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Microfinance institutions' operational self-sufficiency in sub-Saharan Africa: empirical evidence

Laxmi Remer[*] and Hanna Kattilakoski

Abstract

The topic of financial sustainability in microfinance institutions has become more important as an increasing number of Microfinance Institutions (MFIs) seek operational self-sufficiency, which translates into financial sustainability. This study aims to identify factors that drive operational self-sufficiency in microfinance institutions. To accomplish this, 416 MFIs in sub-Saharan Africa are studied and several drivers for operational self-sufficiency are empirically analyzed. Results indicate that these drivers are return on assets, and the ratios total expenses/assets and financial revenues/assets. The results imply that MFIs should encourage cost-management measures. They also reveal that there may not be a significant tradeoff in self-sufficiency and outreach. These findings will enable microfinance institutions worldwide to sharpen their institutional capabilities to achieve operational self-sufficiency and also provide policymakers with more focused tools to assist industry development.

Keywords: MFI, Microfinance institution, Operational self-sufficiency, Financial sustainability, Outreach, Financial inclusion, Africa

Introduction

Microfinance institutions (MFIs) provide small scale loans to poor, low income people and communities, who are considered un-bankable. Microfinance, often referred to as microcredit, has made deep inroads into sustainable finance since Muhammed Yunus set up the Grameen Bank in 1983 to bank the un-bankable. With about 130 million clients, the microfinance market is already fairly established and is predicted to grow at an estimated compound annual growth rate (CAGR) of more than 15% by 2020 (Technavio, 2016). However, although many MFIs have shown great success in outreach, "millions of low income individuals in developing countries still lack access to financial services" (Bogan, 2012). Since they are financially unsustainable, many MFIs are financed mostly through donations or subsidies which provide funds that allow them to continue operating (Quayes, 2012).

By definition, an MFI has a dual objective: to cover its costs (self-sufficiency) and to reach many poor borrowers (outreach) (Hartarska & Nadolnyak, 2007). Financial sustainability in microfinance organizations is paramount because it enables them to achieve, both, their long-term and short-term goals. According to Bayar (2013), the total demand in microfinance markets is about 500 million people, indicating a large unmet demand and potential for further growth within the microfinance industry. Overall, penetration rates are low, ranging from 0.5% in Eastern Europe and Central Asia to about 2.5% in South Asia (Gonzalez & Rosenberg, 2006). To meet this need, MFIs are promoting financial inclusion through provision of financial services to the poor (Chikalipah, 2017). Unfortunately, the industry situation is such that there is an overwhelming number of unprofitable MFIs, which serve about 56% of all micro-borrowers. This number does not even include the extremely small MFIs that do not report financial information and are likely to be unprofitable (Gonzalez & Rosenberg, 2006).

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MFIs remain subsidized because of their importance to poverty alleviation. There is a well acknowledged tradeoff in the industry between sustainability and outreach. The tradeoff assumes that if an MFI focuses on financial sustainability, their outreach will be compromised, since they will likely have to increase interest rates to compensate for higher operating expenses. Likewise, if an MFI focuses solely on financial inclusion and outreach, they are likely to be unprofitable because they are unable to cover the excessive costs of reaching the extremely poor.

However, financial sustainability has recently become more important for the microfinance industry with the MFIs seeing improving profitability over time. With this increasing profitability within the microfinance industry, new players are emerging and entering the market. The expansion of the microfinance industry is likely to continue to meet the demand for about 250 million customers in the future (Bayar, 2013).

In this paper, operational self-sufficiency (OSS) is used to proxy for financial sustainability and is at times used interchangeably. OSS would allow an MFI freedom from subsidies and the opportunity to continue outreach to populations denied financial services whilst being profitable. Financial sustainability or OSS is crucially important for the long-term self-sufficiency of an MFI thereby aiding poverty alleviation.

The aim of this paper to draw attention to the impacts and consequences of efficient operations and cost management measures in the context of MFIs. This in turn, will allow them to achieve operational and financial self-sufficiency. An added aim of this paper is also to provide policymakers with more focused tools to assist in industry development.

A detailed and in-depth study of the existing literature has identified several un-researched gaps, and based on these, this paper offers multiple contributions to research. It uses OSS, a less studied, key indicator of financial sustainability to proxy for long-term financial sustainability. OSS is the MFI's ability to cover its costs through operating income (MIX Market, 2018). The only study that comes close in the recent years is by Chikalipah (2017), where the dependent variable is explicitly financial sustainability and not OSS. Moreover, Chikalipah (2017) uses GMM methodology to deal with endogeneity of data, which is most often an 'unfixable' limitation. This paper also establishes significant causal drivers of MFI OSS using regression analysis whilst attempting to shed light on the tradeoff theory. According to Hermes & Lensink, 2007, "although this issue is the subject of a heated debate, there is a lack of systematic empirical analyses on the nature and determinants of the trade-off." This paper also establishes key differences between the various types of MFIs and focuses on the long-term self-sufficiency of an

MFI rather than taking an investor's perspective. Finally, it uses the most exhaustive and large database from 2000 to 2017, from sub-Saharan Africa (SSA).

The rest of the paper is structured as follows: section two is literature review leading into theoretical framework and hypotheses, section three discusses data and methodology used which in-turn is followed by sections 4 and 5 with results and conclusions respectively.

Literature review

Nature of lending in MFIs

Microfinance has emerged as a feasible financial alternative for poor people with no access to credit from formal financial institutions. Its objectives include poverty alleviation by fostering small scale entrepreneurship through simple access to credit. It distinguishes itself from formal credit by disbursing small loans to the poor, using various innovative non-traditional loan configurations such as loans without collateral, group lending, progressive loan structure, immediate repayment arrangements, regular repayment schedules and collateral substitutes (Quayes, 2012).

The concept of small-scale lending extends beyond just typical institutions, and it includes several types of lending, many that are mostly through informal organizations. Additionally, informal groups create a more competitive landscape for microfinance institutions. Other types of microfinance lending are essentially centered around group lending and group saving.

Group lending is a common type of microfinance loan where the group represents a borrower (Zuru, Hashim, & Arshad, 2016). The loan is disbursed to a group and members of the group, usually four to ten individuals, are responsible for the repayment of the loan (Chetty, 2017) Members of such groups mostly include farmers, labourers, tenants and other rural workers. For a loan provider, this often minimizes risk of lending, as the basic idea is that individual risks are overcome by the collective responsibility and security granted by a group (Grameen Bank, 2018). Group lending focuses on social capital, which promotes social interaction, information sharing and trust. These factors are all foundations of group lending methodology (Kamukama & Natamba, 2013). Mostly, these formation types do not require financial administration. A challenge faced by group lending is personal preferences in lending credit. Group lending can also be referred to as joint liability groups.

Many of the informal groups are extremely similar in their practices. However, the interesting feature in all of them is that they focus heavily on groups. Additionally, most groups have self-selected members, which means that members are admitted into the groups based on their relationships with peers. Individuals are unlikely to recommend someone for a group if they know that the

individual is unlikely to pay back their loans or if they know the individual is dishonest or immoral. Thus, these groups utilize their knowledge of a person's character to make decisions on admittance into a group as a form of risk management.

Different types of MFIs

Microfinance institutions have a range of different legal standings. There is a variety in the types of formal and semiformal institutions within the market including cooperatives, credit unions, non-governmental organizations (NGOs), non-banking financial institutions (NBFIs), rural banks, postal banks, and commercial banks (Daher & Le Saout, 2013). The legal statuses identified by the MIX Market, the data source for this paper, include NGO, NBFI, Banks, Rural Banks and Credit Unions/Cooperatives as well as "other." Research has shown that NGOs account for less than a quarter of total borrowers; most microfinance is provided by governments, such as state-owned institutions or self-help groups that are financed by state banks. About a sixth of borrowers are served by private banks and finance companies (Gonzalez & Rosenberg, 2006).

The different forms of institutions operate in diverse ways. For example, NGOs tend to make smaller loans, which are substantially costlier per dollar lent, and thus require higher interest rates, than microfinance providers chartered as banks or NBFIs. NGO microfinance institutions also lend substantially higher shares of their portfolios to women (Cull, Demirguc-Kunt, & Morduch, 2016).

Many MFIs are not only involved in lending, but they offer additional services such as bank accounts and insurance products, whilst also providing financial and business literacy. Some might offer additional sources such as savings accounts, insurance, health care and personal development, making the scope of MFI's work go beyond only financial matters (Jha, 2016). In principle, MFIs try to build a unique atmosphere of financial inclusion intertwined with a sustainable livelihood aimed at empowering poor communities. Many MFIs are also involved in several social development initiatives such as capacity-building, education, financial literacy, water and sanitation, livelihood promotion, preventative healthcare and training (Jha, 2016). This is in line with the MFI goal of reducing poverty by giving poor the resources needed for them to become self-sufficient whilst remaining financially self-sufficient themselves.

OSS in the context of MFIs

MFIs are critical in meeting the needs of an underserved market. OSS in an MFI, not unlike any other business, is important because it allows the MFI to sustain itself both in the short and long run whilst delivering on its commitment. Financially self-sufficient MFIs are able to use a wider array of financial resources to conduct business, such as borrowing from banks or through capital markets (Gibbons & Meehan, 1999). Financial sustainability through OSS has recently become centerstage for the microfinance industry and MFIs have seen improving profitability over time.

However, meeting the needs of an underserved market is rather expensive. Especially in the rural areas of SSA, where operating costs can run high and capital constraints limit outreach (Bogan, 2012). Without financial sustainability, reaching the long-term goal of aiding poverty alleviation is more difficult since MFIs depend on third parties for funding (Daher & Le Saout, 2013; Otero, 1999).

Third party funding, which can take the form of subsidies, is common practice within the microfinance industry. Subsidies help cover the cost of funds and administration, which in-turn increase the outreach an organization can have (Hudon & Traca, 2010). Subsidies are important in that they allow an MFI to conduct business regardless of whether it is financially self-sufficient or not. Additionally, MFIs can then offer borrowers more affordable lower interest rates. Subsidies are particularly important in more remote areas, where individuals are harder to reach, and thus, administrative costs of loans and doing business are higher.

However, research has found that the (higher) intensity of subsidies is associated with (lower) sustainability (Hudon & Traca, 2010). As MFIs receive more funding, they are less dependent on the success of their own operations. Moreover, although MFIs may claim that they are profitable, they may still use subsidies to cover costs (De Aghion & Morduch, 2004; Hudon & Traca, 2010). According to Quayes (2012), initially, it was expected that MFIs would wean themselves off donor subsidies and achieve self-sufficiency as the rate of recovery of loans increased, but other research contends that the high rate of recovery in the microcredit industry has failed to transform the donor-dependent MFIs into independent self-sustaining organizations. Interestingly, Nawaz (2010) states that financial performance of MFIs is seen to significantly decline without the use of subsidies. It is clear that MFIs need to, both, sustain themselves and increase their outreach to the poor and unbanked population.

Theoretical framework
The tradeoff theory
As mentioned before, given an MFI's dual objective of self-sufficiency and outreach (Hartarska & Nadolnyak, 2007), the "trade-off" theory states that financial inclusion (outreach) keeps the interest rates of MFIs low given scale impacts. Most literature is in agreement that there are two extremes: the poverty/outreach approach

and the self-sustainability approach (Schreiner, 2002). The poverty/outreach approach is directed towards improving the standard of living of poor individuals and focuses on the impact of the MFI on individuals within a community. The success of an MFI with the poverty approach is measured based on how well it fulfills the needs of the poorest individuals in short-term. Mostly, donations fund these typically non-profit MFIs and there is a significant dependence on financial help from third parties.

On the other hand, the self-sustainability approach focuses more on a formal financial system where success is measured through profitability. In this approach, donations cover start-up costs and fund innovation experiments (Schreiner, 2002). Given these innovations, in the long-term, client revenue covers costs. More recently, MFIs have adopted a for-profit business model instead of a non-profit (see changes in Grameen Bank, 2018 and Chikalipah, 2017). However, there is also the apprehension about financial self-sufficiency, in that, it may adversely affect the social outreach mission of accessing credit for the poor (Quayes, 2012) giving rise to the "tradeoff" between outreach and self-sufficiency.

Despite this, there seems to be a trend towards improving financial sustainability as evidenced by data from 2001 and 2004 which shows that based on the borrowers served, profitability has increased from 53% to 64% respectively (Gonzalez & Rosenberg, 2006). The emphasis on financial performance is also important because donor agencies have a vested interest in the efficient utilization of funds allocated.

In order for an MFI to have wider outreach and to maintain financial sustainability, they must charge higher interest and incur higher costs of disbursing loans (Quayes, 2012). Unlike traditional development banks, MFIs use many innovative lending methods and charge market-based interest rates to compensate for the higher costs associated with conducting this type of business (Hartarska & Nadolnyak, 2007). The interest rates cover the cost of screening, monitoring and enforcing loans. According to Bogan (2012), as protection from default, MFIs have charged nominal interest rates of 30% to 60%. Ayayi and Sene (2010) show that MFIs with the highest interest rates are the best performers, the most efficient and the most financially sustainable organizations. However, while these interest rates may cover operating expenses, they are not ideal for expanding outreach, since the financial services being offered become relatively unaffordable to the poor.

Typically, by extending more credit services to the poor, a larger number of small loans will be administered which could translate as higher cost per loan. Also, there is an increased risk in this sort of an outreach because there is a higher chance of default since poor borrowers are more susceptible and less capable of dealing with economic volatility (Quayes, 2012). MFIs that reach the poorest clients have the highest costs and a smaller volume of operations (Lafourcade, Isern, Mwangi, & Brown, 2005). As a result, increased depth of outreach comes at a higher service and administrative cost, which results in worsening financial performance.

There is however, statistical evidence which shows that financially self-sufficient MFIs have better outreach than MFIs that are not self-sufficient (Quayes, 2012). This information is significant in that, financial sustainability should be a prerequisite for all MFIs in order for them to have the best outreach within communities. Though most research agrees that there is a tradeoff between financial self-sustainability and outreach, this information proves that the tradeoff can be overcome. An operationally and therefore financially sustainable microfinance organization should ideally be able to maintain self-sufficiency while keeping interest rates and operating costs low to successfully cater to the poor, especially in SSA.

Microfinance in sub-Saharan Africa (SSA)

The need for microfinance as a means for poverty alleviation is evident in SSA, where the number of poor has increased from 280 million to 330 million since 1990 to 2012 (The World Bank, 2016). Extreme poverty remains a challenge especially within the SSA region. As a perspective, the world average for the population in poverty is 10.7% and in Sub-Saharan Africa, the average is 43% (The World Bank, 2016). Three quarters of the adult population here lack access to formal banking services. In 2014, only 16% of adults had any type of formal savings and only 6% participated in formal borrowing (The World Bank, 2014) as compared to almost 89% adults with accounts in formal banks in high income economies (Bayar, 2013).

Microfinance in this region faces its own, unique challenges. Very low population densities throughout Africa only increase the already high operating expenses. Delivering microfinance services to extremely rural areas is very expensive because the distance between clients is physically vast and financial transactions are likely to be impractically small.

The overall financial infrastructure in Africa is also lacking, and a shortage of strong managers has caused major sub-regions in Africa to agree that staff shortages are holding back their growth and service improvements (Ashcroft, 2008). Africa's small private sector is dominated by small enterprises that engage in largely informal activities, their growth hampered by limited access to formal financial services, such as deposit, credit facilities and other financial services. Only about 15% of small-medium enterprises in Africa have access to these services (United Nations OSAA, n.d.).

Many MFIs in SSA underperform and struggle to remain in business (Chikalipah, 2017). In a study covering Africa, East Asia, Eastern Europe, Latin America, the Middle East and South Asia for the years 2003 and 2006, Africa had the highest percentage of unsustainable MFIs (38.02%), the highest percentage of portfolio at risk (7.03%), and the lowest average return on assets (0.38%) (Bogan, 2012). In a region where poverty is prominent and omnipresent, financially sustainable MFIs are especially important to continue to help the poor.

All of the above makes SSA an apt region to focus on.

Hypotheses

Based on the evidence presented above and according to the concept of social entrepreneurship, a business should be able to be profitable and serve a social need (Martin & Osberg, 2007). Despite the tradeoff theory, which implies that there is a tradeoff between financial self-sufficiency and outreach, higher outreach also implies scale effects thereby reducing cost per borrower. It is therefore likely to be a strategy followed by for-profit MFIs giving rise to our first and second hypotheses, namely,

H_1: *For-profit MFIs have higher outreach as compared to non-profit MFIs* and in the same vein.

H_2: *Higher OSS results in increased outreach.*

For-profit MFIs are likely to be more focused and efficient in terms of their operations as compared to the subsidized non-profit MFIs, thereby giving us the third and fourth hypotheses, namely,

H_3: *For-profit and non-profit MFI's OSS is driven by dissimilar factors.*

and

H_4: *OSS and Non-OSS MFIs are driven by dissimilar factors.*

Dissimilar factors here capture the differences in the operational functioning of "for-" and "non-profit" MFIs. We distinguish between for- and non-profit MFIs and also between operationally self-sufficient and non-operationally self-sufficient MFIs. This is done so as to have clearer results and also to establish the logic that operational self-sufficiency promotes financial self-sufficiency and outreach.

Data and methodology

Data is collected from MIX Market created by the Microfinance Information Exchange. A web-based platform, MIX Market is widely used because of their extensive standardized financial and outreach information on MFIs. The data gathered by the MIX is standardized according to the microfinance industry reporting standards, which are aligned with the International Financial Reporting Standards (Global Impact Investing Network, 2018).

According to Chikalipah (2017), factors that improve financial sustainability include, decreased costs/borrower,

increases in the number of borrowers, higher interest rates and higher return on assets. He also shows that increases in deposits decrease financial sustainability and macroeconomic variables apart from GDP growth (significant at 10%) do not impact financial sustainability of the MFIs. We, therefore, do not include macroeconomic variables in our analysis to preserve the brevity of the model.

Bogan (2012) shows that the size of an MFI's assets and an MFI's capital structure are associated with performance, both in terms of sustainability and outreach. Additionally, a study by Hartarska and Nadolnyak (2007) showed that less leveraged MFIs have better OSS showing donors' willingness to provide equity to MFIs that do well and extend loans to those that slack off – a classic phenomenon witnessed in regular corporate finance. Quayes (2012) showed that financial performance has a positive impact on the depth of outreach which increases the probability of attaining financial sustainability. Additionally, "the depth of outreach is positively affected by financial sustainability, and firms which are OSS have a smaller average loan size than firms which are not" (Quayes, 2012).

Schäfer and Fukasawa (2011) suggest that an MFI can expand its outreach and serve more customers which results in higher financial stability and OSS. The more borrowers an MFI has, the more they can leverage economies of scale and scope, thereby reducing total cost per borrower. They also found that less revenue is associated with reduced OSS.

Given the above, this paper uses the following variables (some as obvious ratios) to test the aforementioned hypotheses. The definitions are sourced from MIX Market (2018):

OSS (Non-OSS): is an indicator of financial performance of an MFI (Hartarska & Nadolnyak, 2007), and measures its ability to (not) cover its costs through operating income (MIX Market, 2018). The widely accepted formula, which this paper also uses, is:

$$OSS = \frac{Financial\ Revenue}{(Financial\ expense + Net\ impairment + Operating\ Expenses)}$$

where financial expense is the expense on funding liabilities and net impairment is the loss on gross loan portfolio (MIX Market, 2018). OSS is a percentage, whereby over 100% indicates self-sufficiency (less than 100% indicates no operational self-sufficiency).

ROA: return on assets is the ratio of net operating income (less taxes) and average assets, a classic measure of profitability.

ROE: return on equity is the ratio of net operating income (less taxes) and average equity, showing investor perspective.

Assets: is the total value of resources controlled by the MFI as a result of past events and from which future economic benefits are expected to flow to the institution. For calculation purposes, assets are the sum of each individual asset account listed.

Active borrowers: is the number of individuals who currently have an outstanding loan balance with the MFI.

Average loan balance: is the ratio of gross loan portfolio to number of active borrowers.

Cost per borrower: is the ratio of operating expenses to average number of active borrowers.

Loan portfolio: includes (average) gross loan portfolio, number of loans outstanding, number of loans disbursed, fees and commission income on loan portfolio, interest income on loan portfolio.

Financial revenue: is revenue from the loan portfolio and other financial assets.

Total Expense: The sum of financial expenses, impairment loss and operating expenses.

Outreach: is number of people an MFI extends credit to, or number of borrowers over a specific period of time (Quayes, 2012). The MIX Market classifies outreach as small, medium or large, where:

- Small: Less than 10,000 borrowers
- Medium: borrowers between 10,000 and 30,000
- Large: Greater than 30,000 borrowers

Methodology

All available information on the above-mentioned variables for the SSA MFIs, for the period from 2000 to 2017, were downloaded from the MIX Market (2018). This resulted in 856 unique individual MFIs with 4124 rows of data. Given the voluntary nature of disclosure, some MFIs have more information than others.

Each MFI is assigned a diamond rating by the MIX Market (2017). This rating system represents the level of disclosure; the higher level of disclosure, the higher the number of diamonds. The currency is US dollar:

- Level 1: General information.
- Level 2: Level 1 and outreach data (at minimum, data for two consecutive years).
- Level 3: Levels 1–2 and financial data (at minimum, data for two consecutive years).
- Level 4: Levels 1–3 and audited financial statements (at minimum, audited financial statements including auditors' opinion and notes for at least two consecutive years).
- Level 5: Levels 1–4 and rating or other due diligence report (at minimum, ratings/evaluation, due diligence and other benchmarking assessment reports or studies for one of the 2 years reported).

To ensure data reliability, only the MFIs with diamond levels above 3 (inclusive) and with no missing information were selected for further analysis giving us a final 416 unique MFIs with 1703 rows of data.

These MFIs were then sorted into categories: for-profit or non-profit and OSS, NOSS (non-OSS), or UPNOSS (underperforming NOSS) MFIs. The OSS, NOSS and UPNOSS categories are based on the OSS ratio, namely, OSS > 100% is operationally self-sufficient, OSS ratio < 100% is non-operationally self-sufficient, UPNOSS is the subset of MFIs with OSS ratio below 80% and for- and non-profit MFIs is based on the legal status declared by the MFI. Once again, we distinguish between the for- and non-profit MFIs, because based on theory, a non-profit organization should be more focused on outreach and less on financial sustainability. OLS regression method is then applied to the data to identify causal factors for OSS in SSA.

Results

Figure 1 below shows that, of 416 MFIs, 57% were OSS, while 43% were NOSS. This is very interesting because there is a higher percentage of self-sufficient MFIs than would have been expected as suggested by literature.

Pie chart based on own analysis; data - mix market 2018
Moreover, from Table 1 below, when comparing the outreach of MFIs, the OSS organizations actually report a larger outreach than the NOSS organizations. I.e. 26% of the OSS MFIs reported larger outreach as compared to 11% of the NOSS MFIs. In fact, 51% of OSS MFIs report medium to large outreach as compared to 30% by NOSS MFIs. This implies that OSS MFIs, contrary to the tradeoff theory, show relatively higher outreach than NOSS.
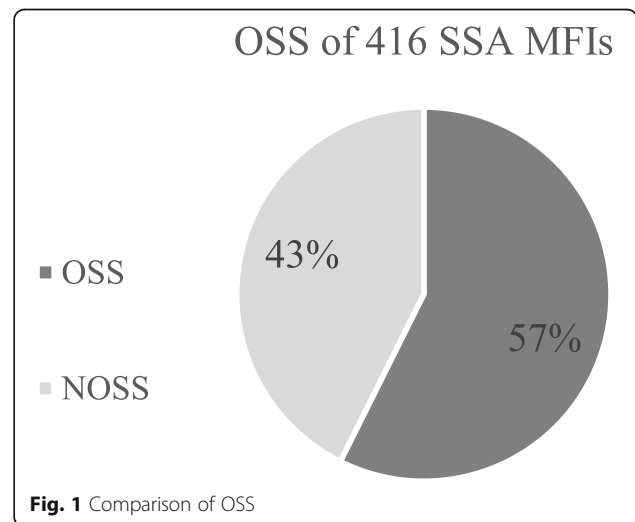
Fig. 1 Comparison of OSS

Table 1 Comparison of Outreach amongst different types of MFIs

OUTREACH	All Data	OSS	NOSS	UPOSS	For-Profit	Non-Profit
Small	55%	49%	65%	72%	49%	60%
Medium	25%	25%	25%	22%	29%	22%
Large	20%	26%	11%	6%	22%	18%

Figures based on own analysis; data - Mix Market, 2018. *OSS* Operational Self-sufficiency, *NOSS* Non-OSS, or *UPNOSS* Underperforming NOSS. Each percentage is a ratio of the number of MFIs with a specific outreach to the total number of MFIs. For e.g., in NOSS MFIs column, the number of "small" outreach organizations was totaled and divided by the total number of MFIs giving 65%. Outreach: Small- Less than 10,000 borrowers, Medium- Number of borrowers is between 10,000 and 30,000, Large- Greater than 30,000 borrowers

From Fig. 2 below, it is clear that a relatively higher percentage, i.e. 65% of for-profit MFIs show OSS whilst 52% of the non-profit MFIs show OSS. This is in line with the theory that non-profit MFIs, which are either credit unions/co-operatives or NGOs and are heavily subsidized, are more focused on other aspects of microfinance than OSS (Quayes, 2012).

Pie chart based on own analysis; data from mix market 2018

When comparing outreach for the for-profit and non-profit MFIs, the results indicate that for-profit MFIs have a slightly higher outreach, as indicated in Table 1 above. We see that 22% of for-profit MFIs have a larger outreach as compared to 18% in non-profit MFIs. This also therefore challenges the theory that for-profit MFIs are not as focused on reaching poor clients. In summary, for- and non-profit MFIs have dissimilar OSS and outreach.

Regression analysis

Before beginning with regression analysis, we check for the presence of multicollinearity. Table 2 below shows that there is no serious multicollinearity in the chosen variables, (barring Return on Equity), since none of the

correlation coefficients are above 0.70 (Baltagi, 2008; Hsiao, 2014).

Correlation matrix indicating no multicollinearity for independent variables for 416 SSA MFIs. Pearson's probability in parenthesis

Table 3 below presents the descriptive statistics for the variables that proxy as drivers for OSS, for the 416 MFIs. The data spans 18 years wherein the average OSS ratio is 106% with a minimum of 2% and a maximum of 1938%. ROA averages at a − 3% and ROE at − 63%, both indicating issues with profitability. The average loan balance per borrower has been US$598 whilst cost/borrower has averaged at US$188. The average number of active borrowers for this period has been 29,299 borrowers with a minimum of 2 and maximum of 801,809 borrowers. Table 3 also shows that the max and min are really extreme implying a high degree of volatility in this industry – a fact also reiterated by rather high standard deviations.

Data from MIX market 2018 for 416 SSA MFIs

Table 4 below presents OLS regression results conducted on the OSS and NOSS MFIs to determine causal factors. Model 1 includes all data for the 416 MFIs and is provided only for comparative basis. Model 2 includes data only for OSS institutions (OSS > 100%), while Model 3 includes data only for NOSS institutions (OSS < 100%). Model 4 for UPNOSS MFIs is where OSS < 80%, because this isolates organizations that are truly NOSS. Models 5 and 6 are grouped based on their declared profit orientation. For sake of brevity, whilst we present the conventional significance levels of 1% (highly significant), 5% (significant) and 10%, we only discuss the significances of 1% and 5%.

A key finding is the set of shared commonalities amongst the different types of MFIs, namely:
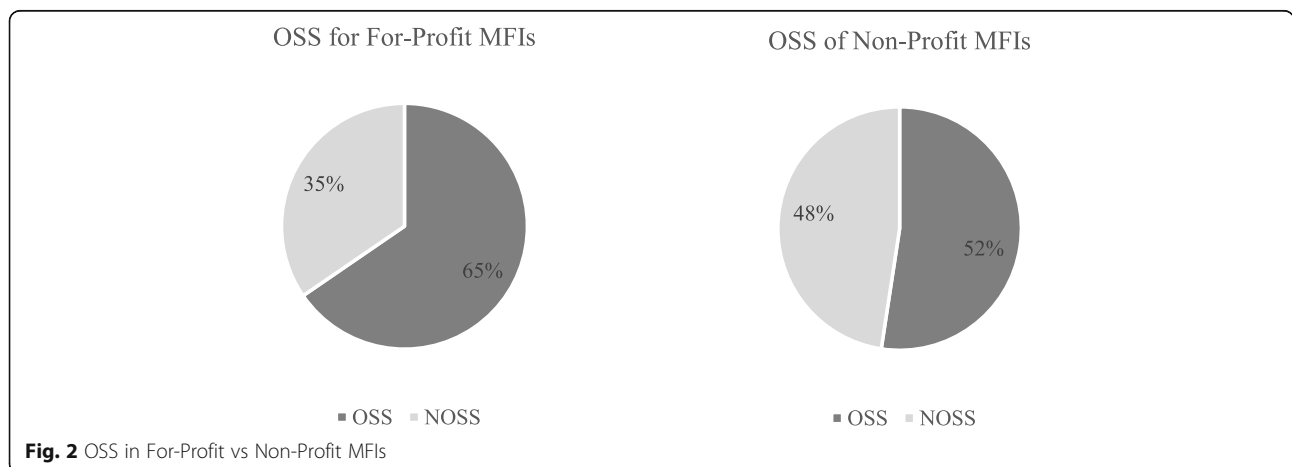
Fig. 2 OSS in For-Profit vs Non-Profit MFIs

Table 2 Pairwise correlations

	Return on assets	Return on equity	Average loan balance per borrower	Cost per borrower	Total expense / assets	Number of Active Borrowers/ Financial Revenue	Number of active borrowers	Financial Revenue/ Assets
Return on assets	1							
Return on equity	0.07 (0.008)	1						
Average loan balance per borrower	0.08 (0.000)	0.012 (0.611)	1					
Cost per borrower	−0.21 (0.000)	0.03 (0.264)	0.39 (0.000)	1				
Total expense / assets	−0.63 (0.000)	−0.07 (0.004)	− 0.17 (0.000)	0.13 (0.000)	1			
Number of Active Borrowers/ Financial Revenue	−0.08 (0.001)	−0.0003 (0.99)	− 0.11 (0.000)	−0.09 (0.000)	− 0.04 (0.110)	1		
Number of active borrowers	0.14 (0.000)	0.01 (0.672)	−0.03 (0.297)	−0.06 (0.010)	− 0.11 (0.000)	−0.003 (0.902)	1	
Financial Revenue/ Assets	0.10 (0.000)	−0.01 (0.782)	−0.08 (0.001)	− 0.03 (0.307)	0.41 (0.000)	− 0.08 (0.002)	−0.01 (0.765)	1

1. The intercept is positive and highly significant in all the models. The coefficients are higher for OSS and for-profit MFIs relative to NOSS, UPNOSS and non-profit MFIs.
2. ROA is positive and consistently highly significant in all the models as a causal driver for OSS. The coefficient is the biggest for OSS MFIs.
3. ROE is not significant in any of the models.
4. Ratio Financial Revenue/Assets is positive and consistently significant in all models, where it is highly significant for OSS MFIs.

Discussion

Our results confirm findings of previous work whilst establishing new results.

Intercept

Here, whilst the result is as expected for OSS and NOSS MFIs, (given their definition and construction), in case of for- and non-profit MFIs, the larger coefficient for the former relative to the latter implies that for-profit MFIs

are relatively better at OSS as compared to non-profit MFIs.

ROA

The results reveal that, for all the MFIs, irrespective of their distinct constructive differences, ROA is the most significant driver for OSS. Our finding supports that of Chikalipah (2017) who found that ROA is the major determinant of financial sustainability in the SSA MFIs. The implication is that MFIs, in general, efficiently generate a higher return from their asset portfolios (the loans they give out), which translates into increased OSS which in-turn translates into financial sustainability. The coefficient for OSS MFIs is the biggest once again reiterating efficient return generation.

Financial revenue/assets

The OSS MFIs have a highly significant positive Financial Revenue/Assets ratio which ties in neatly with the significant ROA. This also implies that despite using a subset of all income by focusing only on financial revenues, OSS MFIs are able to efficiently generate higher

Table 3 Descriptive statistics

Variable	Mean	Standard Deviation	Minimum	Maximum
Operational self-sufficiency	106%	65%	2%	1,94%
Return on assets	−3%	14%	−97%	83%
Return on equity	−63%	2581%	− 105,87%	8,66%
Average loan balance/borrower	598	1101	9	22,25
Cost/borrower	188	456	0	12,185
Total expense/assets	28%	19%	3%	156%
Number of active borrowers/financial revenue	2%	8%	0%	249%
Number of active borrowers	29,299	79,785	3	801,81
Financial revenue/assets	24%	26%	1%	663%

Table 4 Regression Analysis

Dependent Variable	= Operational Self-Sufficiency (OSS)				Period: 2000–2017	
	All Data (Model 1)	OSS MFIs (Model 2)	NOSS MFIs (Model 3)	UP NOSS MFIs (Model 4)	For-Profit MFIs (Model 5)	Non-Profit MFIs (Model 6)
R^2	25.9%	18.7%	74.7%	73.9%	48.1%	21.3%
Independent Variables						
Intercept	1.0877[c] (34.6150)	1.4782[c] (26.1593)	0.6841[c] (67.3453)	0.5654[c] (54.3554)	1.1927[c] (31.2353)	1.0566[c] (22.2142)
Return on Assets	2.1051[c] (14.5958)	4.1541[c] (11.0489)	1.5381[c] (24.7522)	1.3372[c] (17.7114)	1.9032[c] (12.2658)	2.2467[c] (10.5726)
Return on Equity	−0.0002 (− 0.3891)	− 0.013(− 0.2684)	6.1E-06 (0.0567)	1.34E-05 (0.1535)	0.0087(1.4216)	− 0.0002 (− 0.2828)
Average loan balance per borrower	2.79E-06 (0.2009)	−2.8E-05(− 1.2256)	3.7E-05[c] (5.3438)	3.11E-06 (0.3005)	−1.4E-06 (− 0.1120)	7.4E-06 (0.3114)
Cost per borrower	1.5E-05 (0.4438)	4.21E-05 (0.3535)	−1.5E-05[b] (− 1.9716)	−5.5E-06 (− 0.8040)	−1.4E-05 (− 0.4308)	1.88E-05 (0.2759)
Total expense/assets	− 0.0789 (−0.6821)	−1.8014[c] (−8.5486)	0.4712[c] (8.9181)	0.5375[c] (8.1095)	− 0.3655[c] (− 2.9646)	0.0668 (0.3934)
Number of Active Borrowers/Financial Revenue	− 0.3534[a](−1.9542)	−0.5863 (− 0.6166)	1.04E-06[c] (− 5.9365)	−0.1714[c] (− 5.4769)	−1.4540[c] (− 2.9659)	−0.3076 (− 1.4005)
Number of active borrowers	6.67E-07[c] (3.8681)	3.02E-07 (1.4326)	1.04E-06[c] (4.9937)	−8.68E-07[c] (2.9565)	7.21E-07[c] (6.6289)	−1.5E-07 (−0.2129)
Financial Revenue/ Assets	0.1328[b] (2.0357)	0.2164[c] (2.6697)	0.1119[b] (2.2721)	0.1435[b] (2.1603)	0.1051[a] (1.7344)	0.1943[a] (1.9095)
Observations	**1703**	**977**	**726**	**407**	**648**	**1055**

t stats in parenthesis; [a], [b], [c] significant at 10%, 5% and 1% respectively.
The regression is split up both by OSS and by profit status. OSS (Operational Self-sufficiency), NOSS (non-OSS), or UPNOSS (underperforming NOSS). The OSS groups (Models 2 to 4) are based on the MFI's calculated OSS. Model 2 are MFIs with an OSS above 100%. Model 3 is NOSS, or MFIs with an OSS below 100%. UPNOSS group (Model 4) are MFIs with an OSS below 80%. Models 5 and 6 are split by the declared profit status. NOSS- non-OSS MFIs, UPNOSS- underperforming OSS MFIs

returns from their loan portfolios. With a coefficient nearly twice as that of NOSS and UPNOSS, the latter both being significant too, OSS MFIs are simply much better at generating higher financial revenues per unit asset.

Cost/borrower

This finding does not support that of Chikalipah (2017) as it is not significant in any of the models except for NOSS MFIs, where it carries a negative sign implying higher the cost/borrower, lower the NOSS which is intuitive. However, it not being significant in any of the other models suggests that it is not important for OSS. This implies that outreach cannot be limited by geographic remoteness which mostly tends to increase cost/borrower. It also gives credence to common sense that increasing outreach (all else remaining constant) despite geographic constraints increases scale which in-turn lowers the impact of cost/borrower on OSS.

Total expenses/assets

OSS and for-profit MFIs exhibit a negative Total Expenses/Assets ratio which means lower the ratio higher the OSS. In other words, cost management measures need to be undertaken to achieve OSS. This is also supported by the positive coefficient on the ratio for NOSS and UPNOSS MFIs implying these MFIs do not control their expenses effectively. Moreover, the size of

the coefficient is also indicative of the fact that OSS MFIs are much more efficient at reducing and managing their expenses even when compared to for-profit MFIs.

Average loan balance/borrower

Unlike Quayes (2012), this is not significant driver of OSS in any of the models but for NOSS MFIs. This shows that when loan balance/borrower rises, NOSS rises which again confirms that NOSS MFIs are inefficient in cost management.

Number of active borrowers/financial revenue

This ratio is not significant for OSS MFIs but is positive and highly significant for NOSS MFIs. This implies again that when the ratio rises NOSS rises – which ties up with the cost management finding above that the NOSS MFIs are rather slack at managing their costs despite increasing number of active borrowers. The case of UPNOSS MFIs is intuitive with the coefficient signaling that these are barely surviving and are in desperate need of overhaul of their business model. The negative significant sign on for-profit MFIs implies that the number of active borrowers is smaller as compared to financial revenue thereby increasing OSS in for-profit MFIs. This in-turn shows that for-profit MFIs are much more efficient in terms of generating financial revenue from their active borrowers. The fact that this variable is not significant at all for the OSS MFIs implies that they do not necessarily

depend on each current individual borrower given their very efficient dealings with cost management. This also implies there is no real tradeoff between outreach (as proxied by number of active borrowers) and OSS. We have already shown in Table 1 that OSS MFIs have a larger outreach relative to NOSS and combined with the regression result, it is clear that there is no tradeoff between outreach and operational self-sufficiency. According to Bogan (2012) operating costs can run high and capital constraints limit the outreach, but our results prove otherwise.

Number of active borrowers
This proxies for outreach and confirms the findings immediately above. This variable is used here only as a robustness measure.

Roe
This is not significant for any model implying shareholders do not really seem to interfere with OSS. OSS of MFIs, as the results seem to prove has to do with efficient cost management rather than keeping shareholders happy with higher returns. This result by itself distinguishes the business structure of an MFI from a regular corporation.

Conclusion
In summary, ROA is consistently the driver of OSS in all the different types of MFIs we have analyzed. OSS MFIs are far more efficient at managing their costs followed by for-profit MFIs. The OSS model (Model 2) according to the regression is represented as:

$$OSS = 1.478 + 4.154xROA - 1.801xTotal \quad Expenses/Assets + 0.216xFinancial Revenue/Assets$$

Practical implications
NOSS, UPNOSS and non-profit MFIs truly lack in terms of effective cost management. This study shows that of the 8 factors (barring the intercept) tested as drivers for OSS in the different types of MFIs, 7 factors are (highly) significant in case of NOSS MFIs also evidenced by the high R^2. This implies that the degree of OSS that allows NOSS MFIs to remain afloat as businesses, is driven by a combination of many factors together. This hints at an ongoing struggle with self-sufficiency. In case of OSS MFIs, it is only 3 highly significant factors that function as drivers of OSS showing a much more focused and lean strategy at self-sufficiency. These results also show a clear focused business model adopted by OSS and for-profit MFIs, the more chaotic fire-fighting one adopted by NOSS MFIs, and a seemingly relaxed attitude towards OSS manifested by the non-profit MFIs. This proves our third and fourth hypotheses whereby for-profit MFIs and non-profit MFIs are driven by dissimilar factors and OSS and NOSS MFIs are driven by dissimilar factors.

Theoretical implications
Findings indicate that the focus of an MFI should be on cost management and efficient revenue generation form active borrowers. The structure of the MFI should be similar to any other company, where revenues must outweigh expenses. The results are in support of the profit-incentive theory and the financial systems approach. Whilst a causal relationship between OSS and outreach could not been proven, there is a clear positive one between for-profit MFIs and outreach which proves our first hypothesis and supports the findings of Schäfer and Fukasawa (2011). For-profit and non-profit MFIs are also dissimilar both in terms of OSS and outreach. Finally, we show that MFI OSS is driven by higher ROA, lower Total Expenses/Assets and higher Financial Revenue/ Assets.

There is no obvious tradeoff between outreach and OSS, since OSS MFIs have larger outreach partially proving our second hypothesis. This implies that financial self-sufficiency does not undermine the depth of outreach and should therefore not be a point of contention.

To be profitable, an organization can be any legal type and non-profit or for-profit, as this does not seem to affect financial sustainability of an MFI.

In summary therefore, efficient utilization of operational capacities leads to better financial management thereby leading into a more sustainable, effective and long-term functioning of the MFIs which can then translate into higher degree of poverty alleviation. Whilst the inherent functioning of an MFI is still rooted in subsidised financing, the understanding that this can only lead to short term and limited poverty alleviation will enable the industry to explore different business models. Such business models could guarantee increased financial and operational sustainability thereby increasing the actual impact and outreach that MFIs have on poverty alleviation.

Limitations and future outlook
This work has some limitations though. Since the data provided by MIX Market is standardized version of data submitted voluntarily by MFIs, a likely bias cannot be denied. Moreover, since our data analysis was limited only to diamond levels 3 and above, a survivorship bias is likely.

The results from this study indicate that it is very possible for microfinance institutions to be profitable. In fact, over 50% of them are operationally self-sufficient which still leaves plenty of room to change within the industry.

Moreover, applying these findings to a larger, more recent dataset, might be a further avenue to explore. Further evaluating effective ways to capitalise on ROA,

and Financial Revenue, the two strongest drivers for OSS, is another possibility for research. This could allow MFIs a strong and long term foothold to increase their outreach and impact. Additionally, analysing the MFI OSS in the poorer regions of Asia, Eastern Europe, Latin America and Middle East given their diverse cultural context, might be a possibility for further research. In this context, cultural markers or drivers can also be studied to see what drives self-sufficiency in MFIs. Another avenue worth exploring is the (in)direct impact of regulation on MFIs, in different parts of the world.

The findings of such research could solidify the understanding of the drivers of MFI OSS. This will allow policy makers design better frameworks to assist the industry in conquering poverty by developing policies that enable the industry to focus on their operational self-sufficiency whilst not compromising on their outreach.

Abbreviations
CAGR: Compound Annual Growth Rate; GMM: Generalized Method of Moments; MFI: Micro Finance Institution; MIX: Microfinance Information Exchange; NOSS: Non- Operationally Self-Sufficient; OSS: Operating/ Operational Self-Sufficiency; ROA: Return on Assets; ROE: Return on Equity; SSA: Sub-Saharan Africa; UPNOSS: Under Performing Non- Operationally Self-Sufficient

Declaration
We hereby affirm that we have written this academic paper independently and without the help of others. In doing so, we have used only the sources and means mentioned. We have not used works or parts of texts that are protected by copy- right without changing or having reworked them. Passages in the paper where the wording or meaning is taken from other works or sources – including those taken from the internet – have been identified as quotations, citing the exact source.

Authors' contributions
LR contributed towards of the developing the idea, analyzing and interpreting, writing, restructuring and presenting the paper and HK contributed towards idea germ, data collection and conducting the regressions for the said research. Both authors read and approved the final manuscript.

Availability of data and materials
The datasets used and/or analysed during the current study are available from the corresponding author on reasonable request.

Competing interests
The authors declare that they have no competing interests.

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