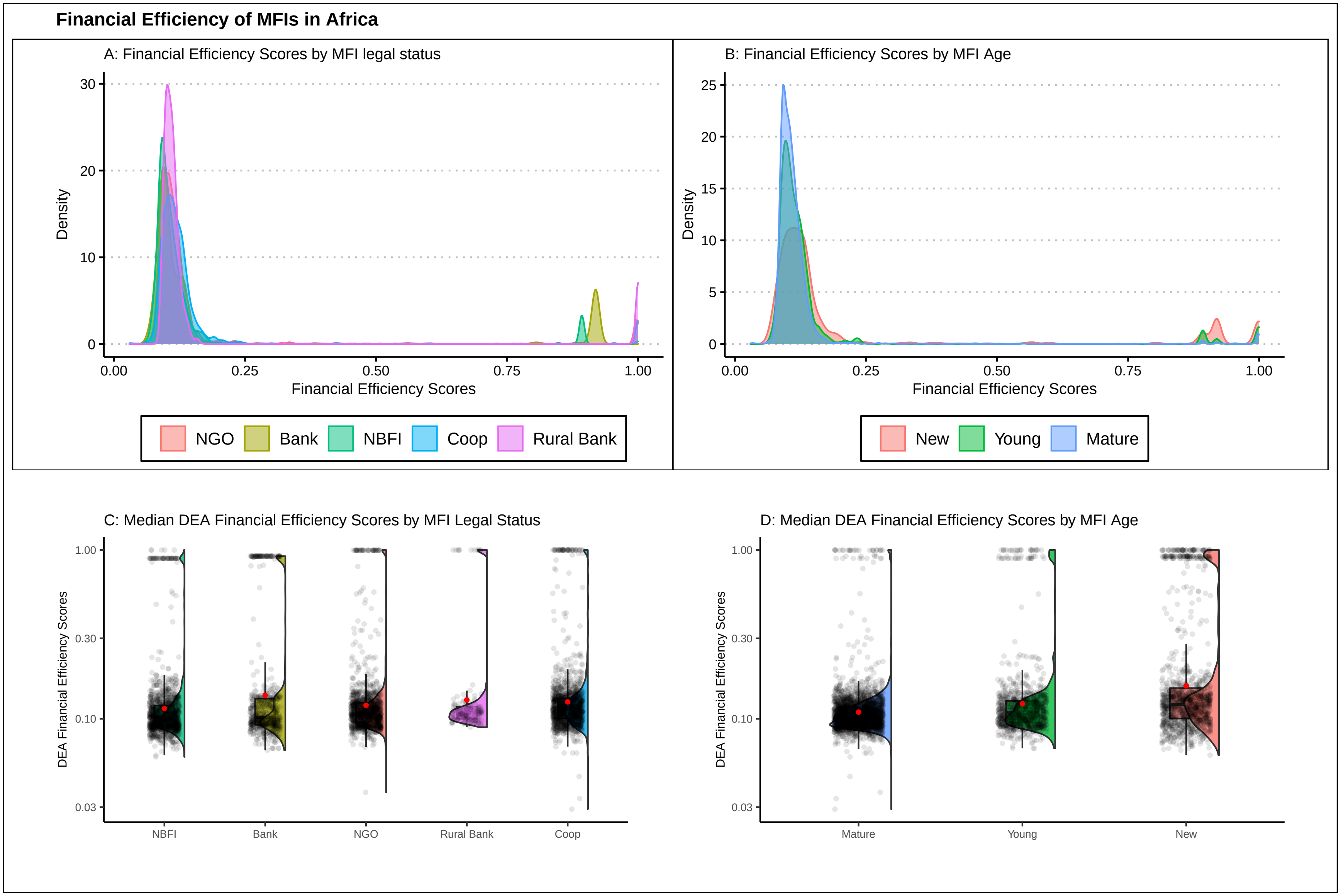

Figure 2: Financial Efficiency Scores for MFIs in Africa

6.1.1.2 Social Efficiency Overall, the social efficiency of MFIs in Africa is high, with a mean and median of 0.79 and 0.78, respectively. However, as Figure () and () show, NGOs have consistently the highest levels of social efficiency, followed by NBFIs and other forms of MFIs. Rural banks and credit unions respectively are the least socially efficient. Considering the financial efficiency scores, it appears that commercialization causes mission drift. Also, both NGOs and NBFIs show a notable decline in social performance over time, which could also be an indictment on the shift towards financial sustainability.

An important observation is that younger MFIs have a higher level of social performance than mature MFIs. earlier, we saw that younger MFIs also have better financial performance than older MFIs. The implication is that younger MFIs are better at balancing financial and social goals than mature MFIs. The explanation could be that younger MFIs have developed their business model in the face of declining donor support or in the complete absence of donor funding and state subsidies. Older MFIs that are required to shift from the donor and state subsidy reliant model to the commercial model do not fare as well. Given that mature MFIs are larger and reach more financially excluded clients, the issue then is how to support mature MFIs to transition to the financial sustainability model without reducing their outreach.

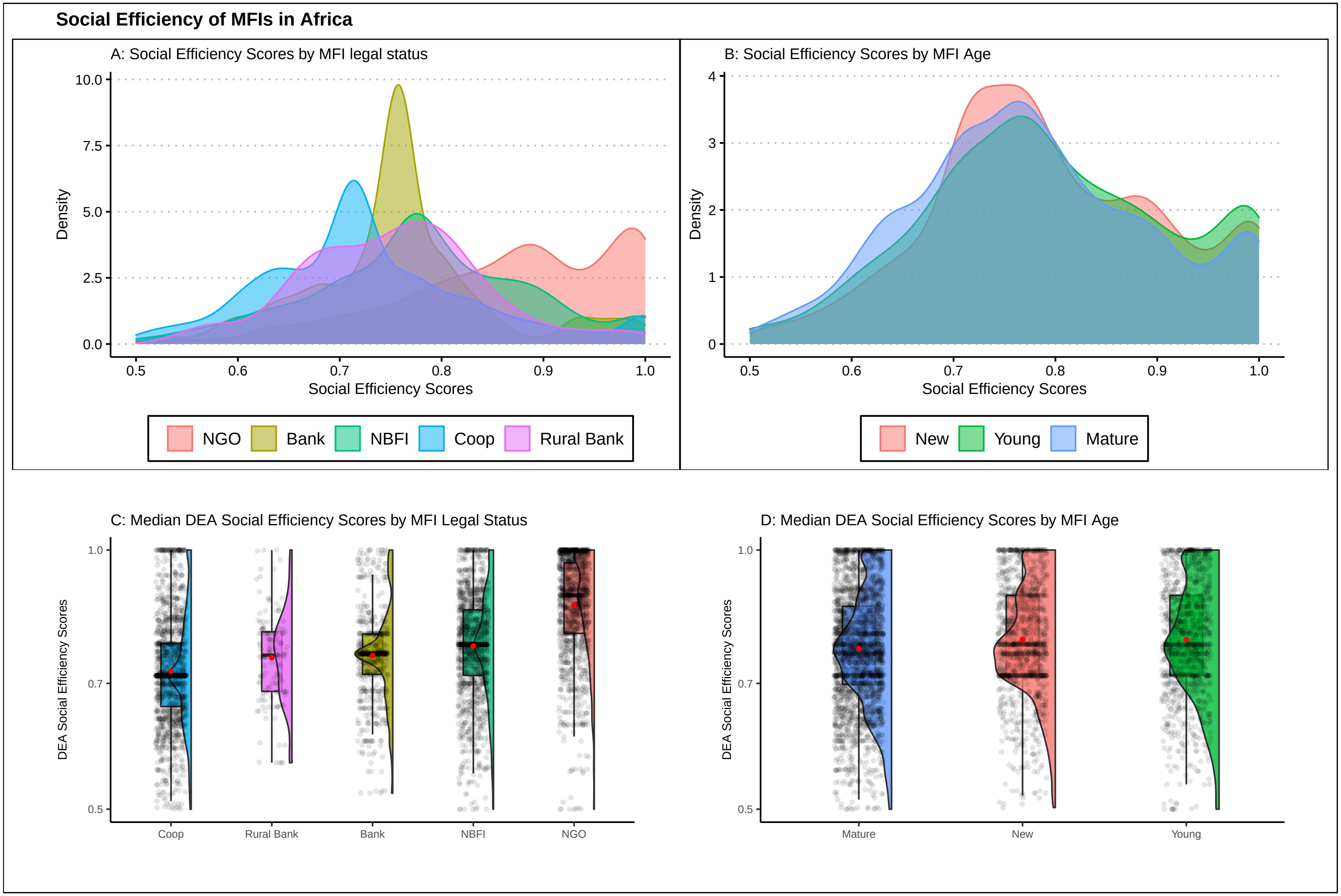

Figure 3: Social Efficiency Scores for MFIs in Africa

6.1.1.3 Financial and Social Efficiency Scores

In figure (), we combine the social and financial metrics. The DEA model now captures the efficiency with which MFIs in Africa convert the inputs (liabilities and equity) into outputs (average loan balance per borrower, percentage of women borrowers, and operational self-sufficiency, OSS). Table () shows the summary staistics of the DEA analysis. The socio-financial efficiency scores are high with a median of 0.7947 and a mean of 0.7767. Again, the median financial efficiency metric is highest for NGOs, which is an oddity given that we would expect commercial firms to dominate (see panel A and C). This means that NGOs are better at balancing financial and social goals of microfinance than the commercial MFIs. NBFIs, banks, rural banks, and cooperatives follow in that order. These results seem like an indictment on the conversion of MFIs to the commercial model.

In Figure (), panels B and D, we plot the median financial and social performance of MFIs faceted by age. As in the social and financial efficiency analysis, younger MFIs fare better in socio-financial efficiency scores that do older MFIs. This means that younger MFIs are better at balancing the social and financial aspects of microfinance as discussed before. Figure (), panel D shows the trends in socio-financial efficiency of MFIs. While the scores appear stable across time, NGOs score consistently higher . Overall, these results mean that embracing neo-liberalism may be harming social performance without helping improve financial performance.

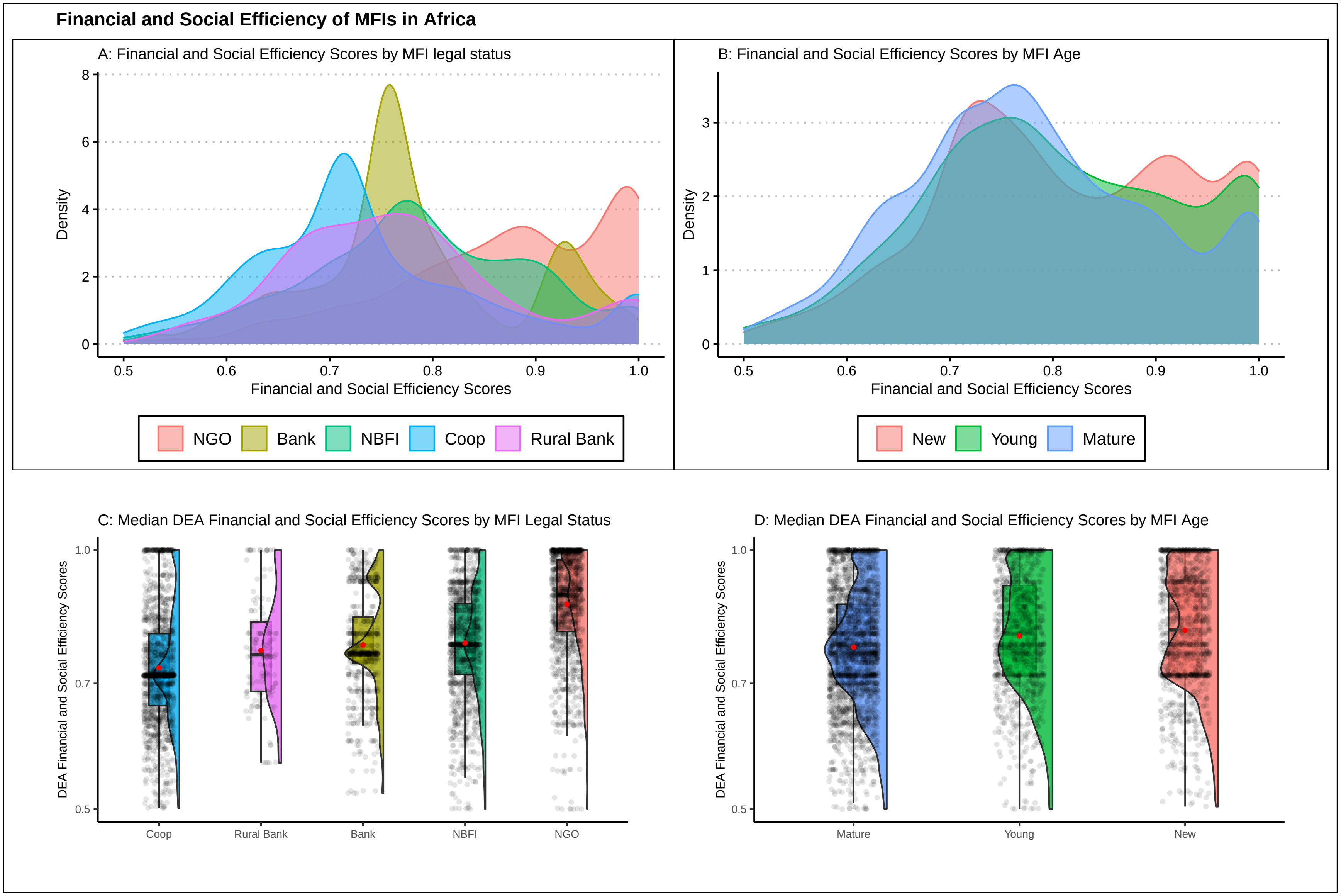

Figure 4: Financial and Social Efficiency Scores for MFIs in Africa

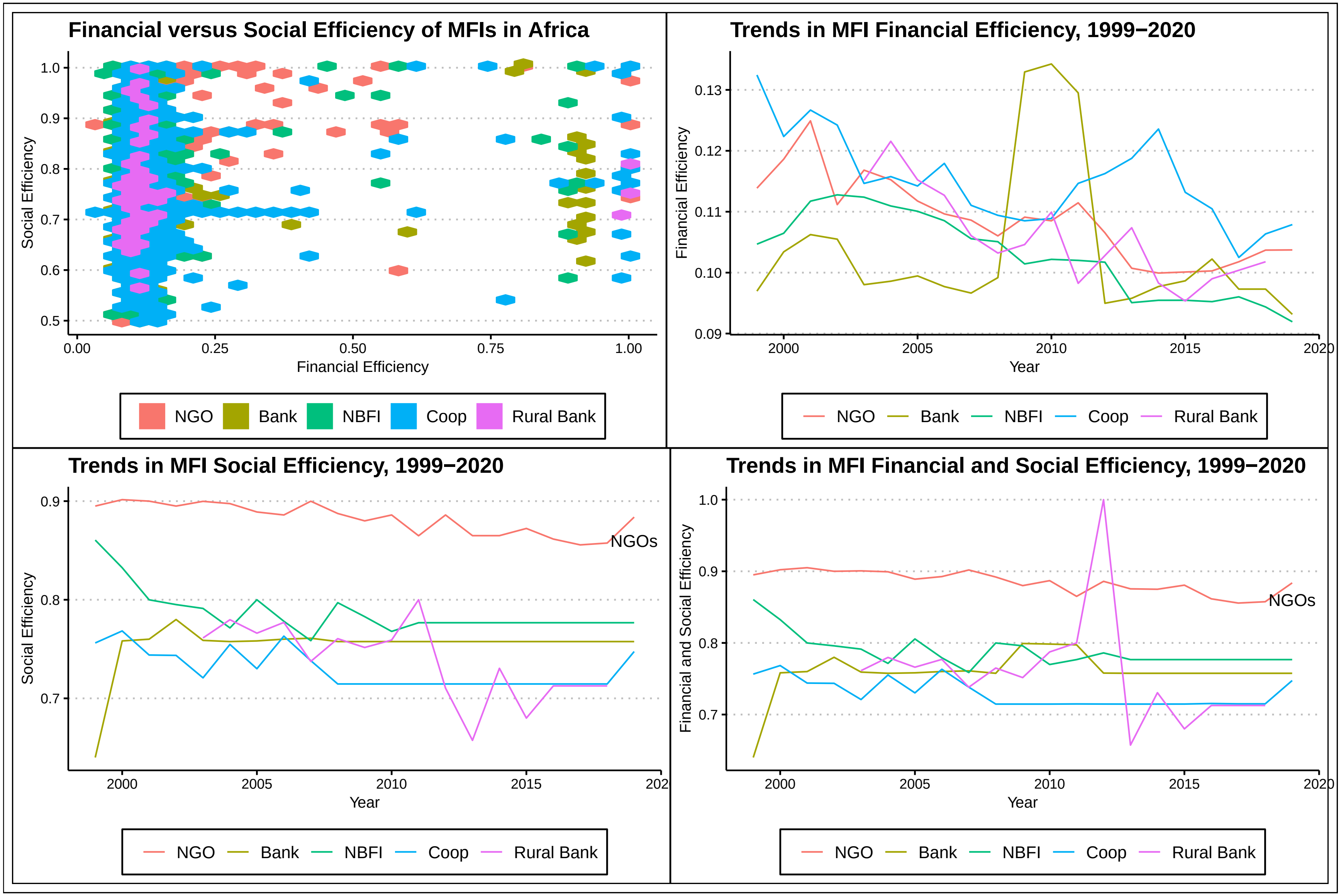
Financial versus Social Efficiency of MFIs in Africa
Social Efficiency
Financial Efficiency
NGO
Bank
NBFI
Coop
Rural Bank
Trends in MFI Financial Efficiency, 1999–2020
Financial Efficiency
Year
NGO
Bank
NBFI
Coop
Rural Bank
Trends in MFI Social Efficiency, 1999–2020
Social Efficiency
NGOs
Year
NGO
Bank
NBFI
Coop
Rural Bank
Trends in MFI Financial and Social Efficiency, 1999–2020
Financial and Social Efficiency
NGOs
Year
NGO
Bank
NBFI
Coop
Rural Bank

Table 4: Summary Statistics: Independent Variables for Regression Model

Variable	Mean	SD	Min	Q1	Median	Q3	Max
Asset Structure	0.0759	0.0694	0.000e+00	0.0351	0.0599	0.092	0.8598
KKM	0.0026	2.0064	-5.233e+00	-1.3041	-0.1137	1.628	7.3690
Private Credit	2.7194	0.6852	2.981e-01	2.3864	2.7584	3.052	6.8806
Stock Market	1.1410	1.4732	0.000e+00	0.0000	0.0000	2.428	5.7972
Profit Margin	-7.7393	513.2995	-3.550e+04	-0.1814	0.0484	0.189	6.2019
Assets	14.9461	2.2619	6.931e-01	13.5399	14.8577	16.416	22.9786

Source: Authors construction from the data

Note:

[1] Private credit refers to credit advanced by deposit taking banks as a percentage of GDP

[2] Stock market is the stock market capitalisation as a percentage of GDP

6.1.2 The Independent Variables

Table () shows summary statistics for the independent variables. Profit margin has the highest variability due to extreme minimum observation. To proxy the size of an MFI, we take the logarithm of assets. We use all the other independent variables without transformation.

In the next section, we detail the regression output from the drivers of the efficiency of MFIs in Africa.

7 Regression Analysis

In this section, we regress each of the DEA efficiency scores against the dependent variables. We bootstrap the the DEA efficiency scores before applying the scores for testing hypothesis regarding the regression model coefficients (Simar and Wilson 2000; Tziogkidis 2012; Fethi and Pasiouras 2010). he purpose of using the bootstrapping approach is two-fold: first, to obtain the bias corrected estimates and the confidence intervals of DEA-efficiency scores and second, to overcome the correlation problem of DEA-efficiency scores and to provide consistent inferences in explaining the determinants of financial and social efficiency (Assaf and Matawie 2010). The bootstrapped DEA scores serve as the dependent variables in the regression analysis. This section provides results from the regression models on the drivers of socio-financial efficiency of MFIs in Africa.

7.1 Financial Efficiency of MFIs

Table () shows the results of the regression analysis with financial efficiency as the dependent variable. The significant drivers of financial efficiency are asset structure and size, proxied by the logarithm of total assets. Current legal status has a weak relationship with financial efficiency. The regression analysis shows that commercial banks and rural banks have significantly better financial efficiency which goes aginst the visualisation in table (). The extreme values in financial performance of banks and rural banks could explain this contradicition. But overall, NGOs do better financially than all the legal forms of MFIs except cooperatives.

The asset structure of MFIs has an inverse relationship with financial efficiency. As noted earlier, asset structure or asset tangibility is the ratio of non-current assets to total assets of an MFI. The results then imply that investment in physical infrastructure harms financial sustainability (Iman, 2018, Demirguc-Kunt et al., 2018). The results are consistent with the theory because serving the financially excluded is expensive and may not yield economies of scale to offset the investment in physical infrastructure by MFIs.

The advent of Fintech allows MFIs to reach out to the financially excluded without high expenditures in brick an mortar branches and other physcical assets. 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. (Allen et al., 2014).

Hence, there is an opportunity for research into the extent to which Fintech affects the investment in physical infrastructure, profitability and outreach of MFIs in Africa.

The size of an MFI is also negatively related to financial efficiency of MFIs in Africa. Large, older MFIs have lower financial efficiency scores relative to smaller, younger which could arise due to dis-economies of scale. Also, larger, older MFIs may not emphasize financial sustainability given they receive relatively more donations. If donors emphasize outreach to financial sustainability, then this could explain the lower levels of financial performance by older MFIs. The ratio of stock market capitalisation to GDP has a weak positive relationship with financial efficiency, implying that MFIs operating in countries with better functioning capital markets exhibit better financial performance. The ratio of private credit to GDP is insignificant. The remaining variables, age and institutional quality have no significant relationship with financial efficiency. However, as we saw earlier in table (), younger MFIs have marginally higher financial performance which is not significant in the regression.

Table 5: Regression Output for Financial Efficiency (Standard Errors in Brackets)

	Dependent variable:					
	depvar					
	(1)	(2)	(3)	(4)	(5)	(6)
currentlegalstatusBank				0.127^{***}	0.012	0.028^{**}
				(0.025)	(0.020)	(0.013)
currentlegalstatusNBFI				0.019	-0.006	0.005
				(0.019)	(0.015)	(0.009)
currentlegalstatusCoop	-0.002	-0.001	-0.0004	-0.003	-0.005	0.008
	(0.019)	(0.018)	(0.022)	(0.015)	(0.014)	(0.009)
currentlegalstatusRural Bank				0.053^{*}	-0.038	-0.004
				(0.031)	(0.028)	(0.028)
ageYoung	0.002	0.001	0.002	0.001	0.001	0.002
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.002)
ageMature	0.005^{*}	0.004	0.005	0.002	0.003	0.004
	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)	(0.003)
kkm	-0.002	-0.002^{*}	-0.002	-0.0001	-0.001	0.0004
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
asset_structure	-0.070^{***}	-0.060^{***}	-0.066^{***}	-0.087^{***}	-0.069^{***}	-0.067^{***}
	(0.015)	(0.016)	(0.016)	(0.018)	(0.017)	(0.016)
pcrdbgdp	-0.001	0.002	0.002	-0.002	-0.003	-0.004
	(0.003)	(0.003)	(0.003)	(0.004)	(0.004)	(0.003)
stmktcap	0.004^{*}	0.004	0.007^{***}	0.005^{**}	0.003	0.005^{***}
	(0.002)	(0.002)	(0.002)	(0.003)	(0.002)	(0.002)
log(assets)	-0.159^{***}	-0.138^{***}	-0.128^{***}	-0.183^{***}	-0.152^{***}	-0.127^{***}
	(0.012)	(0.012)	(0.017)	(0.013)	(0.013)	(0.016)
Model	$Within$	$Within$	$Within$	$Random$	$Random$	$Random$
Data	$Full$	$>= 3Years$	$>= 5Years$	$Full$	$>= 3Years$	$>= 5Years$
Observations	4,782	3,840	3,165	4,782	3,840	3,165
R^2	0.078	0.073	0.098	0.151	0.095	0.101
Adjusted R^2	-0.142	-0.057	-0.003	0.146	0.088	0.093
F Statistic	11.630*** (df = 28; 3862)	9.522*** (df = 28; 3366)	11.080*** (df = 28; 2845)	380.100***	281.000***	293.000***
Note:						$^{*}p<0.1$; $^{**}p<0.05$; $^{***}p<0.01$

7.2 Drivers of Social Efficiency of MFIs

Unlike financial performance, the legal form of an MFI is the dominant driver of social performance. Consistent with figure (), NGOs have significantly much higher levels of social performance than all the other legal forms of MFIs. The concerns by the welfare school of microfinance is that the levels of outreach by NGOs to the financially excluded could be affected by focusing on financial sustainability. However, as the previous section shows, NGOs do not fare badly in financial efficiency than other legal forms of MFIs. It means, therefore, that NGOs could aim at a degree of financial efficiency while still maintaining their social goals.

The results are consistent with the data visualisations. Credit unions have the set objective of serving subscribed members within a set geographic location or a common professional background, and it is not their mission to explicitly target social performance (Mathuva et al., 2017). The contestation here is between NGOs and the other commercial entities, excluding credit unions. The results illustrate that MFIs that exclusively target social performance tend to achieve more socially. Hence the place of social mission of an MFI is central to achieving social objectives, a view that is in line with findings by Berbegal-Mirabent et al. (2019).

Both stock markets capitalisation to GDP and private credit to GDP have a negative and significant relationship with social performance. These two metrics capture the levels of capital market development. People in countries with higher levels of financial development have lower incidences of financial exclusion, on average, relative to people in countries with lower levels of financial inclusion. This observation is in spite of the concurrence in the literature that ability to access financial services does not necessarily translate into use of financial services. However, access to financial services is a necessary precondition for people to use financial services. Financial development means better financial infrastructure that allowing people who could otherwise not used financial services on account of lack of access to use these services.

Institutional quality (KKM) has a mixed but insignificant relationship with the social performance of MFIs. As expected, asset structure has a positive, albeit insignificant relationship with social performance, given that MFIs that have greater presence in financially under-served communities would tend to serve more financially excluded clients. Likewise, the size of an MFI shows a positive but insignificant relationship with social outreach.

Again, consistent with the data visualization, younger MFIs have better levels of social performance than older MFIs although the coefficients are not significant in the regression. The result seems odd given that younger MFIs started when the sustainability school was gaining ground, meaning low donations and subsidies. But given that younger MFIs are smaller, they may tend to serve geographically limited areas where they are able to serve more financially excluded clients. The wider coverage by older MFIs makes it hard for them to focus on social goals given the financial implications of sustaining their presence these settings.

Table 6: Regression Output for Social Efficiency (Standard Errors in Brackets)

	Dependent variable:					
	depvar					
	(1)	(2)	(3)	(4)	(5)	(6)
currentlegalstatusBank				-0.106^{***}	-0.096^{***}	-0.095^{***}
				(0.014)	(0.020)	(0.022)
currentlegalstatusNBFI				-0.084^{***}	-0.080^{***}	-0.077^{***}
				(0.011)	(0.014)	(0.015)
currentlegalstatusCoop	0.047	0.048	0.048	-0.137^{***}	-0.122^{***}	-0.124^{***}
	(0.054)	(0.057)	(0.063)	(0.010)	(0.014)	(0.017)
currentlegalstatusRural Bank				-0.103^{***}	-0.124^{***}	-0.130^{**}
				(0.022)	(0.033)	(0.052)
ageYoung	−0.001	−0.003	−0.001	−0.002	−0.003	−0.001
	(0.005)	(0.005)	(0.006)	(0.004)	(0.005)	(0.006)
ageMature	−0.004	−0.005	−0.002	−0.006	−0.008	−0.003
	(0.007)	(0.008)	(0.009)	(0.006)	(0.007)	(0.009)
kkm	0.0004	0.0003	−0.0002	−0.001	−0.003	−0.003
	(0.003)	(0.003)	(0.004)	(0.002)	(0.002)	(0.003)
asset_structure	0.024	0.029	0.036	0.010	0.022	0.029
	(0.029)	(0.034)	(0.042)	(0.027)	(0.032)	(0.040)
pcrdbgdp	−0.011	−0.013	−0.013	-0.009^{*}	-0.011^{*}	−0.010
	(0.007)	(0.008)	(0.009)	(0.005)	(0.007)	(0.007)
stmktcap	-0.013^{***}	-0.014^{***}	-0.012^{**}	−0.002	−0.002	−0.004
	(0.004)	(0.004)	(0.005)	(0.003)	(0.003)	(0.004)
log(assets)	0.026	0.035	0.034	−0.029	−0.014	−0.006
	(0.026)	(0.028)	(0.045)	(0.018)	(0.025)	(0.039)
Model	$Within$	$Within$	$Within$	$Random$	$Random$	$Random$
Data	$Full$	$>= 3Years$	$>= 5Years$	$Full$	$>= 3Years$	$>= 5Years$
Observations	4,782	3,840	3,165	4,782	3,840	3,165
R^2	0.037	0.039	0.038	0.619	0.348	0.200
Adjusted R^2	-0.192	-0.096	-0.070	0.617	0.342	0.192
F Statistic	5.293*** (df = 28; 3862)	4.840*** (df = 28; 3366)	3.971*** (df = 28; 2845)	421.500***	243.900***	183.800***

Note: *p<0.1; **p<0.05; ***p<0.01

7.3 Socio-Financial Efficiency of MFIs

Like social efficiency, the drivers of socio-financial efficiency are legal status, operating expenses to assets, capital to assets ratio, and education. These results may indicate that the funding providers' pressure does not swamp the depth of outreach. The implication here 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 are inconsistent with the welfare school's view on an inverse relationship between commercial capital and social outreach. More directly, the results support 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).

Table 7: Regression Output for Joint Financial and Social Efficiency (Standard Errors in Brackets)

	Dependent variable:					
	depvar					
	(1)	(2)	(3)	(4)	(5)	(6)
currentlegalstatusBank				-0.106^{***}	-0.096^{***}	-0.095^{***}
				(0.015)	(0.020)	(0.022)
currentlegalstatusNBFI				-0.084^{***}	-0.080^{***}	-0.077^{***}
				(0.012)	(0.014)	(0.015)
currentlegalstatusCoop	0.047	0.048	0.048	-0.137^{***}	-0.122^{***}	-0.124^{***}
	(0.055)	(0.058)	(0.063)	(0.011)	(0.014)	(0.017)
currentlegalstatusRural Bank				-0.103^{***}	-0.124^{***}	-0.130^{**}
				(0.023)	(0.033)	(0.052)
ageYoung	-0.001	-0.003	-0.001	-0.002	-0.003	-0.001
	(0.005)	(0.005)	(0.006)	(0.004)	(0.005)	(0.006)
ageMature	-0.004	-0.005	-0.002	-0.006	-0.008	-0.003
	(0.007)	(0.008)	(0.009)	(0.006)	(0.008)	(0.009)
kkm	0.0004	0.0003	-0.0002	-0.001	-0.003	-0.003
	(0.003)	(0.003)	(0.004)	(0.002)	(0.002)	(0.003)
asset_structure	0.024	0.029	0.036	0.010	0.022	0.029
	(0.029)	(0.034)	(0.042)	(0.028)	(0.033)	(0.040)
pcrdbgdp	-0.011	-0.013	-0.013	-0.009^{*}	-0.011^{*}	-0.010
	(0.007)	(0.008)	(0.009)	(0.006)	(0.007)	(0.007)
stmktcap	-0.013^{***}	-0.014^{***}	-0.012^{**}	-0.002	-0.002	-0.004
	(0.004)	(0.004)	(0.005)	(0.003)	(0.003)	(0.004)
log(assets)	0.026	0.035	0.034	-0.029	-0.014	-0.006
	(0.026)	(0.028)	(0.045)	(0.019)	(0.025)	(0.039)
Model	$Within$	$Within$	$Within$	$Random$	$Random$	$Random$
Data	$Full$	$>= 3Years$	$>= 5Years$	$Full$	$>= 3Years$	$>= 5Years$
Observations	4,782	3,840	3,165	4,782	3,840	3,165
R^2	0.037	0.039	0.038	0.619	0.348	0.200
Adjusted R^2	-0.192	-0.096	-0.070	0.617	0.342	0.192
F Statistic	5.293*** (df = 28; 3862)	4.840*** (df = 28; 3366)	3.971*** (df = 28; 2845)	421.500***	243.900***	183.800***

Note: *p<0.1; **p<0.05; ***p<0.01

7.4 Robustness Tests

We first run the fixed effects model for the entire dataset for robustness, with the results reported in table 5. Secondly, we check for outliers 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. The results remain to correspond to those in Table 4 except for the magnitude of the regression coefficients. Appendix 7 is a plot examining 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.

Given the panel structure of data, there is a 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.

8 Conclusion

This study examined the levels and drivers of financial efficiency, social efficiency, and socio-financial efficiency of MFIs in Africa, particularly along MFI legal status lines. NGOs have the highest levels of social efficiency and socio-financial efficiency, whereas cooperatives have the least. In terms of financial efficiency, cooperatives and rural banks perform best while NBFIs trail. Social efficiency and socio-financial efficiency drivers are legal statuses, operating expense to assets ratio, capital to assets ratio, asset structure, and education. For financial efficiency, the drivers are similar to social efficiency, except that education is not a significant driver. Notably, capital structure positively influences both financial and social efficiency outcomes that support the need for MFIs to seek external capital. However, operating expenses positively relate to social performance and negatively relate to financial performance, pointing to 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 their overarching social mission.

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Table 8: Results of the Hausmann Tests

Statistic	P.value	Parameter	Method	Alternative
73.36	0	8	Hausman Test	one model is inconsistent
62.45	0	8	Hausman Test	one model is inconsistent
84.55	0	8	Hausman Test	one model is inconsistent

10 Appendices

10.1 Appendix 1: Hausmann Test for the Choice Between Fixed and Random effects

10.2 Appendix 2: Visualization of DEA Inputs and Outputs

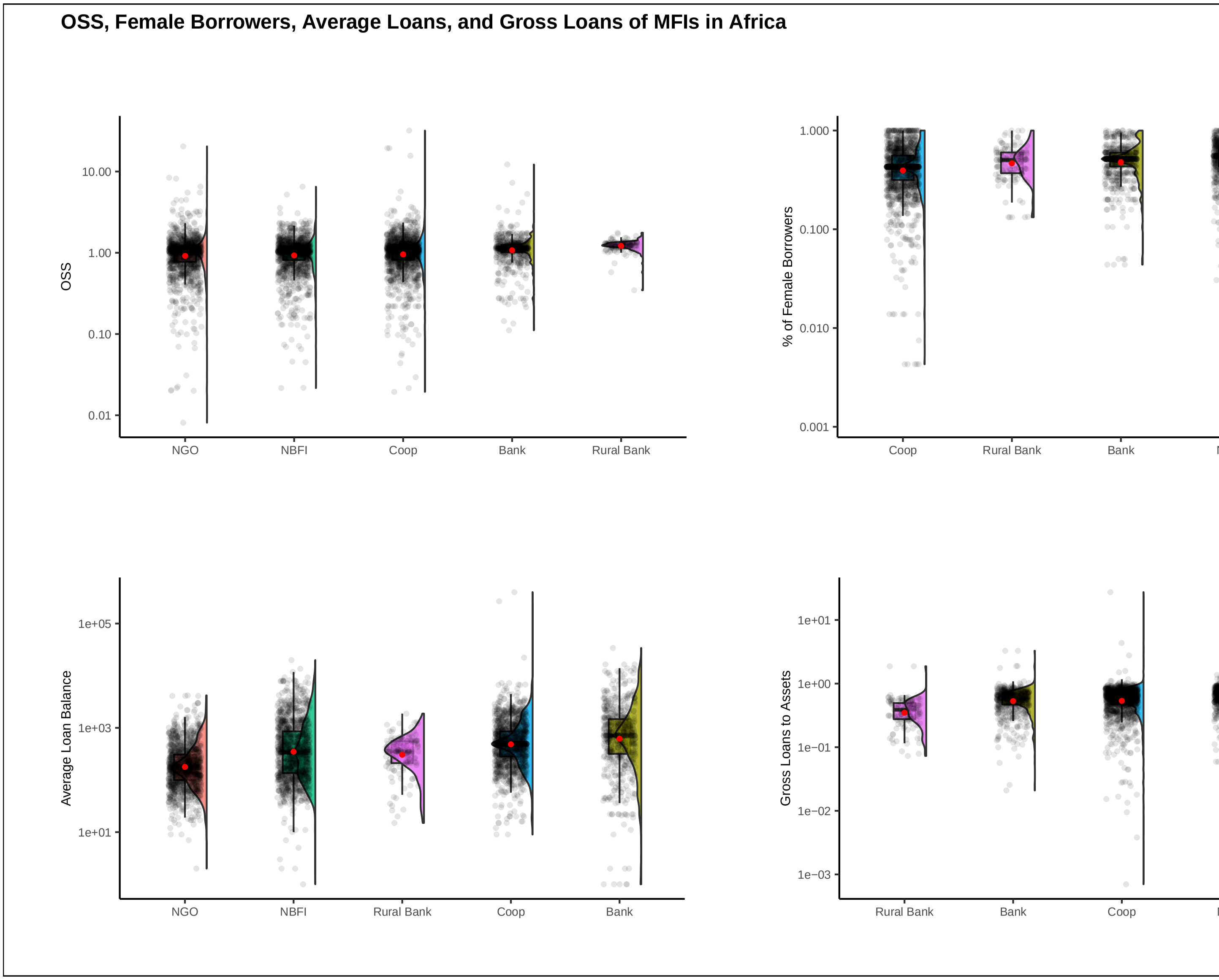

Figure 5: Financial Sustainability and Social Performance Metrics for MFIs in Africa

Table 9: Regression Output for Efficiency for Winsorized Data (Standard Errors in Brackets)

	Dependent variable:					
	depvar					
	(1)	(2)	(3)	(4)	(5)	(6)
currentlegalstatusBank				0.125***	−0.108***	−0.077***
				(0.025)	(0.015)	(0.016)
currentlegalstatusNBFI				0.003	−0.087***	−0.082***
				(0.018)	(0.012)	(0.012)
currentlegalstatusCoop	−0.0001	0.041	0.041	0.010	−0.137***	−0.126***
	(0.015)	(0.052)	(0.052)	(0.015)	(0.011)	(0.011)
currentlegalstatusRural Bank				0.066**	−0.106***	−0.080***
				(0.028)	(0.022)	(0.023)
ageYoung	0.003	0.002	0.002	0.001	0.001	−0.001
	(0.002)	(0.005)	(0.005)	(0.003)	(0.005)	(0.005)
ageMature	0.005*	−0.0002	−0.0001	0.002	−0.002	−0.006
	(0.003)	(0.008)	(0.008)	(0.004)	(0.007)	(0.007)
kkm	−0.002	0.001	0.001	−0.00001	−0.001	−0.0002
	(0.001)	(0.003)	(0.003)	(0.001)	(0.002)	(0.002)
asset_structure	−0.078***	0.065	0.069	−0.092***	0.034	0.024
	(0.020)	(0.044)	(0.045)	(0.025)	(0.041)	(0.043)
pcrdbgdp	−0.003	−0.020*	−0.020*	0.0004	−0.019***	−0.016**
	(0.004)	(0.010)	(0.010)	(0.005)	(0.007)	(0.008)
stmktcap	0.005**	−0.013***	−0.011***	0.006**	−0.0003	0.002
	(0.002)	(0.004)	(0.004)	(0.003)	(0.003)	(0.003)
log(assets)	−0.162***	0.014	0.017	−0.178***	−0.034	−0.046*
	(0.018)	(0.037)	(0.038)	(0.019)	(0.026)	(0.027)
Model	*Within*	*Within*	*Within*	*Random*	*Random*	*Random*
Depvar	*FinEff*	*SocEff*	*FinSocEff*	*FinEff*	*SocEff*	*FinSocEff*
Data	*Full*	*>= 3Years*	*>= 5Years*	*Full*	*>= 3Years*	*>= 5Years*
Observations	4,292	4,292	4,292	4,292	4,292	4,292
R^2	0.062	0.043	0.041	0.132	0.632	0.627
Adjusted R^2	-0.171	-0.196	-0.198	0.126	0.629	0.624
F Statistic (df = 28; 3434)	8.173***	5.496***	5.297***	261.800***	407.700***	333.400***

Note: *p<0.1; **p<0.05; ***p<0.01