

Assessing the Trade-off between Outreach and Financial Sustainability of the Microfinance Industry in the MENA Region

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ABSTRACT

In the Middle East and North Africa (MENA) region, the reduction of poverty remains one of the most critical Sustainable Development Goals yet to be achieved. The region has experienced several shocks over the last decade. This has led to high unemployment particularly among young people and females, and this has affected both poverty levels and human well-being. Access to financial services plays a vital role in eliminating poverty in the region. One of the main tools to improve financial inclusion in the region is Microfinance (MF). However, for microfinance intuitions (MFIs) to meet the demands of the market, they need to focus on achieving ‘The Microfinance Dual mission’; outreach to the poor, and financial sustainability. The complementary role of social outreach and

financial sustainability is highly promising for both welfarists who strive to employ MFIs to alleviate poverty and institutionalists who advocate for attaining financial sustainability. This study assesses whether there is a trade-off between financial sustainability and outreach to the poor in MFIs in the MENA region.

In assessing the simultaneous relationships that exist between outreach and financial sustainability, the GMM estimator was used with balanced panel data consisting of sample of 20 MFIs from 10 countries in the MENA region; a total of 300 observations over the period between 2004 and 2018. The study examines the simultaneous relationships that exist between two endogeneity variables: Sustainability variable measured by (ROA and OSS), and outreach variable measured by average loan balance per borrower/ GNI per capita, number of active borrowers, and proportion of women borrowers. The findings show that; a) Increases in sustainability are positively associated with greater breadth of outreach, b) increases in sustainability result in a decrease in average loan balance per borrower; implying a better depth of outreach. The study finds no evidence of a trade-off. The thesis advances a better understanding of the Microfinance dual mission and contributes to addressing an existing gap in knowledge by building a more comprehensive model that could guide

policymakers in the microfinance sector regarding attaining better social outreach and financial inclusion.

Keywords: Microfinance, Financial Sustainability, Outreach, Trade-off, MENA Region, GMM, Simultaneous Equation Model

1. Introduction

The global poverty landscape has witnessed a significant setback in recent decades, with a resurgence in extreme poverty rates driven by factors like armed conflict, climate change, and the COVID-19 pandemic. These interconnected crises have amplified the vulnerabilities of low-income populations worldwide, underscoring the urgent need for effective poverty reduction strategies (World Bank, 2020).

Conventional banking systems often fail to effectively serve low-income customers, primarily due to stringent collateral requirements and the high costs associated with serving this demographic. This exclusion from traditional financial services results in a significant portion of the global population remaining unbanked, particularly in developing countries. The lack of access to financial services perpetuates poverty and hinders economic mobility, hindering individuals and communities from participating fully in economic opportunities (Hermes, 2007).

Financial inclusion, defined as the access to and responsible use of a range of financial products and services by individuals and businesses, has emerged as a critical focus of international

development efforts. The inclusion of financial inclusion within seven of the United Nations' 17 Sustainable Development Goals (SDGs) underscores its importance in achieving equitable and sustainable development (Demirgüç-Kunt, et al., 2020).

Microfinance (MF), with its focus on providing financial services to low-income individuals and communities, presents a promising avenue for fostering financial inclusion. This sector offers a diverse range of financial products and services, including microcredit, savings, insurance, and money transfers, tailored to the specific needs of underserved populations (Daley-Harris and Laegreid, 2006).

While the microfinance industry has experienced considerable growth in recent decades, millions remain unbanked, highlighting the need for MFIs to effectively achieve their 'dual mission' – reaching out to the poor while ensuring financial sustainability (Demirgüç-Kunt, et al., 2020). This dual mission underscores the importance of balancing social outreach with financial sustainability, a complex and often debated topic within the microfinance sector (Quayes, 2021).

The debate surrounding the existence of a trade-off between these two objectives has led to contrasting viewpoints. Some argue that a trade-off exists (Abdelkader (2023); Abu Wadi (2021), suggesting that MFIs prioritizing financial sustainability might neglect the poorest segments of the population. Conversely, Khalaf et al (2023); Quayes and Joseph (2021),

contend that these objectives are compatible, arguing that MFIs can achieve both financial sustainability and reach the most vulnerable populations. This study seeks to shed light on this ongoing debate by analyzing the relationship between financial sustainability and outreach of the MFIs in the MENA region.

2. Literature Review

2.1 The Microfinance Dual Mission: Outreach and Financial Sustainability

According to Hartarska and Nadolnyak, (2008) MFIs strive to accomplish their two primary goals: reach out to the underprivileged who have been financially eliminated from the conventional banking system; and to be financially self-sufficient, by meeting their expenses as well as being self-sufficient in terms of donor funding.

It has been claimed that because an MFI's primary objective is profitability or financial self-sustainability, it places a lower premium on serving the very poor. As a result, MFIs may begin to target less impoverished clients who are less risky and much less expensive to serve. This, in turn, diverts attention away from the really impoverished customers who are in urgent need of MFIs' financial assistance. Additionally, MFIs that

primary serve only the very poor risk jeopardising their ability to continue providing microfinance (Hermes et al., 2011).

2.1.1 Aspects of Outreach of MFIs

The performance of MFIs has been judged based on the concept of outreach and sustainability. Up to the researcher knowledge, Navajas et al. (2000) developed the theoretical framework for outreach. In which they addressed outreach and sustainability in the context of social welfare theory. The aim of the framework is to assess the social advantages of microfinance for the impoverished regarding six dimensions: worth to clients, cost to clients, depth, breadth, duration, and scope of outreach. Schreiner (2002) confirmed the outreach framework by utilising the same six dimensions and renamed it “the social benefits of microfinance for poor clients” (Schreiner, p.592, 2002). Navajas et al. (2000) argued that the social purpose of microfinance is to maximise estimated social value over time, highlighting that the most beneficial organisations are those that are long-term. They also added that the most unsustainable microfinance businesses impose expenses on the poor in the future that outweigh the benefits they receive in the immediate term. Sustainability is a means to achieve the goal of increased social welfare, not an end in itself (Rhyne, 1998; Navajas et al., 2000).

Among the six dimensions of outreach specified in the outreach framework (breadth, length, depth, user cost, scope and worth), the depth and breadth dimensions have seen significantly greater empirical application and therefore this study uses the depth of outreach, number of active borrowers (NAB), as well as the proportion of women borrowers (PWB) as the outreach measurements.

2.1.2 Aspects of Financial Sustainability of MFIs

Microfinance sustainability is a step towards profitability. Both are achieved when institutions are able to cut transaction costs, offer better goods and services that fulfil customers' needs, earn adequate money, and create new financing methods for unbaked impoverished households (CGAP, 2004). Microfinance sustainability begins with operational self-sustainability (OSS), in which institutions cover their operating costs. It is followed by financial self-sufficiency (FSS), which measures the MFI's operational and financing costs compared to the revenue generated by its activities (Ylinen, 2010). The last level of sustainability is profitability, in which the organisation covers not only its operational expenses but also its fund costs, inflation costs, and other non-cash costs without the need for subsidised funds (Makame and Murinde, 2007; Rosenberg, 2009; Morduch 1999). Sustainability in microfinance institutions seeks to ensure institutions' continued operations in the future, but there is an

issue as to whether microfinance organisations can operate without relying on donor subsidies (Christen, 1997; Conning, 1999, Woller and Schreiner, 2006).

According to Quyaes (2021), there has been a general direction for all MFIs to achieve financial self-sufficiency. It has enabled them to wean themselves off donor subsidies and their financial performance has become one of the most important goals for MFIs that have functioned as non-profit entities. Several prior studies have examined MFI financial sustainability using various criteria, the most frequent of which are operational self-sufficiency (OSS), financial self-sufficiency (FSS), and return on assets (ROA).

In this study, OSS is more likely to be a more accurate indicator of an MFI's financial sustainability than FSS. In addition, the study employed ROA as an additional indicator for MFI profitability. ROA, which is calculated as the ratio of net operating income after taxes to average total assets, evaluates how successfully an MFI uses its total assets to create returns. Further explanation is provided in the next section.

2.2 Microfinance Approaches

The microfinance dual mission (Murdock, 1999) states that an MFI should be profitable while reaching out to low-income

individuals. According to Hartarska and Nadolnyak, (2008), there is a debate over whether there is a trade-off between profitability – or sustainability – and outreach. The first is to become financially self-sustaining by paying their costs and becoming self-sufficient in terms of donor funding. The second is the MFIs' social mission, which is the ability of MFIs to provide poor families access to financial services , in other words, the outreach to impoverished, who are financially excluded from the traditional banking system.

In the 1990s, questions pertaining to the financial sustainability of microfinance organisations sparked a heated dispute between two perspectives: 'institutionist' financial sustainability and 'welfarist' (Robinson 2001). Welfarists advocate for the priority of the outreach goal (Hashemi and Rosenberg, 2006; Woller, 2002), whilst institutionalists emphasise the significance of sustainability and efficiency (Christen, 2001; Rhyne, 1998). While both approaches strive to alleviate poverty, they take a different perspective on how microfinance should be administered to improve the lives conditions of the poor. Both groups present proof to back up their claims (Addae-Korankye, 2020).

2.2.1 The Institutional Approach

Defenders of the institutionalist approach claim that the only way to expand, grow, and reach out to the vast number of

poor in microfinance institutions is via sustainability and profitability (CGAP, 1998; Wright, 2000). They further suggest that if the goal of outreach to the poor and poverty eradication in developing nations is to be met, then microfinance organisations should focus on financial sustainability by employing commercial sources of funding (Christen, 1997, Christen and Drake, 2002, Burkett, 2007). They emphasise the importance of MFI sustainability and how this can be achieved by lowering operating costs and repaying the cost of lending money from the income generated by the existing loan portfolio (Hermes and Lensink 2011). They also claim that obtaining self-sufficiency will allow MFIs to help impoverished businesses without being constrained by donor resources (Morduch 2000).

The primary purpose of the institutionalist school of thinking is to narrow the missing gap created by credit market failure through excessive transaction costs. Institutionalists argue that microfinance's true success is due to its natural attraction to donor agencies. Effective, and well- managed MFIs enable donor organisations to aid institutions that will provide financial services to their customers at a more affordable cost rate for a period of time between five to ten years, after that they will become financially self-sufficient (Addae-Korankye,2020).

Institutionists emphasise the significance of sustainability and efficiency (Otero and Rhyne, 1994; Christen et al., 1995;

Rhyne, 1998; Christen, 2001; Bhatt and Tang, 2001; Robinson, 2001; Isern and Porteous, 2006). They believe that this technique is the only realistic option to serve the huge number of borrowers that exists and that realisation of the same also results in a wide range of outreach. According to Rhyne and Otero (1992) and Otero and Rhyne (1994), MFI sustainability is required to achieve large outreach. They emphasised the necessity of MFIs being able to pay their lending expenses with income produced from the loan portfolio while also reducing operating costs. Advocates said that if MFIs are not financially sustainable, large-scale outreach to the poor cannot be ensured in the long run. Given the number of impoverished households and the need for microfinance, institutionalists claim that an effective poverty reduction method requires a huge scale of financial services, and this huge scale necessitates the availability of considerably greater financial resources than those provided by typical NGOs and aid donors (Ayayi and Sene, 2010). As a result, industry commercialisation is viewed as the primary path through which MFIs may supply the required products and services to poor consumers while also expanding operations to reach new clients in other regions.

The institutionalist approach is not without its critics. Lewis (2008) claimed that, despite the passion for microfinance, a growing number of specialists believe that the industry has lost its direction by turning away from the social goal of alleviating

poverty towards the goal of profit. Scholars contend that microfinance does not reach the lowest of the poor, and that the poorest are purposefully denied access to microfinance programmes, as an increases in interest rates, as well as a proclivity to lend greater average loan amounts to more secure customers, are indicators of extensive mission drift (Simanowitz, 2002; Scully 2004).

2.2.2 The Welfarist Approach

Welfarists suggests that MFIs seeking financial sustainability exclude impoverished entrepreneurs from microfinance programmes because they are unable to withstand high interest rates and provide sufficient collateral to cover loan risks (Bhatt and Tang 2001; Woller et al. 1999). As a result, such institutions serve only wealthy and educated entrepreneurs, rather than impoverished entrepreneurs. The welfarist approach has two goals; first goal is to reach the very poor to be able to decrease poverty; second, to increase the financial self-sufficiency of MFIs (Woller and Brau, 2004).

Welfarists place a disproportionately large emphasis on the depth of outreach relative to the number of active borrowers (breadth of outreach) and use social indicators as predictors of institutional performance (Hashemi and Rosenberg, 2006; Woller, 2002; Morduch, 2000; Hulme and Mosley, 1996). They

claim that MFIs may attain sustainability without being financially self-sufficient by accepting donations in the form of equity from social investors. Bangoura (2012) stated that, social investors that donate financial assistance for supporting MFIs are driven by a desire to contribute to poverty reduction rather than a desire for personal financial benefit.

According to Abdulai (2016), Welfarists see the microfinance industry as having profit-seeking and social purpose organisations focusing on distinct markets with diverse financing sources and with varying levels of dedication to social and financial returns. They focus on utilizing credit to assist people overcome poverty by offering credit at low interest rates, as well as providing other non-financial services such as training and technical assistance to help clients manage their new start-ups.

According to Addae-Korankye, (2020), the institutionalists' arguments for commercialization depends on traditional economic mechanisms like as: human choice, and its effect on the supply and demand. However, welfare advocates believe that the commercialization of microfinance has forced the poor, particularly the poorest, out of the traditional banking system, resulting in an agency problem (Sinclair, 2012; Bennett, 2009). In line with the stewardship perspective of non-profit organisations (Van Puyvelde et al., 2012), the welfarist approach focuses on the demand side, and supports the notion of providing

microcredit products to help to minimise costs for MFIs, so as to enable them to offer loans at reasonable and appropriate interest rates (Congo, 2002).

Using the Welfarist method, Kipesha et al. (2013) discovered that a focus on profitability had a detrimental influence on outreach to the poor. Through so doing, they emphasised the presence of trade-offs. The financial sustainability findings revealed the presence of no trade-offs with the outreach initiatives. According to the institutionalist perspective, the study discovered that outreach to the poor had a good association with both sustainability and profitability criteria. The study also suggested, however, that there is the potential of trade-offs between outreach to the impoverished and profitability measurements when compared to the outreach with financial sustainability. The occurrence of trade-offs between financial performance and poor outreach is also affected by the variables employed and the definition of the given estimating model. Some factors that suggested the existence of trade-offs under the welfarist perspective did not have the same influence under the institutionalist perspective.

To conclude, both sides present empirical evidence to back up their claims. However, in some circumstances, sustainability and outreach may be compatible (Morduch, 2005; Annim, 2010). It is critical to note that both parties ultimately seek to maximise

social effect, even if they disagree on who to target and how to do this (Abdulai 2016). According to Nurmakhanova et al. (2015), there may be a trade-off between sustainability and outreach when comparing the two approaches, meaning that changing the focus away from sustainability and efficiency decreases the potential for MFIs to pursue their more conventional purpose of lending to the poor

3. Data and Methodology

3.1 Data Collection

This study utilizes secondary data obtained from the MixMarket information platform, a web-based platform with detailed financial and outreach information for MFIs, which is currently publicly accessible via the World Bank Data Catalogue. MixMarket, the largest global, web-based microfinance information portal, provides comprehensive cross-country data on the microfinance sector, including information on MFIs and their financial performance. MFIs that report to MixMarket are assigned a diamond rating (from 1 to 5) based on their reliability and the number of years of data coverage. MFIs included in the study were required to have received a diamond rating of 3 to 5 diamonds during the period from 2004 to 2018, ensuring the quality and transparency of the data used in the analysis. The aim is not to compare each year with another but to investigate the

trend of trade-off between financial sustainability and social outreach of microfinance institutions over time.

3.2 Selection of MENA Region

Reducing extreme poverty remains one of the most challenging SDGs to achieve in the MENA area. Although extreme poverty is significantly more prevalent in Sub-Saharan Africa (SSA), and that MENA ranks third among developing areas. During the last decade the region has been in turmoil. The rate at which poverty is spreading in MENA serves as a powerful reminder that fast actions to eliminate poverty must be taken (Emara, N. and Mohieldin, M., 2020).

Microfinance as a component of financial inclusion has now emerged as a critical component of the development agenda of the MENA countries, with the goal of assisting in the eradication of poverty throughout the region. The fact that microfinance is expanding means that it can meet the financial needs of poor people and assist them in funding their small enterprises. Despite this fact, few reliable studies exist in the literature on the effectiveness of MFIs in the MENA region. Much of the existing work on microfinance is focused on MFIs in Asia, Europe, and South Africa (Ferdousi, 2013; Ashraf et al., 2014; Mia and Soltane, 2016).

3.3 Variables

To answer the research question whether there is trade-off between Outreach and sustainability of MFIs in MENA region, simultaneous equation method has been used. There are two main sets of variables to be examined endogeneity variables and exogenous variables.

3.3.1 Endogeneity Variables

○ Outreach

The study uses three measurements of social outreach – breadth of outreach (number of active borrowers, and proportion of women borrowers), as well as depth of outreach. The formal definitions of depth and breadth of outreach, to the best of the researcher knowledge, have been acknowledged to Navajas et al. (2000), and have been reaffirmed by Schreiner (2002).

- Depth

Following previous studies, the depth of outreach is measured by the average loan balance per borrower over GNI per capita to normalize the variation in income across countries. (Olivares-Polanco 2005; Luzzi and Weber 2007; Mersland and Strom (2009), Nurmakhanova (2015); Quayes (2021)). According

to prior studies that use the same measurement, a smaller average loan size per borrower indicates more outreach depth.

According to Rosenberg (2009), the depth of outreach relates to the poverty level of clients served, whereas the breadth of outreach refers to the size of an MFI's activities. The notion of depth and breadth of outreach is still commonly employed in microfinance literature as a measure of an institution's outreach performance.

- Number of active borrowers (NAB)

The breadth of outreach measures the extent to which credit is extended, a greater number of borrowers suggests a bigger breadth of outreach (Quyaes and Joseph, 2021). As a result, the number of customers served is used to quantify the breadth of outreach 'the number of active borrowers' (Schreiner 2002).

- Proportion of women borrowers

While impoverished families in developing nations have restricted access to credit 'formal banks', women's access to credit is considerably more constrained. Most customers in the microfinance sector are women, which contributes to lessen the gender credit gap. The proportion of women borrowers in an MFI's portfolio is defined as a measurement of women's

outreach. According to Quayes (2018), the percentage of women borrowers, presents an MFI's outreach to women.

○ **Sustainability**

The second endogeneity variable is sustainability, which is measured in this study using ROA and OSS.

-OSS

Following the MixMarket definition, Abate et al (2013) explained the OSS measurement by: $OSS = \text{operating revenues} / (\text{financial expense} + \text{loan loss provision expenses} + \text{operating expenses})$. The OSS assesses an MFI's ability to pay its expenditures through operational revenues. It assesses managers' capacity to cover operational expenses. As a result, the OSS might serve as an acceptable estimate of MFI financial success (Hartarska and Nadolnyak 2007). The percentage of operational self-sufficiency (OSS) indicates if a Microfinance Institution (MFI) earns enough revenue (through interest, fee, and commission income) to cover its overall expenditures (financial costs, operational costs, and loan loss provisions). (Vicki L. Bogan 2012; Abate et al 2013; Nurmakhanova et al., 2015; Quayes 2015) also said that OSS with a value of 100 % or above denotes complete operational self-sufficiency; such an institution does not require outside assistance. A number less than 100% shows that the MFI is reliant on outside financing to continue operating at its current level.

-ROA

The return on assets (ROA) is a commonly used measure that is calculated by dividing the MFI's net operating income by its total assets. This is an important measurement since it allows analysts to compare the MFI's performance to that of other MFIs and businesses in general. It advises an investor about the projected return on investment in a microfinance institution (Berk and DeMarzo, 2014).

3.3.2 Exogenous variables

The impact of the endogeneity variables discussed above will be examined in each model while controlling for other variables that have been shown in literature to possibly influence MFIs' performance. Following (Nurmakhanova, 2015; Abu Wadi et al, 2021; Abdelkader, 2023) the study incorporates various control factors that influence both the financial sustainability and outreach of the MFIs. Those control variables are MFIs' age, size, loan-to-asset ratio, and capital- to-asset ratio., as mentioned in table 3.1.

3.3.3 Instrumental variable

In order to identify model parameters, instrumental variables linked to endogeneity variables must be included in the equation. It is usually challenging to find valid and strong

instruments since they must be associated with the endogenous variables (i.e. outreach and financial sustainability), while staying uncorrelated with the error term in both equations.

Following (Nurmakhanova et al., 2015) the average salary per GNI per capita is used as an instrumental variable in the model. Concerning the impact of average salary per GNI per capita, the higher the salary, the greater the costs, and hence the lower the sustainability. The log of other control variables (loans, capital, age, size) are also used as instrumental variables. Sargan-Hansen test is used to check the validity of instrumental variables used.

Table 3.1: The variables used, their measurements, definition and sources.

Variable	Measurement	Definition
Dependent Variables for Outreach:		
Depth	the average loan balance per borrower over GNI per capita	The depth of outreach is a proxy for the extent to which credit is available in relation to one's level of poverty
NAB	Number of active borrowers	The NAB of outreach measures the extent to which credit is extended; a greater number of borrowers suggests a bigger breadth of outreach.
PWB	Proportion of women borrowers from the total number of active borrowers	the proportion of female borrowers shows an MFI's outreach to women.

OSS	OSS = operating revenues / (financial expense + loan loss provision expenses + operating expenses).	The OSS assesses an MFI's ability to pay its expenditures through operational revenues
ROA	Dividing Net operating income by its total assets.	ROA shows how management effectively uses the company's resources and assets to generate profits.
Control variables:		
Age	number of years MFI operates till the time of research sample ends	The number of years a MFI has been operating
Size	logarithm of total assets of MFI	Institution size measured as the log of total asset.
Capital	capital/asset ratio	assess the influence of financial leverage on the performance of the MFI.
Loans	loans-to-assets ratio	To control for the focus on lending to be able to determine whether MFI focusing on lending might affect its performance or not
Instrumental Variable:		
Salary	average salary per GNI per capita	

3.4 Model Specification

Multiple regression analysis is used to examine the relationship between Outreach and sustainability and the opportunity of trade-off between them. Most of the previously

mentioned studies concentrated on measuring either factors affecting Outreach, or factors affecting Efficiency, sustainability and profitability. These researches viewed outreach as an independent variable when modelling financial sustainability of MFIs. (Cull et al., 2007; Hermes et al., 2011). While another set of researches examined the attributes that impact the outreach of MFIs and consider sustainability as an independent variable (Olivares-Polanco, 2005; Makame and Murinde, 2007). The majority of the literature examine the two endogenous variables separately, without taking into account the link between them (Mersland and Strom, 2009; Hartarska and Nadolnyak, 2007; Cull et al., 2011). Following (Luzzi and Weber 2007; Nurmakhanova et al., 2015) this study is concerned in providing an opportunity to close the gap in literature, and to closely examine the relation between financial sustainability and outreach for MFIs. This analysis treats financial sustainability and outreach as dependent variables in simultaneous equations modelling. To be able to answer the research question, the study examines the simultaneous relationship between the endogeneity variables: outreach variable measured by (Depth, NAB, and PWB), and Sustainability variable measured by (ROA, OSS). And in order to do so, the following Overall system contains two models:

Model 1

$$\begin{aligned} outreach_{it} = & \beta_0 + \beta_1 * sustainability_{it} + \beta_2 * age_{it} + \beta_3 \\ & * size_{it} + \beta_4 * loans_{it} + \beta_5 * capital_{it} + \epsilon_{it} \end{aligned}$$

Model 2

$$\begin{aligned}
 \text{sustanabilty}_{it} &= \beta_0 + \beta_1 * \text{outreach}_{it} + \beta_2 * \text{age}_{it} + \beta_3 * \text{size}_{it} \\
 &+ \beta_4 * \text{loans}_{it} + \beta_5 * \text{capital}_{it} + \epsilon_{it}
 \end{aligned}$$

To test the simultaneous relationship between the endogeneity variables: outreach variable measured by (Depth, NAB, and PWB), and sustainability variable measured by (ROA, OSS), the study tests the relation between each of outreach measurements with each of sustainability measurements. In doing so, the main two models, are divided into two empirical sub-systems.

Where the first sub-system, investigates the simultaneous relation between OSS and each of the Outreach variables. And the second sub-system, investigates the simultaneous relation between ROA and each of the Outreach variables.

A) The first empirical sub-systems investigate the simultaneous relation between OSS and each of the Outreach variables as follows:

$$\text{OSS}_{it} = \beta_0 + \beta_1 * \text{outreach}_{it} + \beta_2 * \text{age}_{it} + \beta_3 * \text{size}_{it} + \beta_4 * \text{loans}_{it} + \beta_5 * \text{capital}_{it} + \epsilon_{it} \quad (\text{A.1})$$

$$\text{outreach}_{it} = \beta_0 + \beta_1 * \text{OSS}_{it} + \beta_2 * \text{age}_{it} + \beta_3 * \text{size}_{it} + \beta_4 * \text{loans}_{it} + \beta_5 * \text{capital}_{it} + \epsilon_{it} \quad (\text{A.2})$$

In order to test the trade-off between OSS and each of the Outreach measurements, the following three systems have been established:

System 1:

$$DEPTH_{it} = \beta_0 + \beta_1 OSS_{it} + \beta_2 * loans_{it} + \beta_3 * capital_{it} + \epsilon_{it} \quad (1)$$

$$OSS_{it} = \beta_0 + \beta_1 * DEPTH_{it} + \epsilon_{it} \quad (2)$$

System 2:

$$NAB_{it} = \beta_0 + \beta_1 OSS_{it} + \beta_2 * age_{it} + \beta_3 * capital_{it} + \beta_4 * size + \epsilon_{it} \quad (3)$$

$$OSS_{it} = \beta_0 + \beta_1 * NAB_{it} + \epsilon_{it} \quad (4)$$

System 3:

$$PWB_{it} = \beta_0 + \beta_1 OSS_{it} + \beta_2 * loans_{it} + \beta_3 * size + \epsilon_{it} \quad (5)$$

$$OSS_{it} = \beta_0 + \beta_1 * PWB_{it} + \epsilon_{it} \quad (6)$$

B) The second empirical sub-systems investigate the simultaneous relation between ROA and each of the Outreach variables as follows:

$$ROA_{it} = \beta_0 + \beta_1 * outreach_{it} + \beta_2 * age_{it} + \beta_3 * size_{it} + \beta_4 * loans_{it} + \beta_5 * capital_{it} + \epsilon_{it} \quad (B.1)$$

$$Outreach_{it} = \beta_0 + \beta_1 * ROA_{it} + \beta_2 * age_{it} + \beta_3 * size_{it} + \beta_4 * loans_{it} + \beta_5 * capital_{it} + \epsilon_{it} \quad (B.2)$$

In order to test the trade-off between ROA and each of the Outreach measurements the following three systems have been used:

System 4:

$$DEPTH_{it} = \beta_0 + \beta_1 ROA_{it} + \beta_2 * loans_{it} + \beta_3 * capital_{it} + \epsilon_{it} \quad (7)$$

$$ROA_{it} = \beta_0 + \beta_1 * DEPTH_{it} + \beta_2 * age_{it} + \epsilon_{it} \quad (8)$$

System 5:

$$NAB_{it} = \beta_0 + \beta_1 ROA_{it} + \beta_2 * age_{it} + \beta_3 * capital_{it} + \beta_4 * size + \epsilon_{it} \quad (9)$$

$$ROA_{it} = \beta_0 + \beta_1 * NAB_{it} + \beta_2 * age_{it} + \epsilon_{it} \quad (10)$$

System 6:

$$PWB_{it} = \beta_0 + \beta_1 ROA_{it} + \beta_2 * loans_{it} + \beta_3 * size + \epsilon_{it} \quad (11)$$

$$ROA_{it} = \beta_0 + \beta_1 * PWB_{it} + \beta_2 * age_{it} + \epsilon_{it} \quad (12)$$

3.4.1 Simultaneous Equation Models

Simultaneous equation models, as opposed to single-equation models, include more than one dependent, or endogenous, variable, necessitating the inclusion of an equal number of equations. The simultaneous equation model is distinguished by the fact that an endogenous variable in one equation may appear as an explanatory variable in another (Gujarati (2012)). As a result, such an endogenous explanatory variable becomes stochastic and is usually associated with the equation's disturbance term. Gujarati (2012) also added that the typical OLS approach cannot be employed in this situation

because the resulting estimators are inconsistent, they do not converge to their real population values regardless of sample size. When used to estimate equations that are generally considered as simultaneous equation systems, the OLS technique is likely to provide biased and inconsistent parameter estimators. When there is simultaneity other estimation methods have been developed. In case of simultaneity the two-stage least squares (2SLS) and instrumental variables approaches give consistent and efficient estimators. As a result, before discarding OLS in favour of the alternatives, the simultaneity issue should be tested.

Breusch-Pagan LM Diagonal Covariance Matrix Test was used to determine whether OLS will be used or 3SLS, if p-values are less than 5%, the null hypotheses of “OLS” estimation will be rejected. The result of the test showed the rejection of OLS method.

The study employs the three-stage least squares approach to examine these systems of equations. This is because estimating equation systems using ordinary least squares (OLS) contradicts a critical OLS assumption about the existence of a correlation between regressors and disturbances. When estimating using three-stage least squares, some assumptions must be verified, including the following: homoscedasticity of errors, no autocorrelation, and normality of the dependent variables. In the event that one of these assumptions is violated, an alternate approach is required; this method is the generalized method of moments (GMM), which is the case in the

current research. Liu and Saraiva (2017) proposed a GMM estimator and its heteroskedasticity-robust standard error for a simultaneous equation SAR model. They established the suggested GMM estimator's consistency and asymptotic normality. They also proved that GMM performs well in finite samples. Unlike other IV class estimators, such as the 2SLS and 3SLS, the GMM estimator employs a weighting matrix and accounts for temporal dependence, heteroscedasticity, and autocorrelation (Chen 2010).

3.4.1.1 GMM

The GMM stands as a prevalent econometric technique applied for parameter estimation in simultaneous equation models, as referenced by Lee et al. (2016). Within this study, the System Generalized Method of Moments (SGMM), an extension of GMM proposed by Blundell and Bond (1998), is utilized to address endogeneity concerns inherent in the simultaneous relationship between outreach and sustainability.

Lee et al. (2016) argues that SGMM provides numerous advantages in simultaneous models. Initially, it addresses endogeneity by incorporating lagged variables and differences of endogenous variables as instruments, thereby enhancing the parameter estimates' reliability and efficiency. Furthermore, SGMM ensures estimation reliability even if there are heteroscedasticity and serial correlation in error terms, rendering

it suitable for models with simultaneous equations. SGMM also facilitates the assessment of model adequacy and the detection of potential specification errors by enabling the evaluation of the validity of over-identifying restrictions. Additionally, SGMM offers the flexibility of specifying moment conditions, particularly advantageous for complex models with multiple equations, as exemplified in this study.

4. Results and Discussion

This subsection discusses the empirical tests used in the study to assess the simultaneous relationship between the endogeneity variables: outreach variable measured by (Depth, NAB and PWB), Sustainability variable measured by (ROA, OSS), to test if there is a trade-off between the two sets of the variables or not.

4.1 Descriptive statistics

In this thesis, descriptive statistics are conducted to explain the fundamental characteristics of the data. They summaries the sample and the measures employed, as well as the endogeneity and exogeneity variables used in this study, which includes 20 MFIs with 300 observations. The data measurements are listed in Table 5.1.

Two methods are used to measure MFIs financial sustainability. The first measurement, operational self-sufficiency (OSS), has an average value of 143%. The OSS ratio is a financial ratio that focuses on the business's core revenues and costs. In OSS, a ratio of 100 percent indicates the break-even level. If the ratio is greater than 100 percent, the MFI is performing well. If, on the other hand, the ratio is less than 100%, it indicates that MFI is losing money (Quyaes, 2012). Although the average of OSS is 143% which means that majority of MFIs in the sample generate revenues that cover their costs, however the minimum is 17% which means that some MFIs in the sample are losing money. In this situation, the MFI may need to boost operational income or reduce overall expenditures in order to achieve the desired balance (Esampally, 2016). The second measurement, return on assets (ROA), has an average value of 4.86% which shows an inadequate financial performance of the sampled MFIs, Where the spanning of the minimum and a maximum of ROA is -30% to 29%, which suggested that only few and not majority of sampled MFIs are performing well. Most of the MFIs around MENA region are moderately leverage as shown by a mean 50% of capital -asset ratio. The loan ratio is an indicator of MFIs focus on lending with a mean 78% in MENA region.

As for the Outreach measurement, three methods were used to measure MFIs outreach. The first measurement, Depth of outreach, has an average value of 30 %. Depth of outreach refers to the poverty level of clients served; by expressing average balance as a percentage of GNI per capita, it is possible to compare the extent to which MFIs in various nations extend into their respective national income distributions. The second measurement, number of active borrowers (NAB), has an average value of 10.50283 in its natural logarithm value, in real term the value for the mean is 36419 in which 63% are woman, as the average of (PWB) which is the third measurement of outreach, that measure the proportion of woman borrower. The majority of MFIs serve primarily women, as indicated by the average PWB of 63 %, while some MFIs serve exclusively women, as indicated by the maximum PWB of 165 %, and some MFIs serve mainly men, as indicated by the minimum PWB of 11 %.

Table 4.1: Descriptive Statistics for All Variables

Variable	Obs	Mean	Std. Dev.	Min	Max
Depth	300	.3	.601274	-3.73	3.32
NAB	300	10.50283	1.510563	8	14
PWB	300	.6347	.2483866	.11	1.65
OSS	300	1.435967	2.083233	.17	36.63
ROA	300	.0486333	.067881	-.3	.29
Age	300	18.78	11.494	1	68
Size	300	16.83	1.336808	14	20
Capital	300	.5098	.269014	-.02	1.48
Loans	300	.7827333	.1535833	.29	1.18
Average salary	300	3.260467	1.765036	.39	11.06

4.2 Correlation analysis

Multicollinearity and the state of equation identification have been reported to impact model parameter estimates in the simultaneous equations model. Each equation's error terms are also predicted to be correlated with one another in the model. The Pearson Correlation matrix is used to investigate the influence of multicollinearity, correlation between error terms, and the state of equation identification. Correlation analysis is used to assess how the analysis dimensions are associated with each other and if the variables are strong or weak, and whether they are connected positively or negatively. The nature and direction of the link between variables determine the relationship. The following table shows a correlation matrix that defines the relationships between all variables and their degrees of significance, as well as the coefficient variables.

Table 4.2: Pearson Correlations analysis

Pearson Correlations matrix					
	Depth	NAB	PWB	OSS	ROA
AGE	.061	.212**	-.046	.026	.183**
SIZE	.075	.829**	-.126*	.004	.112
CAPITAL	.244**	-.166**	.046	.046	.102
LOANS	.118*	-.009	-.124*	.070	.048
**. Correlation is significant at the 0.01 level (2-tailed).					
*. Correlation is significant at the 0.05 level (2-tailed).					

Pearson's correlation matrix demonstrates the link between all endogeneity and exogenous variables in the sample. To avoid identification problems the study at first test the correlation between the dependent variables and the control variables to exclude the insignificant relations.

The Pearson correlation matrix as shown in (table 4.2) shows the absence of multi-collinearity between the variables since all the estimated coefficients have values less than 0.80.

4.3 GMM

This section of the study presents the analyses for the multiple regression models First and foremost, the models must be diagnosed for the GMM assumptions. Second, following each model, there is a discussion of the results.

4.3.1 Results and Discussion for the first empirical sub-systems

Table 4.3: Outreach and OSS: main results of GMM

VARIABLES	System 1		System 2		System 3	
	OSS	Depth	OSS	NAB	OSS	PWB
OSS		-2.14*** (0.556)		1.971** (0.854)		-1.388 (2.389)
Depth	-0.281** (0.119)					
NAB			0.0528** (0.0242)			
PWB					3.543 (4.985)	
Age				0.0493*** (0.0113)		
Loans		4.601*** (1.282)				-2.940 (5.652)
Size				0.581*** (0.0652)		0.295 (0.468)
Capital		-0.136 (0.925)		-6.084*** (0.899)		
Constant	1.605*** (0.0723)		0.949*** (0.261)		-0.696 (3.106)	
Observations	300	300	300	300	300	300
Robust standard errors in parentheses						
*** p<0.01, ** p<0.05, * p<0.1						
<p><i>This table provides the GMM regression results of the simultaneous equation system model for assessing the trade-off between Sustainability and Outreach of MFIs; for system 1,2,3. Regressions are based on annual data of MFIs in MENA region from 2004 to 2018. The four endogenous variables are OSS_{it}, $DEPTH_{it}$, NAB_{it}, PWB_{it}, which are operational self-sufficiency, average loan balance per borrower over GDI per capita, number of active borrowers, proportion of women borrower, respectively. The other exogeneity variables are : $loans_{it}$, $capital_{it}$, age_{it}, $size$, where Age refers to how long has the organization performed measured by calculating the number of years since organization has been established; Size refers to MFIs size measured by taking the log of an MFI's value of total assets; Loan refers to MFIs ability to control for focus on lending measured by gross loans portfolio-to-assets; Capital refers to measure the impact of financial leverage on MFI's performance measured by capital-to-asset.</i></p>						
<p><i>Numbers in the parentheses are robust standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.</i></p>						

The system GMM estimator use a stacked form of the differenced and levels equations to estimate the model's parameters. The performance of the System GMM estimator is highly dependent on the instrument validity. The instruments' independence is then tested with Hansen's (1982) J-test (testing overidentification assumption) for all the 3 systems. From Table 4.4, it is concluded that there is no overidentification problem as the p-values for all the three models are greater than 5%, and according to Sargan–Hansen test or Sargan's test which is a statistical test used for to examine the over-identifying restrictions in a statistical model. In other words, to test if the instrumental variables used are accurate or not. The null hypothesis of this test is "no over-identification". The model is accurate if the null hypothesis is not rejected.

Table 4.4: Specific tests (GMM) for OSS regressions

Preliminary tests	System 1		System 2		System 3	
Overidentification	value	p-value	value	p-value	value	p-value
Hansen's J Chi(2)	0.6568	0.4177	4.68641	0.0960	1.73846	0.1873

Findings for the first empirical sub-systems:

In the first sub-system, sustainability is measured using OSS, whereas outreach is measured by the following three indicators: Depth (average loan balance per borrower/GNI per capita), NAB, and PWB. The findings suggest that a rise in OSS

leads to a decrease in average loan balance per borrower, thereby indicating an improved level of depth of outreach. As the coefficient for depth is negative and highly significant. The findings indicate that MFIs that prioritise lending to impoverished individuals and maintain lower average loan balances per borrower exhibit greater sustainability and cost coverage. As a result, there is no evidence for trade-off. This finding is consistent with (Khalf et al., 2023), which asserts that sustainable MFIs have a smaller average loan size; therefore, reaching the poor and attaining profitability are complementary. This contradicts Awaworyi Churchill 's (2020) assertion that MFIs that prioritise financial sustainability drift away from serving the impoverished.

In testing the relation between OSS and NAB, the results suggest that there is no evidence for a trade-off between OSS and number of active clients served by MFIs. As the coefficient for NAB is positive and highly significant. This means that MFIs who tend to serve large number of clients can still be sustainable and cover their costs. This result is consistent with the claims of (Quayes and Joseph, 2021; Khalaf et al., 2023) that increasing the number of active borrowers helps MFIs lower operating costs and achieve economies of scale.

Finally testing for the relation between OSS and PWB, the results suggest that there is no evidence for a trade-off between

OSS and the proportion of women borrower served by MFIs. As the coefficient for PWB has no significant relation with OSS. This contradicts the findings of Zainuddin and Yasin's (2020) who support the concept that women have higher creditworthiness. On the other hand, it has been discovered that lending to women has a detrimental influence on the sustainability of microfinance organisations (Kittilaksanawong and Zhao, 2018; Abdelkader, 2023), and that MFIs that prioritise lending to female borrowers may see less sustainable than those who do not prioritise such lending practices.

4.3.1. Results and Discussion for the second empirical sub-systems:

Table 4.5: Outreach and ROA: main results of GMM

	(4)	(5)	(6)			
VARIABLES	ROA	Depth	ROA	NAB	ROA	PWB
ROA		-7.340***		28.48***		0.811
		(1.803)		(7.888)		(0.847)
Depth	-0.0888***					
	(0.0157)					
NAB			0.0346***			
			(0.00910)			
PWB					0.100	
					(0.158)	
Loans		0.448***				-0.259***
		(0.116)				(0.100)
Age	0.00465***		0.00467***	0.175**	0.00399	
	(0.00115)		(0.00146)	(0.0727)	(0.00335)	
Size				0.706***		0.0472***
				(0.0567)		(0.00535)
Capital		0.559***		1.018**		
		(0.109)		(0.410)		
Constant	-0.0143		-0.402***		-0.0862	
	(0.0197)		(0.0893)		(0.119)	
Observations	300	300	300	300	300	300
Robust standard errors in parentheses						
*** p<0.01, ** p<0.05, * p<0.1						
<p><i>This table provides the GMM regression results of the simultaneous equation system model for assessing the trade-off between Sustainability and Outreach of MFIs; for system 4,5,6. Regressions are based on annual data of MFIs in MENA region from 2004 to 2018. The four endogenous variables are ROA_{it}, $DEPTH_{it}$, NAB_{it}, PWB_{it}, which are return on asset ratio, average loan balance per borrower over GDI per capita, number of active borrowers, proportion of women borrower, respectively. The other exogeneity variables are: $loans_{it}$, $capital_{it}$, age_{it}, $size_{it}$, where Age refers to how long has the organization performed measured by calculating the number of years since organization has been established; Size refers to MFIs size measured by taking the log of an MFI's value of total assets; Loan refers to MFIs ability to control for focus on lending measured by gross loans portfolio-to-assets; Capital refers to measure the impact of financial leverage on MFI's performance measured by capital-to-asset.</i></p>						
Numbers in the parentheses are robust standard errors. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.						

The system GMM estimator use a stacked form of the differenced and levels equations to estimate the model's parameters. The performance of the System GMM estimator is highly dependent on the instrument validity. The instruments' independence is then tested with Hansen's (1982) J-test (testing overidentification assumption) for all the 3 systems. From Table 4.6, it is concluded that there is no overidentification problem as the p-values for all the three models are greater than 5%, and according to Sargan–Hansen test or Sargan's test which is a statistical test used for examine the over-identifying restrictions in a statistical model. In other words, to test if the instrumental variables used in the model are accurate or not. The null hypothesis of this test is "no over-identification". The model is accurate if the null hypothesis is not rejected.

Table 4.6: Specific tests (GMM) for ROA regressions

Preliminary tests	System 4		System 5		System 6	
Overidentification	value	p-value	value	p-value	value	p-value
Hansen's J Chi(2)	4.68354	0.0962	0.056963	0.8114	1.50087	0.4722

Findings for the second empirical sub-systems:

Consistent with the result of the first empirical model , when using the ROA variable in measuring the profitability of MFIs to investigate the simultaneous relation between the two endogeneity variables outreach and financial sustainability, the

following results occurred: In testing the first relation in the second set between the ROA and depth of outreach, the results indicate that an increase in ROA is associated with a decrease in average loan balance per borrower, indicating a better depth of outreach. The results suggest that there is no evidence for a trade-off between depth of outreach to the poor when using ROA as sustainability measures of MFIs. As the coefficient for depth is negative and highly significant. It can be determined that MFIs that prioritise lending to impoverished individuals and consequently have lower average loan balances per borrower tend to exhibit greater profitability. This result is consistent with the findings of (Bassem, 2012; Quayes and Joseph, 2021, Khalaf et al.,2023) study, which found that an increase in ROA results in a decline in average loan balance per borrower, resulting in a better depth of outreach. However, it contradicts Abdelkader's (2023) study, which claims that when MFIs prioritise serving wealthy customers by raising loan sizes, their profitability, as measured by return on assets, rises.

In testing the second relation between ROA and NAB, the results indicate that a higher ROA is positively associated with an increase in the number of active borrowers. This implies that the profitability of MFIs is not compromised by their ability to provide financial services to a wider customer base. This result is in line with the findings of the (Quayes and Joseph, 2021) study,

which discovered that increasing the number of borrowers contributes to increasing organisational profitability. (Awaworyi Churchill, 2020) argue that MFIs that focus on profitability face a trade-off with outreach depth but an increase in outreach breadth, justifying that when mission drift occurs, MFIs may still increase the number of borrowers but with shifting to more wealthier clients.

Testing the last relation between ROA and PWB, the results show that there is no significant relation between profitability and proportion of women borrower. The findings are consistent with the findings of Huq et al. (2017), who found that female borrowers have no statistically significant impact on MFI ROA as well as sustainability. While Haines (2016) believes that women are good microfinance customers, Awaworyi Churchill (2018) verifies that MFIs that concentrate in lending to women are not achieving profitability.

Findings of sub-system two showed that there is no trade-off between ROA and the three measurements of Outreach.

5. Conclusion

The current study, Assessing the trade-off between outreach and sustainability in MFIs in the MENA region, investigated the simultaneous relationship between MFIs' ability to reach poor clientele while being sustainable.

The GMM estimator was used to verify the relationship between the two endogenous variables outreach and sustainability. The results indicated that there is no indication of a trade-off in the region between outreach and sustainability in the MFIs. The findings of the study were consistent with previous studies undertaken in the MENA region. However, the time period in which the research was done included eight years of wars, conflicts, which led to a significant shift in the region's poverty map. This prompted the researcher to look at how there is no trade-off in the region during economic and political crises. The researcher might draw the conclusion that this is because the majority of MFIs included in the sample are large and established institutions that serve both low and middle- class consumers, also that some of the MFIs in the sample, have started adapting the fintech in their organizations. According to the study, this is a good sign that MFIs in the region can operate with both categories of clientele.

To eliminate poverty through MFIs as a main tool of financial inclusion in the MENA region, all stakeholders in the industry must collaborate to develop innovative strategies to deal with post-conflict and pandemic eras. Within county research is required to assess the MENA MFIs in the future. Given that few MFIs are publishing their data the world bank - MixMarket data set. As well as in depth interviews and questionnaires are recommended to take place with different MFIs stakeholders within each country.

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