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Investigating the Trade-Off between Sustainability and Outreach of Micro- finance Institutions

دراسة مفاضلة بين الإستدامة المالية والإنتشار لمؤسسات التمويل المتناهي الصغر

Abstract

Microfinance is the provision of financial services to the poor and low-income clients; who do not have access to formal financial institutions. Nowadays, countries' main objective is to develop a microfinance industry in which sustainable financial services for lower market segments are integrated into the overall development of a broad, inclusive, and diverse financial sector. This study aims at investigating the relationship between MFI sustainability and outreach in order to reach a conclusion of whether a trade-off exists between both objectives or not. Sustainability is measured using OSS, while outreach is measured on two main aspects namely; depth and breadth utilizing three indicators which are average loan balance, percentage of female borrowers from total borrowers, and the number of active borrowers. Dataset consisting of 992 observations on 124 MFIs dispersed in 45 countries located in six regions was collected for the period 20-04-2011 and is gathered from two main sources: the MIX Market database and the World Development Indicators (WD-I) by The World Bank. Results found no evidence of a trade-off between MFI sustainability and outreach, i.e. the sustainability of an MFI does not have a significant effect on an MFI's composition of new clients, nor the number of clients an MFI serves. This helps MFIs in achieving its ultimate social goal of serving the poor, while at the same time maintaining its sustainability and achieving profitability.

Key words: Microfinance Institutions, Outreach, Sustainability, Operational Self-Sufficiency, Developing Countries, Empirical Study.

ملخص البحث

يهدف التمويل المتناهي الصغر إلى تقديم خدمات مالية للفقراء ومحدودي الدخل ممن ليس لديهم مصدر آخر للخدمات المالية من مؤسسات التمويل الرسمية الأخرى. الخدمات المالية المقدمة للفقراء ومحدودي الدخل تمثل هدف أساسي من أهداف الحكومات التي تسعى لتحقيقه كسياسة مالية هامة من ضمن النظام المالي الشامل للدولة. لذلك فإن البحث الحالي يهدف إلى دراسة العلاقة بين الإستدامة المالية والإنتشار لمؤسسات التمويل المتناهي الصغر لتحديد أهمية كل منهما مقارنة بالآخر كأهداف أساسية لمؤسسات التمويل المتناهي الصغر. الإستدامة المالية تم قياسها لأغراض البحث باستخدام الإكتفاء الذاتي التشغيلي. بينما إنتشار مؤسسات التمويل المتناهي الصغر تم قياسه علي أساس عمق واتساع الإنتشار، حيث أن العمق يتم قياسه علي أساس متوسط قيمة القرض بالإضافة إلى نسبة الإناث من إجمالي أعداد المقترضين، بينما يتم قياس الإتساع علي أساس عدد المقترضين الكلي. التحليل الإحصائي تم باستخدام بيانات ١٢٤ مؤسسة للتمويل المتناهي الصغر في ٤٥ دولة للفترة ما بين ٢٠٠٤-٢٠١١. أشارت نتائج التحليل الإحصائي للبحث إلى عدم وجود علاقة مباشرة بين الإستدامة المالية وإنتشار مؤسسات التمويل المتناهي الصغر، حيث أن الإستدامة المالية ليس لها تأثير علي عدد أو نوع عملاء مؤسسات التمويل المتناهي الصغر. لذلك فإن هذه النتائج تشير إلى قدرة مؤسسات التمويل المتناهي الصغر علي التركيز علي أهدافها الإجتماعية المتمثلة في تقديم الخدمات المالية الضرورية للمحتاجين من الفقراء ومحدودي الدخل مع عدم التأثير بالإستدامة المالية للمؤسسات مما يعني إمكانية تحسين الأداء المالي والإجتماعي في نفس الوقت بدون أي تأثيرات سلبية لأحدهما علي الآخر.

Paper category: Research paper

1. Introduction

Microfinance is viewed as a financial development tool aiming at alleviating poverty (Barr,2005;Gohar and Batool, 2015), as it focuses on gradually lifting low-income households out of poverty by providing them with various financial services (Maksudova, 2010). Microfinance also plays a vital role in the empowering of women (Gohar and Batool, 2015). Kyereboah-Coleman and Osei (2008) highlighted that the financial services offered by Microfinance Institutions (MFIs) are not limited only to credit and savings, but can also include various services such as insurance and payment services. Barr (2005) also supported that view and explained that microfinance is a broader term than microcredit;microfinance also involves other financial services such as insurance, savings, and transactional services. Hassan and Sanchez (2009) defined MFIs as financial institutions that mainly provide small loans to its low-income clients in order to help them participate in productive activities. MFIs tend to make small loans to the poor that can range from \$100 to roughly \$5,000. In so doing, MFIs can serve several million clients (Cull *et al.*, 2013).

According to microfinance literature, MFIs in general seek to achieve two main objectives, the first is to reach the poor who are financially excluded by banks, and the second is to become financially sustainable by covering its costs and becoming independent from donor subsidies. MFIs originally were committed to achieving the social objective of poverty alleviation; however, a

shift in the emphasis of MFIs took place recently which turned MFIs' attention towards profitability. Since then, MFIs have had a dual mission: a social mission in the form of expanding their outreach and reaching as many poor people as they can, and a commercial mission in the form of becoming self-sufficient and providing these financial services in a profitable way in order to ensure an MFI's sustainability without the need for subsidies (Zerai and Rani, 2012).

In agreement with that, Perera (2010) has stated that as a result of having many financially excluded clients by the formal financial system, MFIs took on the responsibility of serving these clients who belong to the neglected niche market and to prove that these clients are bankable by extending financial services to them, while at the same time achieving profits for their institutions. Hermes *et al.*(2009)also mentioned outreach as being the main focus of MFIs, and described it as the provision of credit to the poor who have no access to the formal banking system in order to help them get out of poverty. In addition to that, Hermes *et al.* (2009) highlighted that financial sustainability is becoming an important objective for MFIs, in which they use income generated from their outstanding loan portfolios to cover their cost of lending.

Achieving this double mission can sometimes be challenging for MFIs. This has given rise to the debate on whether there exists a trade-off between financial sustainability and outreach (Zerai and Rani, 2012). It is argued that as an MFI focuses primarily on financial self-sustainability or profitability, it tends to shift away from its social ob-

jective which is reaching the very poor. In doing so, MFIs start targeting less poor clients as they are less risky and less costly to serve, thus shifting away from the very poor who are in desperate need of an MFI's financial services. Conversely, MFIs that focus on the social objective of reaching the very poor can threaten their sustainability and thus their continuity in providing microfinance.

This debate has not reached a solid conclusion on the nature of the relationship between an MFI's outreach and financial performance, as some argued that a trade-off exists between both objectives in which focusing on one of them tends to turn an MFI's attention away from the other (Mersland and Strøm, 2009; Hermes *et al.*, 2009; Perera, 2010), while others argued that both objectives are not substitutes, and that they can go hand in hand (Cull *et al.*, 2007; Vanroose and D'Espallier, 2009). Finally, some other studies found no significant relationship between both goals such as Mueller and Uhde (2013).

This paper attempts to clearly understand the nature of the relationship between MFI sustainability and outreach by investigating the relationship between both objectives in order to reach a conclusion of whether a trade-off exists between them or not. Understanding this is of great importance in order to know whether achieving self-sustainability is in conflict with achieving outreach and reaching for the very poor, or whether these two MFI objectives can be achieved in line. This issue needs to be addressed in order to be able to help MFIs achieve the balance required to reach both goals as most MFIs focusing on sustainability tend to ignore their so-

cial mission which is reaching out to the poor, while the other MFIs which focus on expanding their outreach tend to threaten their survival. It is therefore important to investigate whether both goals are achievable together or not. On an academic level, this research adds to microfinance literature by analyzing the relationship between MFI sustainability and outreach in order to reach a solid result as to whether a trade-off exists between both objectives or not, as the results in microfinance literature were inconclusive.

The rest of the paper is organised as follows: section 2 reviews the literature on the relationship between MFI financial performance and outreach, section 3 discusses variables, data, and methodology used, section 4 discusses the empirical results and findings, section 5 presents the robustness check and section 6 concludes the whole research.

2. Literature Review

The two ultimate goals of an MFI are to serve as many poor people as possible and to become financially sustainable (Sainz-Fernandez *et al.*, 2015). Achieving the dual mission of MFIs requires reaching and serving as many financially excluded people as possible, while at the same time maintaining financial sustainability. This section explores the literature on the two MFI objectives and the possibility of the existence of a trade-off between them.

2.1 MFI Outreach

Schreiner (2002) developed a framework for microfinance outreach intended to measure the social benefits of microfinance for the poor in terms of six aspects: worth to clients, cost to clients, depth, breadth, length, and scope

of outreach. Worth is the willingness to pay, or in other words the highest cost a client is willing to pay for a financial contract. It might also be defined as how valuable, useful, or appealing a microfinance service is to a client. The more the microfinance service matches the needs of the client, the more the worth of the service to the client. Schreiner (2002) believes that measuring worth depends on the subjective gains that clients get from microfinance, and hence, is difficult to measure. However, the lower bound in total worth is represented by the increase in profits in the client's business. Cost consists of two types of costs: price costs and transaction costs. Price costs are computed as the direct cash payments for interest on loans in addition to fees that clients pay for receiving microfinance services, and are considered revenues for the MFI. Transaction costs are non-cash opportunity costs and indirect cash expenses (such as cost of transportation to use the services of an MFI) borne by the clients themselves, and are not considered revenues to the MFI.

Schreiner (2002) defined depth as "the value that society attaches to the net gain of a given client". Proxies for depth of outreach include: sex, location, education, ethnicity, housing, and access to public services. More depth is associated with more women clients, clients living in rural areas, less educated clients, minorities, clients living in small houses, and clients lacking access to public services. Loan size is considered to be the most common measure of depth of outreach and is measured as the amount disbursed or time to maturity. Greater depth is associated with smaller amounts and shorter time frames because poorer borrowers tend to get sm-

aller loans and repay within a shorter time period in order to reduce the default risk that an MFI bears when lending them. As for the MFI, depth of outreach increases its costs of supplying microfinance, which in turn causes them to charge higher prices for their services or increase their reliance on donations. Schreiner (2002) defined breadth of outreach as the number of clients served. Depth and breadth of outreach often go in opposite directions as they complement each other. More depth helps in the case of narrow breadth, and wide breadth helps in the case of shallow depth. Length of outreach is the time frame of the supply of microfinance to clients. Realizing profits for an MFI is one proxy for the length of outreach as they replace donations in helping the MFI survive. Schreiner (2002) stated that the length of outreach is the years of service of an MFI. Schreiner (2002) defines scope of outreach as the "types of financial contracts supplied", which might be measured as the types of services provided by an MFI such as loans and savings.

Kuchler (2011) has also relied on the framework developed by Schreiner (2002) in measuring outreach in which depth of outreach was measured by average loan balance and percentage of female borrowers, and breadth of outreach was measured using the number of borrowers. Quayes (2015) used average loan balance per borrower divided by the gross national income per capita to measure an MFI's depth of outreach when investigating if a trade-off existed between an MFI's outreach and its financial performance. Nurmakanova *et al.*, (2015) also measured the outreach of an MFI in an attempt to examine the determinants of an MFI's social and fi-

financial performances, in addition to investigating if a trade-off exists between both. In their study, outreach was measured from two aspects: depth and breadth. Depth of outreach was proxied by average loan balance per borrower over GDP per capita, whereas breadth of outreach was measured using the percentage of female borrowers and the number of active borrowers. Other studies that also focused on depth and/or breadth of outreach are Cull *et al.* (2007), Mersland and Strøm (2009), Vanroose and D’Espallier (2009), Perera (2010), and Cull *et al.* (2013).

2.2 MFI Sustainability

MFI sustainability is a measure of MFI financial performance. It has been measured in several previous studies using different measures, the most common being Operational Self-Sufficiency (OSS). OSS is the ratio of financial revenue –including donations– to financial expense, net impairment loss, and operating expense, as defined by the Microfinance Information eXchange (MIX). A value higher than one indicates that an MFI’s revenues cover its expenses and therefore the MFI is self-sufficient or sustainable, while a value less than one indicates that an MFI’s revenues are insufficient to cover its costs.

Quayes (2015) used three different measures of financial performance when investigating whether a trade-off existed between an MFI’s outreach and its financial performance. OSS was among the measures used as proxies for MFI sustainability. Nurmakhanova *et al.*, (2015) also measured the sustainability of an MFI using OSS in order to examine the determinants of an MFI’s social and financial performances, in addition

to investigating if a trade-off exists between both. In their study, OSS was specifically chosen as it measures an MFI’s ability to cover its costs through operating revenues. Other studies that proxied MFI financial performance and sustainability using OSS are: Ahlin *et al.* (2011), Kuchler (2011), Zerai and Rani (2012), and Ben Soltane (2012).

Another measure for sustainability that has been used by some other studies is Financial Self-Sufficiency (FSS), which is intended to measure an MFI’s ability to cover its costs without the use of any subsidies but by only generating enough revenues (Perera, 2010; Cull *et al.*, 2013). However, this study relies on OSS as a measure of sustainability as OSS takes into account subsidies and donations, which are additional sources of finance that MFIs rely on, and thus cannot be ignored.

2.3 The Trade-off between Outreach and Financial Performance

Many studies have questioned whether there is a trade-off between the two primary objectives mostly pursued by MFIs which are: expanded outreach and improved financial performance in terms of sustainability or profitability. Some studies found a significant negative relationship between both objectives which suggests that a trade-off exists, and thus achieving one of the two objectives requires abandoning the other, others found a significant positive relationship which suggests that both objectives can be achieved simultaneously, while some others did not find any significant relationship between the two objectives. This section reviews the results reported by these previous studies.

Cull *et al.* (2007) tested if MFI profitability caused a change in an MFI's composition of new clients, and whether it became oriented towards relatively wealthier clients by neglecting the very poor in what is known as "Mission Drift". Results were disaggregated by the lending type an MFI applies. Three lending types were taken into consideration: individual lending, group (solidarity) lending, and village lending. Results suggested that no relationship existed between profitability and outreach –proxied by average loan size– unless lending type was used as an interaction term. The higher the profitability of individual-based lenders, the smaller the average loan size and the more lending extended to women, indicating deeper outreach, and therefore a reverse mission drift.

Mueller and Uhde (2013) have also tested whether a trade-off existed between an MFI's profitability and its level of outreach but found no evidence for a trade-off. Ben Soltane (2012) found no significant effect of financial performance –proxied by OSS, Return on Equity (ROE), and Return on Assets (ROA)- on the depth of outreach proxied by the average loan size per borrower/GNI per capita and the percentage of female borrowers. Zerai and Rani (2012) also did not find a significant trade-off between financial sustainability –as proxied by OSS and adjusted ROA- and outreach which was proxied by number of active clients, percentage of women borrowers, and loan size.

Vanroose and D'Espallier (2009) have reported a positive correlation between outreach measures (total loan portfolio and number of active borrowers) and profitability measures (OSS, ROE, and

ROA). This positive correlation means that MFIs that have a wider outreach are also slightly more profitable, which suggests that outreach and profitability are complementary performance-measures and that no trade-off exists. Quayes (2015) investigated if a trade-off existed between an MFI's depth of outreach and its financial performance. MFI outreach was measured using average loan balance per borrower divided by the gross national income per capita, while MFI financial performance was measured using profit margin rate, ROA, and OSS. Results of the study concluded that there was evidence of a reverse mission drift and that depth of outreach was found to be significantly positively associated with an MFI's financial performance, which does not support the idea of a trade-off between both goals.

Nurmakhanova *et al.*, (2015) have also examined if a trade-off existed between an MFI's social and financial performances. In their study, outreach was measured by average loan balance per borrower over gross domestic income per capita as an indicator of depth of outreach, and the percentage of female borrowers and the number of active borrowers as indicators of breadth of outreach. MFI's financial performance was measured using OSS. Nurmakhanova *et al.*, (2015) reported that there was no evidence for a mission drift between MFI depth of outreach and MFI financial performance. On the other hand, no trade-off was found between MFI breadth of outreach and MFI financial performance when both measures of breadth of outreach were used. This indicates that as an MFI focuses on its financial sustainability, its depth of outreach

is not necessarily harmed, and its breadth of outreach can still be improved.

On the other hand, some other studies contradict the previously mentioned findings. These studies support the idea that a trade-off exists between outreach of MFIs and their profitability or efficiency. Hermes *et al.* (2009) reported an inverse relationship between MFIs' outreach and efficiency. In that study, depth of outreach was measured using average loan balance per borrower as well as the percentage of female borrowers in the total loan portfolio of an MFI. Higher average loan balances per borrower indicated lower depth of outreach, whereas higher percentage of women indicated higher depth of outreach. The study concluded that MFIs that had lower average loan balances and more women borrowers as clients were also less efficient. In other words, the deeper the outreach, the less efficient the MFI becomes.

Mersland and Strøm (2009) have examined the possibility of a microfinance schism between the financial performance of an MFI and its outreach. In their study, financial performance was measured using ROA, portfolio yield, operational costs, and debt to equity ratio, whereas outreach was measured using the number of credit clients served, the number of branch offices, and the average outstanding loan. Mersland and Strøm (2009) found that a trade-off exists –to a certain extent- between outreach and financial performance as reaching out to the poor represented by smaller loans resulted in a lower ROA.

Schreiner (2002) believes that microfinance providers aim to improve the

poor's welfare and that their approach in pursuing this goal lies between two extremes: the poverty approach and the self-sustainability approach. The poverty approach serves the very poor whose service is considered to be costly for the microfinance provider. In doing so, MFIs mainly rely on donations in covering the cost of supplying services to the poor as revenues from serving clients do not cover costs. On the other extreme, the self-sustainability approach serves the less-poor. MFIs might rely on donations in the beginning in order to cover start-up costs, but then they try to come up with innovations that would help in reducing the cost of providing their services to the extent of which revenues can cover these costs.

Schreiner (2002) believes that in order for an MFI to be able to increase its length of outreach, it must increase the amount of donations it gets or its profits. Donations do not require higher prices and therefore it increases net gain per client. On the other hand, higher profits require higher prices –which is translated into higher costs for clients and thus lower net gain- or relying on innovations in increasing worth to clients, or decreasing costs in order to keep net gain unchanged. The poverty approach focuses primarily on depth of outreach as it relies mainly on donations and on serving the very poor for a short period of time, therefore values the higher net gain per client over the short length of donations and the low profits for the MFI, whereas the self-sustainability approach focuses primarily on the length of outreach as it relies on long term profits for the MFI which compensates for the lower net gain per client.

3. Methodology

3.1 Data and Sample

A balanced panel dataset consisting of 992 observations on 124 MFIs is constructed. The MFIs included in the study are dispersed in 45 countries located in six regions: Middle East and North Africa (MENA), Eastern Europe and Central Asia (EECA), East Asia and the Pacific (EAP), South Asia, Latin America and the Caribbean (LAC), and Africa. Data is collected for the period 2004-2011 and is gathered from two main sources: the MIX Market database and the World Development Indicators (WDI) by The World Bank.

Data on MFIs is obtained from the MIX Market (Microfinance Information eXchange) (mixmarket.org), which is an online platform that is publicly available for the exchange of data and benchmarking across MFIs, that aims at increasing transparency in the microfinance industry. MFIs on the MIX are rated on a scale from 1 to 5 diamonds based on the reliability and the amount of information reported by the MFI. Since a higher number of diamonds indicates more transparency and more reliable MFI data, the 124 MFIs that make up the sample are rated either 4 or 5 diamonds in each of the eight years of data starting from 2004 until 2011. This is to make sure that the chosen MFIs have their financial statements audited, and have rating or due diligence report published for the year. Results however must be interpreted in the light of this fact. Moreover, in order to enable comparability among MFIs, and between MFI level data and country level data, all MFIs included in the sample had a calendar-year fiscal year.

3.2 Variables Selection

This paper investigates whether a trade-off exists between the two mostly pursued goals by MFIs: sustainability and outreach, in which MFI outreach is the dependent variable and MFI sustainability is the independent variable. MFI sustainability is proxied by OSS which is the ratio of financial revenue to the sum of financial expense, net loan loss expense, and operating expense.

In order to measure outreach, the framework of Schreiner (2002) will be adopted, that was also used by Kuchler (2011) in measuring outreach. However, only two of the outreach measures developed by Schreiner (2002) will be adopted: depth of outreach and breadth of outreach. This is due to the importance of these aspects of outreach and to the fact that Schreiner (2002) mentioned that worth to clients is difficult to measure, length of outreach is proxied by OSS which is a measure used to proxy the independent variable "sustainability" in this study as previously mentioned, cost to clients requires making estimates through surveys about the costs borne by clients and relying on the Internal Rate of Return (IRR) of MFIs which is difficult to obtain, and finally scope of outreach has been proxied in previous studies by the ratio of depositors to borrowers which was viewed as an imperfect measure. Depth of outreach is proxied by the average loan balance per borrower and the percentage of female borrowers, while breadth of outreach is proxied by the number of active borrowers. Data on both the dependent and independent variables is obtained from the MIX, as has been previously mentioned.

In investigating the possibility of a trade-off between an MFI's sustainability and outreach, several variables have been controlled for as they were found to have an effect on MFI performance in previous studies, and therefore cannot be dropped. The control variables used are classified as either MFI-specific controls, or macroeconomic controls. MFI-specific controls include: MFI size, MFI age, MFI type, and region. MFI size is proxied by the logarithm of total assets, while MFI age is proxied by the number of years since an MFI started operating.

As for MFI type, an MFI is classified as one of the following five types (according to the MIX): bank, credit union/cooperative, Non-Bank Financial Institution (NBFi), Non-Governmental Organisation (NGO), or rural bank, with "Bank" being the omitted or the reference category. According to the MIX, a bank is defined as a licensed financial intermediary that provides a variety of financial services such as lending, money transfers, and deposit taking, and is usually supervised by a state banking supervisory agency. A credit union/cooperative is a non-profit financial intermediary that offers financial services such as lending and deposit taking but only to its members. An NBFi provides services that are similar to those of a bank but is not licensed as a bank, which might be due to some limitations on the financial services offered, or supervision by a different state agency, or lower capital requirements. An NGO is a non-profit organisation that offers restricted financial services and does not usually take deposits. A rural bank is a banking institution that mainly serves those who are involved in agricultural-

related activities and are living and working in non-urban areas.

Region is the region in which an MFI operates and corresponds to one of the following six regions: MENA, LA-C, South Asia, EAP, Africa, and EECA, with "Africa" being the omitted category. Data on MFI-specific characteristics is also obtained from the MIX.

Macroeconomic controls used are the development of the formal banking sector proxied by the ratio of domestic credit to private sector as a percentage of GDP, population density proxied by the number of people per square km of land area, rural population as a percentage of total population, and the outreach of banks proxied by the number of ATMs per 100,000 adults. Data used in measuring these macroeconomic variables was obtained from the World Development Indicators (WDI) database by The World Bank.

3.3 Model Formulation

This study is an attempt to reach a solid result as to whether a trade-off exists between both objectives or not as the results in microfinance literature were inconclusive. The following basic regression is estimated:

$$MFI\ Outreach_{it} = \alpha + \beta_J J_{it} + \beta_K K_{it} + \beta_L L_{it} + \beta_M M_{it} + \beta_N N_{it} + \beta_O O_{it} + \beta_P P_{it} + \beta_Q Q_{it} + \beta_{Region_{it}} + \mu_{it}$$

Where *MFI Outreach* is a set of measures of outreach of MFI *i* in year *t*, with $i=1 \dots N$, $t=1 \dots T$; α is the regression constant, β is the coefficients, J_{it} is an MFI's OSS that measures MFI sustainability K_{it} is an MFI's age measured as the number of years of operation, L_{it} is an MFI's size measured as the loga-

rithm of total assets, M_{it} is a set of MFI type variables that enter the specification independently with “Bank” as the omitted category, N_{it} is the ratio of domestic credit to the private sector, O_{it} is the number of ATMs per 100,000 adults, P_{it} is the percentage of rural population, Q_{it} is the population density, $Region$ is a set of regional dummies capturing the regional differences in MFI performance, with “Africa” as the omitted category, μ_{it} is the error term.

3.4 Research Hypotheses

Based on the previously reviewed literature and key variables, the main hypotheses this paper attempts to test are:

H₁: *There is a trade-off between MFI sustainability and depth of outreach.*

H₂: *There is a trade-off between MFI sustainability and breadth of outreach.*

A positive relationship between sustainability and outreach proves that there is no trade-off between both objectives and therefore the hypothesis is rejected, whereas a negative relationship between both objectives indicates that increased sustainability results in lower outreach levels, and thus requires accepting the research hypotheses.

3.5 Testing Procedures

In order to test the above hypotheses through a multivariate regression model, it is necessary to first test the assumptions of the Classical Linear Regres-

sion Model (CLRM). The first assumption of CLRM that needs to be tested is the average value of errors. The errors are assumed to have a zero mean since the regression equation includes a constant term, and therefore, it tends to absorb any non-zero mean in errors. Second, Wald test for groupwise heteroskedasticity in Fixed Effects (FE) regression model, and Wooldridge test for autocorrelation in panel data were applied in order to test for heteroskedasticity and autocorrelation respectively. This is to ensure that the variance of the errors is constant, i.e. homoskedastic, and that the error terms are not correlated with one another over time. Third, histograms and PP-Plots were used to plot residuals in order to check if the errors were normally distributed.

Moreover, multicollinearity has been addressed by evaluating the Variance Inflation Factor (VIF) as well as the pairwise correlation coefficients between variables. No signs of multicollinearity were found as all VIFs were below 2, and all correlation coefficients between the independent variables were below 0.5 as presented in tables 1 and 2 respectively. Finally, the Hausman test and the Breush Pagan LM tests are conducted for each model in order to choose which of the Pooled Ordinary Least Squares (Pooled OLS), Fixed Effects (FE), and Random Effects (RE) models is more appropriate.

Table 1: VIF

Variable	VIF	1/VIF
ATMs	1.71	0.584097
Rural Population	1.68	0.596964
Private Sector	1.37	0.727791
Population Density	1.35	0.740307
Age	1.24	0.804566
Log Assets	1.23	0.813898
OSS	1.08	0.927838
Mean VIF	1.38	

Table 2: Pairwise Correlation

	ALB	NOB	FB	OSS	Dcr	ATMs	POPDENS	RURPOP	Age	Size
ALB	1									
NOB	-	1								
FB	-	0.1346	1							
OSS	-	0.1525	0.080	1						
Dcr	0.0427	-	0.081	-	1					
ATMs	0.4077*	-	-	-	0.4740*	1				
POPDE	-	0.04	0.155	0.0205	-0.0621	-0.1062*	1			
RURPO	-	-	0.175	0.0111	-0.0985*	-0.4938*	0.4269*	1		
Age	-	0.2428	0.166	0.0066	0.0817*	0.0002	0.1030*	-0.0361	1	
Size	0.4016*	0.5513	-	0.0773	0.0863*	0.2025*	-0.1369*	-0.1450*	0.330	1

Note: * denotes significance at $p < 0.05$

4. Analysis and Results

Data analysis was done using Stata version 13. The section below presents the results and discussion.

4.1 Descriptive Statistics

The average loan balance for MFIs in the sample is \$1,233. The average number of borrowers is 36,191, in which there is a large variation between the MFIs included in the sample as the maximum number of borrowers is 223,839

and the minimum number of borrowers is 372. On average, the MFIs included in the sample are self-sustainable as the average OSS is 1.2. The average percentage of female borrowers among MFIs is 63%; however, some MFIs serve only women and some other MFIs do not serve women at all. The MFIs included in the sample have been operating for 13 years on average. All descriptive and summary statistics are presented in table 3.

Table 3: Descriptive and Summary Statistics

Variable	Mean	Median	Maxi-	Minimum	Standard Deviation
Avg. Loan Balance	1233.112	763.85	6582.35	34.17	1304.728
Number of Borrowers	36190.72	19611.5	223839	372	41539.67
Female Borrowers	0.630968	0.58115	1	0.005	0.266375
OSS	1.206163	1.1772	2.1382	0.4901	0.236384
Private Sector	0.333854	0.295785	0.933562	0.049139	0.171245
ATMs	19.28538	15.56301	83.83772	0.127364	15.7089
Population Density	88.09949	70.88655	332.7858	1.606792	79.29419
Rural Population	44.99638	45.698	87.245	12.696	16.18738
Age	12.98361	12	39	0	6.815348
Size	7.388995	7.344084	9.28083	5.244476	0.779921

4.2 Correlations

As evident from table 2, OSS is significantly correlated with all measures of outreach; however, all correlations are relatively weak. There is a significant negative correlation between OSS and average loan balance (-0.0913), indicating that higher OSS is associated with lower average loan balance implying deeper outreach. OSS is positively correlated with the percentage of female borrowers (0.0807) and the number of active borrowers (0.1525) indicating deeper and wider breadth of outreach respectively. Correlation coefficients show no signs of a trade-off between sustainability and outreach.

As for control variables, domestic credit is positively correlated with the number of female borrowers (0.0811) which indicates more depth of outreach. The number of ATMs is positively correlated with average loan balance (0.4077) and negatively correlated with female borrowers (-0.2922) indicating less depth of outreach. Population density and rural population are both negatively correlated with average loan balance (-0.1345 and -0.1602 respectively), in

dicating more depth of outreach. Both control variables are also positively correlated with female borrowers (0.1550 and 0.1755 respectively), again indicating more depth of outreach. Age is positively correlated with both female borrowers and number of borrowers indicating more depth and breadth of outreach respectively, and is negatively correlated with average loan balance, again indicating more depth of outreach. Size is positively correlated with both average loan balance and number of borrowers, indicating less depth but more breadth of outreach, and negatively correlated with female borrowers, which again indicates less depth of outreach.

4.3 Empirical Results and Discussion

This study aims at investigating the relationship between MFI sustainability and outreach in order to reach a conclusion of whether a trade-off exists between both objectives or not. Sustainability is measured using OSS, while outreach is measured using three indicators: average loan balance, percentage

of female borrowers from total borrowers, and the number of active borrowers. The baseline results are reported in table 4, in which each of the MFI outreach indicators is listed on top of each column as the dependent variable.

As evident from table 4, OSS is not significantly linked to any of the depth or breadth of outreach measures, namely: average loan balance, female borrowers, and the number of active borrowers. This is concluded from the insignificant coefficients of OSS in each of the

outreach models. These insignificant coefficients imply that there is no evidence of a trade-off between MFI sustainability and outreach, i.e. the sustainability of an MFI does not have a significant effect on an MFI’s composition of new clients, nor the number of clients an MFI serves. It also suggests that there is no evidence of a mission drift, as an MFI’s increased sustainability does not have a significant effect on shifting an MFI’s attention towards relatively wealthier clients thus neglecting the very poor ones.

Table 4: Baseline Results

	Depth of Outreach		Breadth of Outreach
	Avg. Loan Balance	Female Borrowers	Number of Borrowers
OSS	31.458312	0.026549	6006.2
Private Sector	90.486619	-0.12234	-79069.265**
ATMs	22.688879***	-0.00119	209
Population Density	-1.478742	-0.00059	784.15
Rural Population	6.0100379	-0.00095	-2669.4
CreditUnion/Cooperative	57.688002	-0.05703	
NBFI	-1179.7226***	0.054607	
NGO	-859.03615*	.18614671**	
Rural Bank	-274.87358	0.162477	
EAP	-274.58352	0.17035	
EECA	677.84199	-0.2837	
LAC	188.62141	-0.1785	
MENA	-566.98844	-0.01208	
SA	-520.63546	0.04468	
Age	-44.169943***	-0.00106	-869.56
Log Assets	584.74011***	-0.02534	51647.676***
Intercept	-2479.6666	1.0295183***	-261687.24*
MFIs	107	101	103
Observations	686	639	670
R²	0.5450	0.4629	0.4349

Note: * p<.05; ** p<.01; *** p<.001,

EAP: East Asia and the Pacific, EECA: Eastern Europe and Central Asia, LAC: Latin America and the Caribbean, MENA: Middle East and North Africa, SA: South Asia.

The findings of this study tend to be in line with several previous studies which did not find a significant relationship between the two most pursued goals by MFIs: financial performance and outreach, such as Mueller and Uhde (2013) who have tested whether a trade-off existed between an MFI's profitability and its level of outreach but found no evidence for a trade-off. The findings of this study are also in accordance with the findings of Cull *et al.* (2007) who did not find a significant relationship between MFI sustainability and outreach before results were disaggregated by an MFI's lending type. In addition to that, the findings of this study also support the findings of Ben Soltane (2012) who found no significant effect of financial performance on the depth of outreach, and Zerai and Rani (2012) who also found no significant trade-off between financial sustainability and outreach.

This allows for the rejection of both hypotheses 1 and 2 which state that a trade-off exists between MFI sustainability and depth of outreach, and that a trade-off exists between MFI sustainability and breadth of outreach respectively. Since no trade-off has been significantly proven to exist, it might also be implied from the results that an MFI can achieve both goals simultaneously without having to abandon either of them for the sake of achieving the other. This helps MFIs in achieving its ultimate social goal of serving the poor, while at the same time maintaining its sustainability and achieving profitability.

As for the variables controlled for in each of the three outreach models (average loan balance, female borrowers,

and number of borrowers), MFI size was found to be significantly positively related to average loan balance and the number of borrowers. The positive relationship an MFI size has with average loan balance indicates that as an MFI grows bigger, it tends to focus more on relatively wealthier clients, which is regarded as weaker depth of outreach, as more depth is signalled by smaller average loan balances. This is consistent with the findings of Cull *et al.* (2013), who found that MFI size was negatively associated with outreach as it resulted in a higher average loan size. The significant positive relationship between MFI size and number of borrowers suggests that an MFI tends to lend to more clients as it grows bigger. This supports the results of Vanroose and D'Espallier (2009), which stated that larger MFIs had higher outreach than smaller ones. MFI size has no significant effect on the percentage of female borrowers from total borrowers.

MFI age was found to be significantly negatively related to an MFI's average loan balance indicating that as an MFI grows older, it gives out smaller loans, thus reaching the very poor and deepening its outreach. This is in line with the findings of Cull *et al.* (2007), who reported that MFI age for group lenders and village banks results in deeper outreach. On the other hand, these results are in contrast to the findings of Kuchler (2011), who found that MFI age has a significant positive relationship with average loan balance indicating weaker depth of outreach, and Cull *et al.* (2007) who reported that more mature individual-based lenders also had weaker depth of outreach.

MFI type has a significant effect on depth of outreach, in which NBFIs are found to have the lowest average loan balance, suggesting the deepest outreach among all types of MFIs, followed by NGOs. NGOs are also found to lend the most to women compared to other MFI types.

Finally, the development of the formal banking sector and the increased outreach of banks have a significant effect on MFI outreach. The ratio of domestic credit to private sector has a significant negative relationship with the number of active borrowers. This implies that as the formal banking sector becomes more developed, MFIs tend to experience a decrease in the number of clients they serve, thus a narrower breadth of outreach. This suggests competition between the two sectors, as more developed mainstream banking sectors attract MFI clients who substitute MFIs for banks.

In addition to that, the number of ATMs per 100,000 adults is significantly positively related to the average loan balance per borrower. This implies that increased bank's outreach –resembled by more ATMs per 100,000 adults- negatively affects MFIs' depth of outreach as it causes the average loan balance to rise indicating less depth of outreach. This again suggests competition between both sectors and supports the findings of Hermes *et al.* (2009) and Vanroose and D'Espallier (2009), who argued that a negative relationship exists between the development of the formal banking sector and the performance of the microfinance sector due to competition between both sectors caused by banks adapting their products to serve more market niches which incre-

ases pressures on MFIs, thus negatively affecting the development of the micro-finance sector.

5. Robustness Check

A robustness check is conducted by disaggregating the effect of sustainability on outreach by MFI type in order to confirm the main results. This will be undertaken by including an interaction term between OSS –as a sustainability measure- and MFI Type. The results reached will reveal the differences between the effects of sustainability on outreach for banks and each of the other MFI types: credit union/cooperative, NBFIs, NGO, and rural bank. Therefore, the following regression is estimated for robustness check:

$$MFI\ Outreach_{it} = \alpha + \beta_1 OSS_{it} + \beta_2 OSS * MFI\ Type + \beta_3 MFI\ Type_{it} + \beta_4 Age_{it} + \beta_5 Size_{it} + \beta_6 Private_{it} + \beta_7 ATM_{it} + \beta_8 Rural_{it} + \beta_9 Density_{it} + \beta_{10} Region_{it} + \mu_{it}$$

Where *MFI Outreach* is a set of measures of outreach of MFI *i* in year *t*, with $i=1...N$, $t=1...T$; *OSS_{it}* is an MFI sustainability measure, β_2 shows how the effects of *OSS* vary by *MFI Type* as it is a coefficient matrix that has four coefficients, one for each MFI type, excluding the omitted category “*Bank*” in which each of these coefficients measures the difference between the effect of *OSS* on *MFI Outreach* for that MFI type and for Banks, the coefficient β_1 captures the effect of *OSS* on *MFI Outreach* for Banks.

Results reveal that the relationship between MFI sustainability and outreach differs when it is allowed to vary by MFI type. Robustness check results are reported below in table 5.

The significant negative coefficient of *OSS* in the average loan balance mo-

del suggests that banks are more focused on the poor, as higher OSS in banks results in lower average loan balances, i.e. deeper outreach, which implies a reverse mission drift. On the other hand, the interaction between OSS and MFI type is positive and significant for NBFIs. This indicates that the relationship between OSS and average loan balance for NBFIs differs significantly from the one for banks. The net effect of summing the coefficients for the OSS variable and the OSS*NBFI interaction term is positive and is significantly greater than zero (according to the Wald test results) indicating that more sustainable NBFIs tend to give out larger loans, and therefore experience a mission drift.

Moreover, the absence of statistical significance of the interaction terms in the cases of credit unions, NGOs, and rural banks means that the hypothesis that the relationship between OSS and average loan balance is the same for each of these MFI types as it is for ba-

nks cannot be rejected. Additionally, adding up the coefficient of OSS and each of the coefficients of the interaction terms for these MFI types is not significantly different from zero, indicating that for credit unions, NGOs, and rural banks, OSS has no significant effect on depth of outreach. These findings reveal that only banks are able to take advantage of their increased sustainability by deepening their outreach and focusing more on the poor.

In accordance with the main discussion, OSS appears to have no association with the percentage of female borrowers for any of the MFI types, as neither the OSS variable nor the interaction terms are significant. In addition to that, summing the coefficient of OSS and each of the coefficients of the interaction terms is not significantly different from zero. This implies again that there is no evidence of a trade-off or a mission drift between MFI sustainability and the percentage of female borrowers.

Table 5: Robustness Check Results

	Depth of Outreach		Breadth of Outreach
	Avg. Loan Balance	Female Borrowers	Number of Borrowers
OSS	-677.20333**	0.05833	19550.18
OSS*CreditUnion/Co	-1484.3	-0.1828	-15815.1
OSS*NBFI	991.33999***	-0.0494	-27726.574*
OSS*NGO	513.746	-0.0041	12186.08
OSS*Rural Bank	929.958	-0.2519	-219926.97**
Private Sector	12.6802	-0.1093	-61893.87*
ATMs	21.681888***	-.00132173*	156.3791
Population Density	-1.633	-0.0006	990.5197
Rural Population	4.59573	-0.001	-2684.78
Credit Union/Coope-rative	1576.08	0.14844	
NBFI	-2387.0131***	0.11657	
NGO	-1487.1261**	.19380408*	
Rural Bank	-1429.5	0.461	
EAP	-316.69	0.16828	

EECA	628.067	-0.2832	
LAC	80.4138	-0.1786	
MENA	-614.78	-0.0178	
SA	-614.91	0.04576	
Age	-40.55466**	-0.0011	-1103.25
Log Assets	574.9915***	-0.0245	50282.675***
Intercept	-1393.8	.98489626***	-270649.53*
MFIs	107	101	103
Observations	686	639	670
R ²	0.5563	0.4680	0.4618

Note: * p<.05; ** p<.01; *** p<.001,

EAP: East Asia and the Pacific, EECA: Eastern Europe and Central Asia, LAC: Latin America and the Caribbean, MENA: Middle East and North Africa, SA: South Asia.

Finally, OSS appears to have no association with the number of borrowers for banks. This is evident from the insignificant coefficient of OSS, which resembles the omitted category “banks”. The same also applies to credit union, as the coefficient of the interaction term OSS*credit union is insignificant, as well as the net effect of summing the coefficients for the OSS variable and the interaction term OSS*credit union. As for NBFIs, the interaction between OSS and NBFIs is negative and significant, indicating that the relationship between OSS and number of borrowers for NBFIs differs significantly from that for banks. However, after conducting the Wald test, it was found that the net effect of adding up the coefficients of the OSS variable and the interaction term for NBFIs is not significantly different from zero, which suggests that there is no evidence of a trade-off between MFI sustainability and the breadth of outreach for NBFIs.

The interaction term for rural banks also has a significant negative coefficient suggesting that the relationship between OSS and the number of borrowers for rural banks is significantly

different from that of banks. In addition to that, the net effect of summing the coefficients of the OSS variable and the interaction term for rural banks is negative and significantly different from zero, which suggests that more sustainable rural banks tend to experience narrower breadth of outreach in the form of lower number of active borrowers, which signals a trade-off between sustainability and outreach for rural banks. The only type of MFI which experienced no trade-off in the breadth of outreach is NGOs. Despite having an insignificant interaction term, the result of summing the coefficients of OSS and the interaction term for NGOs is positive and significantly different from zero, which suggests that more sustainable NGOs lend to more clients, and thus experience broader outreach.

6. Conclusion

This study is an attempt to reach a conclusive result as to whether there exists a trade-off between an MFI’s outreach and self-sustainability by analysing the relationship between both objectives. A significant negative relationship suggests that a trade-off exists, and so, achieving one of the two objectives re-

quires abandoning the other. While a significant positive relationship suggests that both objectives can be achieved simultaneously. The absence of a significant relationship between the two objectives suggests the absence of an association between them.

A balanced panel of 124 MFIs from 45 countries located in six regions for the period 2004-2011 was constructed in order to test for signs of a trade-off. MFI sustainability was measured by OSS, while MFI outreach was measured along two main dimensions: depth and breadth of outreach. Depth of outreach is captured by the average loan size and the percentage of female borrowers, while breadth of outreach is captured by the number of active borrowers. Signs for better outreach are a decrease in average loan size—which resembles reaching poorer clients, and hence deeper outreach-, more female borrowers, and a larger number of active borrowers. MFI-specific characteristics such as age, size and type, in addition to some macroeconomic variables such as the ratio of domestic credit to private sector, number of ATMs per 100,000 adults, population density, and the percentage of rural population were controlled for.

Results reveal that there is no evidence of a trade-off between MFI sustainability and outreach except when the effect of sustainability on outreach is disaggregated by MFI type by including an interaction term between OSS – as a sustainability measure- and MFI type. More sustainable banks were found to have deeper outreach, while NBFIs were found to experience a trade-off between sustainability and depth of outreach measured by average loan bal-

ance. On the other hand, no significant relationship was found to exist between MFI sustainability and the percentage of female borrowers for all MFI types. As for the breadth of outreach, NGOs tend to experience a significant positive relationship between MFI sustainability and breadth of outreach, while rural banks experience a trade-off between sustainability and breadth of outreach.

These findings imply that banks that offer microfinance services are found to be more focused on the poor. It also implies that as banks become more sustainable, they shift their attention towards the poor by offering very small loans in what is known as a reverse mission drift. This might be due to the increased sustainability they experienced, which allows them to handle the higher costs associated with giving smaller loans, as well as bear some additional risk of default. NBFIs tend to serve the less poor as they become more sustainable, indicating the existence of a mission drift. This implies that in an attempt to maintain their sustainability and increase their profitability, NBFIs reduce their costs of lending by giving out larger loans to the less poor.

The findings also imply that rural banks also experience a trade-off as they become more sustainable. This might be due to their wish to maintain their sustainability and improve their profitability which causes them to reduce their costs of lending. Reducing the number of active borrowers enables an MFI to give out larger loans, which is less costly for an MFI. As for NGOs, they tend to serve more clients as they become more sustainable, i.e. they expand their breadth of outreach when they become more sustainable. This im-

plies that NGOs, being a non-profit organisation, focus more on the social objective of an MFI rather than seeking to achieve more profits. This study concludes that the type of an MFI matters significantly in understanding the nature of the relationship between MFI sustainability and outreach, and in deciding whether a trade-off exists between the two objectives or not.

7.Limitations and Future Research

The findings of this study must be interpreted with care due to some limitations that pertain to the MIX data. First, data on the MIX is self-reported as MFIs report to the MIX voluntarily which results in missing data or data that is not up to date. Additionally, in order to ensure the reliability of the findings of this study, only MFIs which have a diamond rating of either 4 or 5, and a year-end fiscal year-end are included in the sample, which resulted in a small sample size. This might cause a decrease in the accuracy of coefficient estimation, thus increasing the coefficient standard errors (Brooks, 2008). Finally, the results are based on well-established MFIs that report to the MIX in order to attract donors, and therefore might not accurately represent the whole microfinance sector.

It is therefore recommended for future research in order to overcome these limitations, to rely more on primary data. This might help increase the sample size as well as make the sample more representative. It is also recommended for future research to examine the possibility of the existence of a trade-off between MFI sustainability and other aspects of outreach such as the scope of outreach and cost to clients

which were not addressed in this study due to data limitations, in addition to finding ways to overcome the trade-off some MFIs experience as a result of the nature of their operations, instead of eliminating these MFI types.

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