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Article

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FINANCIAL ECONOMICS | RESEARCH ARTICLE

The bidirectional relationship between MFIs' financial and social performance: Sustainability and outreach perspective

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Abstract: This paper examines the bidirectional relationship between sustainability and outreach of microfinance institutions (MFIs) in the MENA region, using unbalanced panel data regression during the period from 1999 to 2018. The simultaneous equation model (SEM) is used based on the 2SLS regression considering endogeneity problem between sustainability and outreach. Two main systems are developed based on SEM; the first relates sustainability with breadth of outreach, while the second includes sustainability and depth of outreach. Results state that sustainability and outreach are complementary objectives, and the direction of their relationship is from outreach to sustainability. This finding is tested and supported using various robustness checks, namely: excluding firms with few data, using other methods to estimate 2SLS regression model, and examining the impact of sustainability on outreach based on their indices developed based on the TOPSIS method. The study concludes with some suggestions for future research in this field.

Subjects: Quantitative Finance; Finance; Corporate Finance; Entrepreneurial Finance

Keywords: MFIs; sustainability; outreach; Simultaneous equation model (SEM); MENA; TOPSIS

1. Introduction

Microfinance institutions (MFIs) are a special part of the financial system that contributes mainly to the first channel of development by affecting the saving rate and reallocating resources. MFIs play an important role in the economy through their financial and social role. Basically, the idea of microfinance was developed as a survival strategy to expand outreach of financial services and

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make a movement towards a developed economy, where the MFIs can be incentivized to develop and maintain a channel to the population groups that are not adequately serviced by the financial stem, especially the low-income people (Khalaf & Saqfahait, 2019). In emerging countries, micro-finance institutions offer loans and technical assistance on how to start and develop a business (Hartungi, 2007).

Mainly, MFIs focus on two aspects: (1) creating financial institutions that serve the needs of the low-income people; and (2) achieving financial self-sufficiency and sustainability. As MFIs focus more on social objectives, rather than on the repayment of the loan, this will lead MFIs taking greater risk (Shahzad, 2015). There are two theories that explain the importance of sustainability for MFIs: the welfarist theory and the institutional theory. Welfarists argue that depth of outreach by reaching the very poor clients should be the main objective of the MFIs, and sustainability is just a means to achieve this goal. On the other hand, institutionists believe that sustainability should be the focus of MFIs in order to have a high breadth of outreach without depending on subsidies and grants (Githaiga, 2022).

MFIs should focus on creating services that satisfy the needs of the low-income clients while achieving financial self-sufficiency. The MFI literature in recent years has seen an increased focus on financial sustainability as the MFIs continue to grow and develop. To achieve its full potential, an MFI needs to be self-sufficient in a financial context, so it no longer has to rely on donors, subsidized grants or loans, NGOs, or government programs for its continued operations. There is a growing literature focusing on this need of sustainability, which has used measures such as operational sustainability, financial sustainability, return on assets, and return on equity as measures for MFI performance (Anisul Islam & Nasreen, 2018; Ario, 2020; El-maksoud, 2016; Gibson, 2012; Githaiga, 2022; Khachatryan et al., 2019; Long & Marwa, 2015; Narwal & Yadav, 2014; Parvin et al., 2020; Pollinger et al., 2007).

Moreover, extensive academic research has explored outreach determinants of MFIs (Ahmed et al., 2018; Bayai & Ikhida, 2016; Hoque et al., 2011; Khalaf & Saqfahait, 2019; Khan et al., 2016; Lislevand, 2012; Narwal & Yadav, 2014; Quayes, 2015). Nevertheless, there are fears from researchers focusing on studying the microfinance sector that more focus on financial performance and profitability may have an effect on the MFI's primary objective of providing credit loans to the poor. However, much less research has investigated the bidirectional relationship between sustainability and outreach (Abu Wadi et al., 2022; Navin & Sinha, 2021).

Thus, considering the bidirectional relationship between sustainability and outreach in particular, the literature is almost silent, especially in creating sustainability and outreach indices and determining the possible association between social and financial performance of MFIs. Consequently, the picture of the way MFIs achieve their social and financial goals is incomplete.

Against this background, the purpose of this research is to examine the interaction between outreach and financial sustainability in MENA countries over 1999–2018. More specifically, the main objective of this study is to examine the impact of MFIs' outreach on its sustainability, and to conversely examine the impact of MFIs' sustainability on its outreach. What distinguishes this study from previous studies in the same field is that it studies the bidirectional relationship between sustainability and outreach after considering the endogeneity problem. This is done by employing the simultaneous equation model (SEM) based on 2SLS regression. In addition, the study covers the whole period available at MIX market database from 1999 to 2018.

This paper makes a novel attempt to measure outreach by means of a more comprehensive approach. Furthermore, the robustness of findings has been checked and confirmed by excluding firms with few data from the sample, using other methods to estimate 2SLS model, and examining the impact of sustainability on outreach based on their indices. Outreach and sustainability indices are developed using the technique of order preference by similarity to ideal solution (TOPSIS) to

test the relationship between sustainability and outreach. To the best of the researchers' knowledge, this is the first study in microfinance that creates an outreach index using this technique, that would contribute to arranging MFIs in MENA according to their outreach achievements that is an important basis to decision makers. The use of different proxies may result in diverse research findings. Thus, it might be useful to use outreach and sustainability indices, combining many variables, to measure MFIs' performance. Since the use of different proxies may result in diverse research findings (A.K. Kar, 2013), it might be useful to use outreach and sustainability indices, combining many variables, to measure MFIs' performance. Thus, in addition to using LNAB (natural log of the number of active borrowers) and LBB (average loan balance per borrower) to measure outreach, and OSS (operational self-sufficiency) to measure sustainability, the robustness of the findings could be checked using outreach index and sustainability index.

This study also serves as a reference for academics and researchers studying microfinance in MENA countries; as microfinance in MENA is currently facing several challenges that are stifling its growth. In addition to the unique national culture of MENA region, Alattas and Tayachi (2021) argue that microcredit performance in MENA countries is relatively poor compared to other regions. That MFIs face some barriers such as the absence of institutional and administrative support, concentrating on microcredit regardless of other products (eg. Deposits), lack of regulation, and credit bureau has not been set up yet in many MENA countries. High competition from commercial banks is also a primary challenge (Carrillo and Reviakin, 2022). Additionally, Alattas and Tayachi (2021) study's survey shows that low microfinance development was attributed to the economic transitioning pressure from social and political factors. Their study also reveals that MENA countries' performance on access to small, medium enterprises loans is relatively low compared to the financial sector depth of the other countries having similar GDP. On the other hand, the present study highlights some challenges faced by MFIs in MENA countries. According to Lassoued (2021), MENA countries suffer from high poverty rate, having a lower consumption rate of less than 5% per day. Besides, they have the highest youth rates of unemployment in the world and much higher among women. All these challenges may restrict MFIs' financial and social roles.

This study will contribute to the efforts of the policy makers, expertise, and MFIs' advisors through clarifying the importance of microfinance in MENA countries and its role in enhancing economic development and alleviating poverty through improving their ability of outreach and maintaining their sustainability.

The remainder of the paper is organized as follows: section two offers an outline of the existing literature; section three shows variables used in the study and develops the research hypotheses based on the rationale for each hypothesis; in sections four and five, a discussion is made on the research methodology and data, respectively; section six covers the findings and discussion; and section seven provides summary and conclusion of the findings.

1.1 Literature review

According to Muhammad Yunus, increasing the global welfare requires that capitalism needs to be done through entities that place people above profits known as social businesses (Hulme & Arun, 2009). As for investors, they are sensitive to the way MFIs are placed in the markets they invest in, especially with regard to the operating costs and the interest rates as well as the borrowers' economies in order to prove that their price is acceptable depending on the business in case of achieving the financial and the social effect objectives. On the other hand, microfinance institutions' performance is measured aiming at two objectives: progress assessment and determination on meeting the microfinance goals. Microfinance is regarded as important because it is aimed at improving the standard of living of the poor and alleviating poverty but, at the same time, achieving the operational and financial self-sufficiency.

When MFIs increased, many studies examined their activities from different perspectives. The authors of the current research categorize these studies into three groups. Group one is aimed at

finding out about factors determined the MFI performance success in terms of outreach to clients, the poor being the most important of whom. Group two, however, is aimed at finding out about the sustainability of such factors. Finally, group three is aimed at defining the link between outreach and sustainability of microfinance.

It is possible to determine the performance of MFI through the indicators of outreach and sustainability as well as through developing the possibility of having disciplinary rating agencies, since the regulatory engagement and the financial statement transparency do not affect performance. In this regard, Vichore and Deshpande (2012) argue that in order to minimize the gap between credit supply and demand of formal financial institutions, stimulation of the frontier has been done. Consequently, measures of minimizing such a gap between credit supply and demand by MFIs are being taken by emerging economies governments aiming at providing microcredit to the poor.

1.2. Outreach of microfinance institutions: depth and breadth

It is possible to consider the number of poor people that receive the service, along with the number of female clients as outreach (Abdulai & Tewarib, 2017). Additionally, it may include MFIs' plausibility that has to do with the financial services variety. According to Navajas et al. (2000), there are six dimensions that can be used to obtain outreach. These dimensions are breadth, depth, length, scope, cost, and worth. This makes outreach a significant indicator in terms of examining the MFIs ability to penetrate to the poor. To find out the MFI's contribution to reducing poverty, outreach depth can be measured, as it relates to the clients' degree of poverty.

MFIs' outreach determinants and trend were examined by Osotimehin et al. (2011). The link between both outreach determinants has been studied using the GLS method, to conclude that the average loan size, debt-equity ratio, loan repayment rate, and salaries determined the microfinance outreach positively and significantly. According to Osotimehin et al. (2011) findings, in order to improve outreach, emphasis should be on the average loan size. On the other hand, A. K. Kar (2012) examined the capital and financial structure impact on both social and financial performance of the sample of the 782 MFIs distributed over 92 countries and covering six developing regions. The study period is between the years 2000 and 2007. The two measures of social performance and outreach breadth and depth. Although leverage seemed to have a significant negative impact on outreach depth, the same does not exist in the case of outreach breadth.

MFI's mission drift is detected in the study of A.K. Kar (2013) over the 2000–2007 period, based on a sample of 113 MFIs in 47 countries and seven regions, including MENA. It means that high financial performance is at the expense of low social performance. In addition, breadth of outreach leads to better sustainability by reducing delivery costs, and to better depth of outreach. Risk factors adversely affect both depth of outreach and sustainability. Contrary to expectations, MFI's large size does not guarantee better sustainability, and is related to poor social performance. Finally, a positive relationship is detected between MFI's age and social performance.

Additionally, the capital structure and performance relationship was studied by Khachatryan et al. (2019) who examined a sample of 310 MFIs distributed over 16 countries in the region of Eastern Europe and Central Asia; the study period is between the years 2005 and 2009. Khachatryan et al. (2019) concluded that preferences of stakeholders providing the capital influences that performance.

Moreover, depth of outreach determinants was studied by Khan et al. (2016), who used a sample of 22 MFIs in the country of Pakistan covering the period from 2008 to 2012. According to Khan et al. (2016), the depth of outreach is negatively affected by MFIs' age and credit methodology. Also, depth of outreach is positively impacted by leverage, female borrowers, and profit status. On the other hand, sustainability's effect on depth of outreach is a negative insignificant effect.

According to Khan et al. (2016), even if the Pakistani institutions finance their projects with debt, depth of outreach may succeed in case of smaller loans lend by institutions.

The four outreach indicators of the number of active borrowers being served by MFIs, the percentage of women borrowers, average loan size per borrower, and MFIs' gross loan portfolio to measure the MFIs' outreach performance were examined by Khalaf and Saqfalhait (2019). They used the panel data model in six Arab countries during the period from 1999 to 2016. Khalaf and Saqfalhait (2019) concluded that the process of serving the main poor clients in the Arab countries through MFIs is not sufficient. On the other hand, according to the study findings, MFIs' outreach performance is robustly affected by the gross loan portfolio, being an important factor at the institutional level. The scores of breadth, depth, and overall outreach were measured by Wasiaturrahma et al. (2020). They used Tobit regression analysis to examine case studies from East Javan Islamic cooperatives. Wasiaturrahma et al. (2020) concluded that there is a significant impact of size, non-performing financing (NPF), number of branches, grants, and financial leverage on Islamic cooperatives' outreach.

Recently, Bansah (2021) has examined the outreach determinants. Banash concluded that there is a negative significant impact of the ratio of the operating expenses to the assets, ROE, loan loss ratio, and debt to equity ratio on average loan balance per borrower. However, the impact of cost per borrower on the average loan balance per borrower is negative and positive. On the contrary, the relationship between cost per borrower to the percentage of FB in MFIs is negative, but the FB percentage is impacted in a direct and positive manner by the operating expense divided by total assets. Also, there is a positive relationship between loan loss reserve and FB percentage. Additionally, there is a significant and negative relationship between cost per borrower and the operational self-sufficiency and is related to the active borrowers' numbers, whereas the relationship between gross loan portfolio and portfolio at risk is positive in terms of its relationship to the active borrowers' number.

1.3. Sustainability of microfinance institutions

Whereas microfinance extension of loans of small amounts is aimed at achieving self-employment and income generation for the jointly liable poor group members, microfinance extension turned into an important tool that promotes sustainable development and promoting inclusive growth. Microfinance is regarded as important because it is related to the affordable financial services access, reduction of inequality, and alleviation of poverty. Usually, the focus of MFIs is to establish financial institutions in favor of the people with low income but at the same time achieve operational and financial self-sufficiency. This is confirmed by many studies.

Many studies discovered the factors determining the successful performance of MFI in terms of financial sustainability and outreach to clients. Some studies investigate the determinants of several performance indicators of MFIs' profitability or sustainability, repayment status, or portfolio quality and cost indicators primarily to explore why some MFIs perform better than others (e.g., Pollinger et al., 2007; Gibson, 2012; Long & Marwa, 2015; Githaiga, 2022).

According to Pollinger et al. (2007), that examined some MFIs in the US, MFIs do not cover their cost or benefit from the cost-based pricing. Consequently, there is a need for MFIs to focus not on the income their lending and related operations generate each year, but on increasing additional resources. The methods they use include the grants or other funds that aim at the MFIs' ability to sustain their operations and to survive.

On the other hand, Gibson (2012) carried a study with the aim of discovering the operational sustainability determining factors of Kenya's MFIs. Gibson (2012) focused on the factors affecting operations self-sufficiency and financial sustainability at first, then ended up with a model of financial sustainability that is more comprehensive and representative in order to create and index that observes the financial performance of microfinance sector. Gibson's (2012) sample consisted 30 of the MFIs listed on Kenya's Association of Microfinance Institutions (AMFIs) that provide their services to the low-income Kenyans.

The study findings revealed that capital to asset ratio and operating expenses to loan portfolio are the factors affecting the operational and financial sustainability.

The impact of leverage on MFIs performance was examined by A. K. Kar (2012), Rai and Rai (2012), Lislevand (2012), and A. K. Kar (2012) examined six developing regions and concluded that financial performance improves significantly when leverage is increased if this financial performance is measured by return on equity, and cost efficiency. Rai and Rai (2012), on the other hand, argue that MFIs' sustainability is affected by the important factors of capital to asset ratio, operating expenses to loan portfolio, and portfolio at risk greater than 30 days. Additionally, Lislevand (2012) examined a sample of 403 MFIs distributed to 73 countries to find out that majority of the MFIs are highly leveraged. Also, he argues that there is a negative and significant effect of total debt to assets and long-term debt to assets on return on assets. On the other hand, financial sustainability determinants were examined by Long and Marwa (2015) in 25 MFIs in Ghana using the unbalanced panel analysis for the period from 2006 to 2011. Long and Marwa (2015) found out that MFIs' sustainability related positively to yield on gross portfolio and administrative efficiency ratio but negatively to staff productivity.

On the other hand, Quayes (2015) has analyzed the potential trade-off between performance and outreach by examining a panel data made of 764 MFIs distributed to 87 countries. The study concluded that when depth of outreach increases, it will have a positive impact on the MFIs' financial performance. This finding implies that it is possible to enhance the financial performance through outreaching the poor, meaning that the effort of outreach does not constitute an obstacle to achieving financial sustainability. On the contrary, it can even make it easier to achieve better performance. Consequently, MFIs can go through microcredit operations as a commercial operation without having to depend on the funds provided by donors or by subsidies. Zerai and Rani (2012) ended up with similar findings as they proved that there is no trade-off between outreach and financial sustainability. More studies by Wagenaar (2012) and Millson (2013) support this finding by arguing that commercial is an optimizer for breadth of outreach and an obstacle to depth of outreach. The researchers ended up with a conclusion that in the case of commercial MFIs, the lumpier loans are extended, and that the female clients' number is limited.

The impact of funding sources on three profitability measures (return on assets (ROA), operational-self-sufficiency (OSS), and return on equity (ROE)) in a total of 382 MFIs was studied by Abrar and Javaid (2016), who used panel data for the period 2004–2010 from 70 countries in the world. These countries covered six regions in the world. The study ended up by concluding that capital structuring debt levels are enhanced by deposits, which leads to the completion of the institution's overall profitability, while the profitability decreases with the increased operating costs amounts and the relative risks. Moreover, Nyanzu et al. (2019) argued that MFIs who accept deposits have better sustainability and a tendency to serve the marginal poor.

In addition, the impact of national culture on the relationship between depth of outreach and sustainability was examined by Zainuddin et al. (2020) over the period 2003–2016. They employed correlated random effects approach, based on an unbalanced panel including 5,741 observations of 1,232 microfinance institutions in 43 countries from six regions, including MENA. Four proxies are used to measure national culture in their study, namely power distance, uncertainty avoidance, individualism, and masculinity. They conclude that the relationship between depth of outreach and sustainability is negative and moderated by national culture. Whereas this negative relationship becomes more negative in individualist and masculine countries, it becomes less negative in countries with high power distance and uncertainty avoidance. In addition, the impact of breadth of outreach measured by number of active borrowers on sustainability was insignificant.

Similarly, Githaiga (2022) used a sample of 443 MFIs distributed to 108 countries to conclude that there is a significant and positive impact of revenue diversification on the MFI financial

stability. Githaiga (2022) also concludes that it is possible for the income of nonlending business to improve the lending one by decreasing the margins of interest. Moreover, there is negative impact of leverage on financial sustainability that can be attributed to the possible link relating the willingness of a donor to provide MFIs that are financially sustainable with equity, and MFIs that are unsustainable with loans. Githaiga (2022) also argues that larger institutions are more financially sustainable.

Githaiga (2022) concluded with findings in line with Quayes (2015) findings, but not in line with other studies, such as S. A. Churchill (2018) who agree with the depth of outreach and sustainability trade-off of MFIs. Other studies agree with S. A. Churchill (2018) that there is evidence of the complementary relationship between breadth of outreach and financial sustainability. This study, however, does not agree with the trade-off theory and concludes that financial sustainability for MFIs can be achieved by expanding their breadth of outreach and depth of outreach.

1.4. Linkages between sustainability and outreach

The third and last group of studies, such as Churchill and Marr (2017), Navin and Sinha (2021), Ponce et al. (2021), and Abu Wadi et al. (2022), explore the outreach and sustainability bidirectional relationship. In comparison with the first two groups' studies, the studies of the third groups are more recent. In the study of Churchill and Marr (2017), the bidirectional relationship is discussed on South Asia, and Latin America and the Caribbean regions using Pooled OLS, fixed effect, random effect, and the system GMM techniques from 2005 to 2015. Whereas an index of sustainability and its components are used to examine the impact of sustainability on outreach, the effect of the depth and breadth of outreach on sustainability are only expressed in indices form. The trade-off between outreach and sustainability is detected in this study in both regions. However, the severity of trade-off is dependent on whether the main emphasis of MIFs is on sustainability or outreach.

Based on 1595 MFIs in 109 countries from 6 regions, including MENA, over the 2005–2014 period, S.A. Churchill (2020) examined the potential trade-off between sustainability and outreach, expressed in indices forms, using GMM-3SLS technique. Although the trade-off between sustainability and outreach depth is detected, a complementarity between sustainability and outreach breadth is found.

The third and last group of studies, such as Abu Wadi et al. (2022) and Navin and Sinha (2021), explore the outreach and sustainability bidirectional relationship. In comparison with the first two groups' studies, the studies of the third groups are more recent. The purpose of the study of Abu Wadi et al. (2022) is to end up with an estimation of the MENA countries outreach and financial sustainability interaction. Abu Wadi et al. (2022) sampled 82 MFIs for the period from 2004 to 2018 to conclude with 133 observations. They used the panel data method depending on the models of fixed and random effects. The study findings revealed that there is a trade-off between MENA MFIs' financial sustainability and outreach performance. It recommends that there is a need for MFIs to pay more attention of financial ratio management, including ROA, ROE, and OSS, in order to be able to achieve outreach and sustainability. However, the limitation of this study is ignoring the endogeneity problem which may affect the results.

Like other studies, Navin and Sinha (2021) argue that there is a statistically significant negative impact of average loan size on the MFI operational self-sufficiency as average loan size is used as a measure for depth of outreach and operational self-sufficiency is used as a measure of sustainability. Navin and Sinha's (2021) primary focus was on examining the depth of reach MFI impact on its financial health. Additionally, the study explored the reasons that might affect the relationship between social performance and financial performance of MFIs, while taking the nature of this sector into account. The researchers used 990 Indian MFIs as a sample covering the period from 2005 to 2016. They applied the simultaneous equation model (SEM) based on GMM-3SLS model to find out that MFIs that are operationally self-sufficient and tend to provide their clients with bigger

loans compared to MFIs that are operationally insufficient. Additionally, the study ended up with arguing that MFIs' yield on its financial health has a significantly positive effect on outreach as well as on sustainability. Also, there is a statistically significant positive effect of gross loan portfolio, operational cost per borrower and financial cost per borrower on the average loan size.

It was also found by Navin and Sinha (2021) that financial cost per borrower effect is significant but relatively low. The reason for this is that subsidized loans and grants that MFIs receive went through no adjustments. This means that it is more expensive for MFIs to work with bigger loans. They concluded that there is a negative impact of yield on a loan size of MFIs, and that the variable is statistically significant. The presence of equity capital, considered as a low-cost financial source, enhances the financial health of an MFI as well as its social outreach. On the contrary, equity-to-assets ratio's impact on operational self-sufficiency is somehow small. In terms of age, however, the financial performance of mature MFIs is better than new ones, while the social performance of new MFIs is better compared to that of mature ones. The study also showed that MFIs' financial performance is hampered by portfolio at risk.

In a longer and a more recent sampling period from 1999 to 2018, Ponce et al. (2021) studied the causality between the individual variables of sustainability and the depth of outreach. The sample of this study encompasses six regions including MENA. The Granger causality analysis results show that whereas the depth of outreach causes financial sustainability in South Asia and Latin America, a bidirectional relationship is found between outreach and financial sustainability in East Asia and the Pacific.

The purpose of the study of Abu Wadi et al. (2022) is to end up with an estimation of the MENA countries outreach and financial sustainability interaction. Abu Wadi et al. (2022) sampled 82 MFIs for the period from 2004 to 2018 to conclude with 133 observations. They used the panel data method depending on the models of fixed and random effects. The study findings revealed that there is a trade-off between MENA MFIs' financial sustainability and outreach performance. It recommends that there is a need for MFIs to pay more attention of financial ratios management, including ROA, ROE, and OSS, in order to be able to achieve outreach and sustainability. However, the limitation of this study is ignoring the endogeneity problem which may affect the results.

On the other hand, some literature used the meta-analysis to examine the relationship between financial and social performance (e.g., Reichert, 2018; Zainuddin & Yasin, 2019). Reichert (2018) used initial sample of 3,299 articles to play a meta-analysis on the relationship between financial and social performance. The study used meta-analysis on the statistical significance of estimates from primary studies on financial-social performance trade-offs. Reichert (2018) used a probit model for which he classify between two estimate groups, which is basic practice for meta-analyses analyzing the direction and statistical significance of the effect under investigation. The model suited for examining the variation in a categorical variable with two categories is the probit model. Results indicate that articles using the MIX Market database are less likely to prove trade-offs while studies that use efficiency indicators, utilize an economic frontier methodology, or are published in development journals are more likely to prove indication of performance trade-offs.

In addition to the previously mentioned empirical studies regarding the relationship between outreach and sustainability, Zainuddin and Yasin (2019) presented a theoretical study concerning this relationship. Specifically, they discussed, among other issues, the findings of the main empirical studies examining the outreach and sustainability relationship. They found mixed results, and proposed further investigation to this relationship in future studies.

Based on the above discussion of the related studies three groups are discussed. The first group examines the determinants of outreach, the second group discusses the main explanatory variables of sustainability, and the third one shows the linkages between sustainability and outreach. It is evident that the studies within the third group are the more recent studies. This means that

the current study is categorized within the third group aiming at filling the gap of lack of similar studies in this field. Therefore, it is important to show the main differences between our study and other studies classified in this group.

First, Although Abu Wadi et al. (2022) study is applied on MENA; it ignores the endogeneity problem which may affect its results. Second, despite using the simultaneous equation model (SEM) in the studies of S.A. Churchill (2020), and Navin and Sinha (2021) based on GMM-3SLS method, MENA countries have the least number of MFIs in the study of S.A. Churchill (2020), which may lead to biased outcomes towards other regions and countries in the study, and Navin and Sinha (2021) is applied on India rather than MENA. Churchill and Marr (2017) study is also not applied on MENA. Third, the studies of Navin and Sinha (2021) and Ponce et al. (2021) focus only on the depth of outreach and ignore its breadth dimension. Fourth, although the period of Ponce et al. (2021) study is identical to ours, they employed Granger causality analysis instead of SEM. Therefore, the present study contributes to the existing literature by examining the bidirectional relationship between sustainability and both dimensions of outreach, i.e depth and breadth in MENA, based on a long and a more recent period extending from 1999 to 2018, based on SEM. In addition, sustainability and outreach variables are measured in both individual and index forms.

Based on the above discussion of the related studies of three groups, it is evident that the studies within the first group, discussing the bidirectional relationship between outreach and sustainability, are the more recent studies. This means that the current study is categorized within the first group aiming at filling the gap of lack of similar studies in this field. The present study is in line with Navin and Sinha (2021) in terms of considering the matter of facing the endogeneity problem by using simultaneous equation model (SEM).

The following table shows various studies that have positive/negative/non-significant results of outreach-sustainability relationship.

2. Variables and hypotheses

The following section shows variables used in the study and develops the research hypotheses based on the rationale for each hypothesis. Sustainability and outreach variables are the endogenous variables used in this study. They represent the measures of financial and social performance, respectively. The most common indicator for sustainability is the operational self-sufficiency (OSS) that measures the capability of MFIs to meet its operating costs using its own revenues that are created from their operating activities. MFI is considered as being sustainable when the value of OSS equals one or more (Quayes, 2015). In this case, MFI's financial revenue equals or exceeds its financial and operating expenses and loan losses. Moreover, return on assets (ROA) and return on equity (ROE) are used as indicators for financial performance. Therefore, they are used as control variables in this study. Moreover, an index of sustainability (SI) is developed based on TOPSIS method using OSS, ROA, and ROE variables.

There are two dimensions for outreach, namely breadth and depth. For the purposes of the current study, breadth of outreach is measured by the natural log of the number of active borrowers (LNAB), while the average loan balance per borrower (LBB) is the measure chosen for depth of outreach as commonly used in literature. The number of active borrowers represents the number of beneficiaries of entities that currently have an outstanding loan balance with an MFI in the country. The greater the amount of LNAB, the greater the breadth of outreach, but the smaller the amount of LBB, the greater the depth of the outreach assumed to be. Alternatively, Louis et al. (2013) and Abdulai and Tewarib (2017) argue that a greater depth can be presented in a small-size loan which indicates outreach to poorer clients by MFIs. Similar to sustainability, an index for outreach is created based on LNAB and LBB variables based on TOPSIS method. To the best of the authors' knowledge, this is the first study to develop outreach index based on this method.

Table 1. Outreach-sustainability relationship according to literature

Study	Positive relationship	Negative relationship	Non-significant relationship
Bansah (2021)	Cost per borrower, operating expense divided by total assets and loan loss reserve have a positive significant relation with depth of outreach. Gross loan portfolio, portfolio at risk, and interest expense on deposits have a positive significant relation with breadth of outreach.	Operating expenses to the assets, return on equity, loan loss ratio, debt to equity ratio have a negative significant relation with depth of outreach. Operational self-sufficiency, cost per borrower, and operating expenses divided by total assets have a negative significant relation with breadth of outreach.	
Hoque et al. (2011)	Size of the loan portfolio and age of an MFI have a positive significant relation with outreach.	ROE have a negative significant relation with outreach.	
Gibson (2012)		A weak relation between performance and outreach.	Operational sustainability with respect to performance and outreach, average loan size, net deposits, have a positive non-significant relation with sustainability.
Narwal and Yadav (2014)	Number of offices has positive significant relation with outreach.	Size of MFIs, age, personnel allocation ratio, and asset structure have a negative significant relation with outreach.	
Long and Marwa (2015)	Debt to equity ratio a have a positive significant relation with sustainability.	Profitability, portfolio at risk and operating expenses have a negative significant relation with sustainability.	
Quayes (2015)	Outreach has a positive significant relation with sustainability.	Total expense ratio and loan loss reserve ratio have a negative significant relation with sustainability.	
Bayai and Ikhide (2016)	Equity has a positive significant relation with depth of outreach. Deposits have a positive relation with breadth of outreach.	Borrowings and deposits have a negative significant relation with depth of outreach. Borrowings have a negative significant relation with breadth of outreach.	

(Continued)

Study	Positive relationship	Negative relationship	Non-significant relationship
El-maksoud (2016)	Macroeconomic variables, economic freedom, size, and age of an MFI have a positive relation with outreach and sustainability. Domestic credit to GDP has a positive relation with outreach. Sustainability has a positive relation with outreach for NGOs.	Development of the formal banking system, liquid liabilities to GDP have a negative significant relation with sustainability.	MFI type has non-significant relation with sustainability. Sustainability and development of the formal banking system has a non-significant relation with outreach.
Khan et al. (2016)	Leverage, female borrowers, regulations, and profit have a positive significant relation with depth of outreach.	Sustainability, credit methodology, and age of the institution have a negative significant relation with depth of outreach.	
Khachatryan et al. (2019)	Loans and savings have a positive significant relation with outreach and sustainability.		
Khalaf and Saqfalhait (2019)	Borrower per Staff Member, portfolio at risk have a positive significant relation with breadth of outreach. Gross loan portfolio has a positive significant relation with depth of outreach.	Yield has a negative relation with depth of outreach.	Yield has a non-significant relation with breadth of outreach. Average loan size has a non-significant relation with sustainability.
Ario (2020)			There is non-significant relationship between depth of outreach and sustainability in group lending.
Parvin et al. (2020)	Equity to asset ratio and size have a positive significant relation with sustainability.	Debt to loan ratio and risk have a negative significant relation with sustainability.	
Wasiaturrahma et al. (2020)	Age, ratio of total grants to equity, financing to deposit ratio have a positive significant relation with outreach.	Size, non-performing financing, leverages have a negative significant relation with outreach.	Number of branches has a non-significant relation with outreach.
Githaiga (2021)	Revenue diversifications have a positive significant relation with sustainability.	Leverage has a negative significant relation with sustainability.	
Navin and Sinha (2021)	Sustainability, gross loan portfolio, equity-to-assets ratio have a positive significant relation with sustainability and outreach. Age has a positive significant relation with sustainability.	Average loan size and Portfolio at risk has a negative significant relation with sustainability. Yield, Age, operational cost per borrower and financial cost per borrower have a negative significant relation with outreach.	

(Continued)

Table 1. (Continued)

Study	Positive relationship	Negative relationship	Non-significant relationship
A. K. Kar (2012)	Leverage has a positive significant relation with sustainability.	Leverage has a negative significant relation with depth of outreach.	Capital structure has a non-significant relationship to outreach.
Khachatryan et al. (2019)	Grants and loans at below-market-interest rates and loans from social investors have a positive significant relation with outreach.	Loans from social investors has a negative significant relation with sustainability.	Deposits have non-significant relationship to sustainability.
Rocha et al. (2019)	Size has a positive significant relation with outreach and sustainability.	Capital structure, financial performance, and environment have a negative significant relation with operating efficiency. Operating efficiency has a negative relationship with outreach.	Capital structure, size and environment have a non-significant relationship to financial efficiency.
A.K. Kar (2013)	Gross loan portfolio and the number of active borrowers have a positive significant relation with outreach and sustainability.	Risk and size have a negative significant relation with outreach and sustainability. Age has a negative significant relation with depth of outreach.	
Churchill and Marr (2017)	Outreach has a positive significant relation with sustainability in Latin America and the Caribbean.	Outreach has a negative significant relation with sustainability in South Asia.	
S.A. Churchill (2020)		Depth of outreach has a negative significant relation with sustainability.	
Ponce et al. (2021)	Outreach has a positive significant relation with sustainability.		

Table 2 shows the variables used in the study, their measurements, and some previous studies used in these measures. The choice of independent variables is based on reviewing the existing literature in this domain. Also, they have been judiciously selected so that there is minimum correlation amongst the variables.

There is a great debate in the literature on whether there is a trade-off or a complementariness between sustainability and outreach. In other words, can MFIs achieve sustainability and outreach at the same time? Or do these two objectives contradict each other? This study contributes to answering this question. The first main hypothesis (H1) of this study shows the expected influence of outreach on sustainability as follows:

H1: There is a significant impact of outreach on sustainability

Justification of this main hypothesis could be done through the breadth and depth of outreach expected influence on sustainability. According to the first perspective related to the outreach influence on sustainability, both are contradictory objectives. Accordingly, it is expected that

Table 2. Variables and their measurements

Variable	Definition	Measurement (Selected Studies)
SI	Sustainability index	The Technique for Order of Preference by Similarity to Ideal Solution (TOPSIS) Method (Bhanot & Bapat, 2015)
OSS	Operational self sufficiency	Financial Revenue/(Financial Expense + Net Impairment Loss + Operating Expense (Cull, et al., 2007; Ek, 2011; Quayes, 2015; Abrar & Javaid, 2016; Bayai & Ikhida, 2016; Abdulai & Tewarib, 2017; Khalaf & Saqfalhait, 2019; Abu Wadi et al., 2022; Githaiga, 2022)
OI	Outreach index	TOPSIS Method
LNAB	Natural log of the number of active borrowers	The natural log of the number of individuals who currently have an outstanding loan balance with the financial institution or are primarily responsible for repaying any portion of the gross loan portfolio (A. K. Kar, 2012; Khachatryan et al., 2019; Ahmed et al., 2018; Anisul Islam & Nasreen, 2018; Khalaf & Saqfalhait, 2019; Githaiga, 2022)
LBB	Average loan balance per borrower	Gross Loan Portfolio/Number of Active Borrowers (Quayes, 2015; Khan et al., 2016; Ahmed et al., 2018; Khalaf & Saqfalhait, 2019; Abu Wadi et al., 2021; Navin & Sinha, 2021)
FB	Percent of female borrowers	Number of active female borrowers/Number of Active Borrowers (A. K. Kar, 2012; Khachatryan et al., 2019; Abrar & Javaid, 2016; Khan et al., 2016; Ahmed et al., 2018; Abu Wadi et al., 2021; Navin & Sinha, 2021)
ROA	Return on Assets	(Net Operating Income—Taxes)/Average Total Assets (Narwal & Yadav, 2014; Quayes, 2015; Abrar & Javaid, 2016; Khan et al., 2016; Khachatryan et al., 2019; Parvin et al., 2020; Abu Wadi et al., 2022; Githaiga, 2022)
ROE	Return on equity	(Net Operating Income—Taxes)/Average Total Equity (Hoque et al., 2011; A. K. Kar, 2012; Narwal & Yadav, 2014; Abrar & Javaid, 2016; Abu Wadi et al., 2022; Githaiga, 2021)
CAR	Capital-assets ratio	Total Equity/Total Assets (A. K. Kar, 2012; Masood & Ashraf, 2012; Francis, 2013; Perera et al., 2013; Ahmed et al., 2018; Abu Wadi et al., 2022)

(Continued)

Table2. (Continued)

Variable	Definition	Measurement (Selected Studies)
PAR	Portfolio at risk, 30 days	Outstanding balance, portfolio overdue > 30 Days + renegotiated portfolio/Gross Loan Portfolio (Cull et al., 2007; A. K. Kar, 2012; Abdulai & Tewarib, 2017; Khachatryan et al., 2019; Ahmed et al., 2018; Anisul Islam & Nasreen, 2018; Khachatryan et al., 2019; Khalaf & Saqfalhait, 2019; Abu Wadi et al., 2022; Navin & Sinha, 2021)
SIZE	MFI's size	The natural log of total assets (Kyereboah-Coleman, 2007; A. K. Kar, 2012; Narwal & Yadav, 2014; Abrar & Javaid, 2016; Khachatryan et al., 2019; Anisul Islam & Nasreen, 2018; Towo et al., 2019; Parvin et al., 2020; Wasiaturrahma et al., 2020; Abu Wadi et al., 2022)

sustainability will be negatively affected by outreach. As for the second perspective, however, outreach and sustainability are complementary objectives. It is expected for the impact between the breadth of outreach and sustainability to be positive with the increase of the MFI number of borrowers, making the later more sufficient in terms of its satisfaction of the main goal represented in the inclusion of unbanked population in the MFI services (Efendic & Hadziahmetovic, 2017). Furthermore, MFIs would achieve economies of scale and would have reduced operating costs as a result in case of increasing the number of borrowers. This means that sustainability of the MFIs may increase (De Crombrugghe et al., 2008; Mersland & Strøm, 2010). According to Meyer (2002), MFIs would enjoy economies of scale and therefore diminish costs if the number of their clients increases. This helps MFIs achieve financial sustainability. However, Abrar and Javaid (2016) ended up with a finding that contradicts with the trade-off theory, suggesting that there is a significant positive impact of breadth of outreach on financial sustainability. Therefore, the first sub-hypothesis of hypothesis one (H1) is developed as follows:

H1a: There is a significant positive impact of breadth of outreach on sustainability.

The impact of depth of outreach on sustainability may be negative or positive. It is possible to expect the negative impact of depth of outreach on sustainability since lending poor clients can be riskier as it causes default risk to increase, consequently affecting the ability of MFIs to cover their operational costs. Also, Quayes (2015) argues that MFI's profit margin can be lowered by smaller loans since the administrative costs are fixed ones that this would not cause the direct decrease with the loan size decline.

However, Quayes (2015) argues that it is expected for the impact of depth of outreach on sustainability to be positive since the rate of repayment of poorer borrowers who receive smaller loans is higher. Also, it was found out by Rahman and Mazlan (2014) and Quayes (2015) that there is a negative impact of the inverse measure for depth of outreach, i.e., the average loan balance per borrower on the sustainability of MFIs. Moreover, on average, institutions making smaller loans are not less profitable. Similarly, Abrar and Javaid (2016) concluded that depth of outreach has a significant impact on financial sustainability. As a result, the second sub-hypothesis of hypothesis one (H1) is formulated as follows:

H1b: There is a significant impact of depth of outreach on sustainability.

The second main hypothesis (H2) highlights the expected impact of sustainability on outreach. Thus, H2 is developed as follows:

H2: There is a significant impact of sustainability on outreach.

First, the impact of sustainability of breadth of outreach is discussed followed by the impact of sustainability on depth of outreach. The negative impact of sustainability on breadth of outreach is attributed to the wide lending process that can possibly cause more default risk, leading to less cautiousness by MFI in terms of selecting clients based on their repayment of loans ability. Also, Bansah (2021) concludes that operational self-sufficiency is significant and negatively related to the number of active borrowers. Also, he states that MFI that seeks profit would decrease its breadth of reach to be satisfied with maintaining a limited number of its trusted borrowers to reduce the cost of such lending. Also, it is possible to justify the positive impact of sustainability on breadth of outreach by arguing that the only way for MFIs to reach the largest number of poor people and to eliminate poverty is through financially sustainable methods (Abu Wadi et al., 2022; Mersland & Strøm, 2010). An efficient MFI that can optimally reduce its cost of lending is also placed in a better position to improve its breadth of outreach (Bansah, 2021). Moreover, Ek (2011) as well as other studies concludes that MFIs that are self-sufficient serve more clients than non-self-sufficient MFIs do. Therefore, the first sub-hypothesis of hypothesis two (H2) is developed as follows:

H2a: There is a significant impact of sustainability on breadth of outreach.

Greater average loan balance means that there is more tendency to move away from serving the poor, and instead serve wealthier clients. In terms of economics of scale referring to per unit costs reduction with the growth of institutions, the bigger the loan balance causes lower costs per dollar lent. Usually, sustainable MFIs tend to have larger average loan balance, and MFIs tend to be more commercial, giving away their poor clients in favor of more profitable ones. Also, in addition, strategic decisions of MFIs often involve situations where MFIs have to compromise with their social objectives to achieve their financial objectives. The social cost and the social value both increase with depth of outreach. Also, when poor people are targeted with small loans, the operational costs increase, especially in the cases where clients are distributed to vast geographical rural region. Additionally, the poor people's financial positions remain vulnerable to external shocks. This causes the lender to be exposed to higher risks. Moreover, the poor are more heterogeneous and less able to indicate their ability and readiness to repay the loan (Ek, 2011; Navin & Sinha, 2021). The above implies that low depth of outreach might be the result of high sustainability.

On the contrary, MFIs performing financially well is always good as this is helpful for them in terms of repaying their creditors in a timely manner as well as in terms of reaching newer locations and providing their innovation projects with funds. MFIs that are financially sustainable and are non-profit have the ability to have more grants and donations. Financially stable for-profit MFIs can give some returns to their investors. This means they can expand their operations through attracting fresh capital. Based on this argument, it is fine for MFIs to try to have a good financial position in line with their social goals. MFIs' main object should be outreach as argued by the welfarist perspective. At the same time, sustainability's role shall be a means helps to attain outreach. Also, Mersland and Strøm (2010) argue that increasing outreach and sustainability are complementary objectives because MFIs must eventually become financially self-sustained to eliminate poverty and improve economic growth and women's empowerment. Therefore, the impact of sustainability on the depth of outreach may also be positive. The positive impact of

sustainability on depth of outreach is also reached in the study of Khan et al. (2016). Therefore, the second sub-hypothesis of hypothesis two (H2) is formulated as follows:

H2b: There is a significant impact of sustainability on depth of outreach.

If the significant bidirectional relationship between sustainability and outreach is confirmed, the following hypothesis should be accepted:

H3: There is a significant bidirectional relationship between sustainability and outreach.

3. Control variables

As indicated in Table 1, The percentage of female borrowers (FB), return on assets (ROA), return on equity (ROE), capital-asset ratio (CAR), portfolio at risk (PAR), and SIZE are the control variables used in this study. FB variable is used by Abu Wadi et al. (2022), among others, as a control variable when identifying the determinants of financial performance. Thus, it is also employed in this study as a control variable in the sustainability models. The other remaining control variables are used in several prior studies in the outreach and sustainability models as shown in Table 1.

The percentage of FB is argued by Navajas et al. (2000) to be used as an indicator for the process of targeting the poorest. This means that it could be used as an indicator for depth of outreach. There can be a positive or a negative impact of FB on sustainability. According to Hermes et al. (2011), MFI profitability is impacted positively by an increased share of FB. Moreover, Abrar and Javaid (2016) also argue that in MFIs, FB are less likely to default and turn back in regular payments. Both Khachatryan et al. (2019) and Blanco-Oliver et al. (2021) agree with Abrar and Javaid (2016) and argue that female clients' percentage is related to better repayment rates and better profitability. In addition, Blanco-Oliver et al. (2021) find that female loan officers lend more to females. However, it is argued by Hermes et al. (2011) that lower rates of loan repayments chances increase with the focus on women clients. This finding is in line with Khan et al. (2016) who argue the existence of a negative impact of FB on average outstanding loan and average outstanding loan per capita gross national product.

Both ROA and ROE are used as indicators for financial performance in several studies such as Abu Wadi et al. (2021). Therefore, their relationships with outreach are expected to be the same as operational self-sufficiency (OSS). The way institutions use their assets is measured using ROA, making it an acceptable measure by many studies to measure banks and other financial institutions' financial performance. Sebhatu (2011) found a significant negative correlation between ROA and the operational efficiency. On the other hand, ROE is the financial profitability measure which expresses the capacity of the capital invested by the shareholders to obtain a certain level of net profits. It reflects the ability of MFI managers to generate net profits from using the owners' equity as one of the financial sources.

Capital-asset ratio (CAR) is used as an inverse measure for leverage in both outreach and sustainability models. It is recommended by Basel accord for judging asset quality and prudent credit risk management. The higher ratio is an indication for less leverage and better assets quality and liquidity, and lower credit risk. A positive relationship is expected between CAR and sustainability because banks and MFIs with good CAR usually have good financial performance. Consistent with the results of Gizaw et al. (2015), Abu Wadi et al. (2021), and Githaiga (2021) who find a negative and significant relationship between leverage and financial sustainability, which may be attributed to a possible link between donors' willingness to provide equity to financially sustainable MFIs. Less levered MFIs with high capital-asset ratio and more endowments would be more efficient in their operations; since they do not need to drift from their mission to get additional

capital. These results are consistent with the study of Gizaw et al. (2015). However, they contradict the study of A. K. Kar (2012), who supports the agency theory by documenting a significant positive relationship between leverage and profit-efficiency in MFIs.

Nevertheless, a negative relationship between capital-asset ratio and outreach could be expected because firms with less leverage may find difficulty to provide the required finance to large number of borrowers and to provide the required finance to poor people. According to Kyereboah-Coleman (2007), highly leveraged microfinance institutions perform better by reaching out to more clientele and enjoy scale economies of scale. This is consistent with the study of Khan et al. (2016), who find a positive relationship between leverage and depth of outreach but contradicts the findings of Hoque et al. (2011) and A. K. Kar (2012), who find a negative relationship between leverage and outreach to the very poor. They attributed this result to the higher cost of borrowing, higher default rate, and increased risk associated with leverage. In addition, leverage has a negative impact on the depth of outreach, and a positive influence on the breadth of outreach in the study of Anisul Islam and Nasreen (2018).

Risk is measured by portfolio at risk for a period greater than 30 days (PAR). This variable is used in order to assess the portfolio quality and the performance of the clients in meeting repayment obligations of MFIs. Higher portfolio at risk ratio implies lower portfolio quality and lower sustainability (Long & Marwa, 2015). This argument is consistent with the findings of Navin and Sinha (2021). However, MFIs which focus more on social performance usually have high portfolio at risk. This may refer to the reason that when MFIs focus more on social objectives, rather than the repayment of the loan, it will cause MFIs to take greater risk (Shahzad, 2015). Bansah (2021) confirms this argument by reporting a positive relationship between PAR and the breadth of outreach. Higher PAR values typically reflect poor management in loan collections, resulting in a loan portfolio in poor quality (Abdulai & Tewarib, 2017). In addition, Khachatryan et al. (2019) find a negative relationship between PAR and depth of outreach.

MFI's size is measured by the natural log of total assets (SIZE). This variable is used to control for the effects of differences in technology, investment opportunities, and diversification among MFIs. It may have positive or negative relationship with MFI's performance (A. K. Kar, 2012). The positive relationship is expected because large MFIs may have established infrastructures and be better managed; therefore, they are expected to benefit from the economies of scale and product diversification, making them more efficient (A. K. Kar, 2012; Kyereboah-Coleman, 2007). They also have higher experience, brand name recognition, and market power compared to smaller ones. Correspondingly, large MFIs are more reachable to commercial funding and other financial resources, improving their financial sustainability (Githaiga, 2021). On the other hand, smaller MFIs are more likely to have an opportunity for growth and, therefore, may be more efficient in order to have better performance (Hartarska, 2005). In addition, Gibson (2012) argues that young MFIs are doing better as compared to old ones on the number of active borrowers.

4. Methodology

4.1. Data and sample

All variables' data used in the present study are extracted from the microfinance information exchange (MIX) market database. This database is available at the World Bank website. MIX market database includes 92 MFIs in 12 countries in the Middle East and North Africa (MENA) region. South Sudan is excluded from the study sample because the data related to its seven MFIs is not available. In addition, 15 MFIs are also excluded from the remaining 11 countries due to the unavailability of data related to the variables used in the study. Therefore, the sample encompasses 70 MFIs in 11 countries. These countries include Turkey, in addition to 10 Arab countries, namely Egypt, Iraq, Jordan, Lebanon, Morocco, Palestine, Syria, Sudan, Tunisia,

and Yemen. Data is available in MIX market of MENA region from 1999 to 2018. Consequently, the study sample covers this period.

5. Research methods

Because the main purpose of the study is to test the bidirectional relationship between sustainability and outreach, the endogeneity problem should be checked. If this problem exists, the OLS estimates are biased, and the simultaneous equation model (SEM) should be used instead. (Asteriou & Hall, 2007; Brooks, 2008; Wooldridge, 2013). Hausman test is used to test the endogeneity problem. The null hypothesis of this test states that OLS estimates are consistent. If the null hypothesis is rejected, OLS estimates are not consistent, and the simultaneous equation model (SEM) based on the two-stage least squares model (known as 2SLS or TSLS) should be used. In addition, the Sargan over-identification test is used to test the validity of instruments. According to the null hypothesis of this test, the instruments are valid. Thus, the null hypothesis of the Sargan test should not be rejected to use valid instruments. These two tests are available in Gretl and STATA software.

System 1 includes two simultaneous equations where the dependent variable of the first equation is sustainability measured by operational self-sufficiency (OSS), whereas breadth of outreach measured by the natural log of the number of active borrowers (LNAB) represents the dependent variable of the second equation. The control variables in the two equations are explained in Table 1, and ε_{it} is the error term of company i at year t .

System 1

$$\begin{aligned} OSS_{it} &= \alpha + \beta_1 LNAB_{it} + \beta_2 CAR_{it} + \beta_3 PAR_{it} + \beta_4 SIZE_{it} + \beta_5 FB_{it} + \varepsilon_{it} \\ LNAB_{it} &= \alpha + \beta_1 OSS_{it} + \beta_2 ROA_{it} + \beta_3 ROE_{it} + \beta_4 CAR_{it} + \beta_5 PAR_{it} + \beta_6 SIZE_{it} + \varepsilon_{it} \end{aligned}$$

System 2 is the same as system 1 after using depth of outreach measured by the average loan balance per borrower (LBB), instead of breadth of outreach.

System 2

$$\begin{aligned} OSS_{it} &= \alpha + \beta_1 LBB_{it} + \beta_2 CAR_{it} + \beta_3 PAR_{it} + \beta_4 SIZE_{it} + \beta_5 FB_{it} + \varepsilon_{it} \\ LBB_{it} &= \alpha + \beta_1 OSS_{it} + \beta_2 ROA_{it} + \beta_3 ROE_{it} + \beta_4 CAR_{it} + \beta_5 PAR_{it} + \beta_6 SIZE_{it} + \varepsilon_{it} \end{aligned}$$

Since the use of different proxies may result in diverse research findings (A.K. Kar, 2013), it might be useful to use outreach and sustainability indices, combining many variables, to measure MFIs' performance. Thus, in addition to using LNAB and LBB to measure outreach, and OSS to measure sustainability, the robustness of the findings could be checked using outreach index and sustainability index. Multi-criteria decision making (MCDM) technique is used to aggregate individual indicators into an outreach index to obtain composite outreach scores of MFIs. MCDM effectively addresses the uncertainty associated with decision making, especially when decisions are to be made in the presence of multiple decision criteria. For our study, the two-dimensional construct including both outreach breadth (LNAB) and depth (LBB) serves as multiple decision criteria. The technique of order preference by similarity to ideal solution (TOPSIS), a commonly used MCDM technique developed by Hwang and Yoon (1981), is used in the present study to combine the scores on individual indicators (criteria) to obtain a composite outreach score. TOPSIS is used to rank M alternatives/options on N attributes/criteria, where the score of each option is with respect to each criterion (Bhanot & Bapat, 2015).

To allow comparisons across criteria, normalized decision $M \times N$ matrix is constructed by normalizing the data as:

$$r_{ij} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^M (x_{ij})^2}}$$

Each element of the $M \times N$ matrix is represented by x_{ij} , $i \in M$; $j \in N$. Next a weighted normalization matrix is built so that each $v_{ij} = w_j r_{ij}$ where w_j represents the weight of the criteria j . As TOPSIS ranks the alternatives based on the ideal and negative ideal solution, so each criterion is either to be minimized or maximized depending on whether the values of the criteria should be high or lows (Bhanot & Bapat, 2015). So, while some criteria need to be maximized and others minimized, the positive ideal (A^*) and negative ideal (A^-) are defined as:

$$A^* = \begin{cases} \left(\max_j \right) v_{ij} & \text{i when criteria } j \text{ is to be maximized} \\ \left(\min_j \right) v_{ij} & \text{i when criteria } j \text{ is to be minimized} \end{cases} = \{v_1^*, v_2^*\}$$

$$A^- = \begin{cases} \left(\min_j \right) v_{ij} & \text{i when criteria } j \text{ is to be maximized} \\ \left(\max_j \right) v_{ij} & \text{i when criteria } j \text{ is to be minimized} \end{cases} = \{v_{1-}, v_{2-}\}$$

For instance, a positive ideal is the hypothetical MFI with the highest number of active borrowers, and lowest average loan balance per borrower (and vice versa to be called a negative ideal). Subsequently, the separation measure (distance) for each MFI from the positive ideal, S_{i^+} and negative ideal, S_{i^-} , would be calculated as:

$$S_{i^+} = \sqrt{\sum_{j=1}^2 [v_{ij} - v_j^*]^2}, \text{ for } i = 1, 2, \dots, n$$

And

$$S_{i^-} = \sqrt{\sum_{j=1}^2 [v_{ij} - v_{j-}]^2}, \text{ for } i = 1, 2, \dots, n$$

In the rare case of an MFI matching with the ideal solution for all its criterion values, its S_{i^+} will be 0 and S_{i^-} will be 1. Finally, for each MFI the relative closeness to the ideal solution is calculated as:

$$C_{i^+} = \frac{S_{i^-}}{S_{i^+} + S_{i^-}}, \text{ for } i = 1, 2, \dots, n$$

Having calculated the relative closeness of an alternative to the ideal solution, then the alternatives are all ranked accordingly. The best alternative is the one which is nearest to the positive ideal and farthest from the negative ideal. Also, it should be noted that in this study, the values of C_{i^+} (C_{1^+} to C_{n^+}) are the outreach scores of MFIs. When these scores are ranked in the descending order, they provide the desired ranking of the MFIs—the MFI closest to the positive ideal takes the top spot and the farthest one takes the lowest spot. Thus, using TOPSIS allows getting a relative ranking of the MFIs based on the distance from its positive ideal and negative ideal solutions and arriving at outreach scores of MENA countries' MFIs.

After reaching the scores of the outreach index (OI), the same procedures are repeated to construct the sustainability index. However, the scores of the sustainability index (SI) in this

study rely on three measures for financial performance: Operational self-sufficiency (OSS), return on assets (ROA), and return on equity (ROE). After getting the outreach and sustainability scores, system three is developed. The 2SLS could be conducted in this case to only identify the outreach index (OI) determinants as a dependent variable, whereas treating sustainability index (SI) as a dependent variable in this system is not allowed because the order condition is not fulfilled.

TOPSIS will be used to combine the scores on individual indicators (criteria) to obtain a composite outreach and sustainability score. A composite indicator (CI) of sustainability of each of the MFIs will be arrived at. The (CI) or the index of outreach and sustainability will be used to rank the MFIs in terms of their outreach and sustainability performance. Having obtained the composite sustainability score of MFIs, this study will perform 2SLS analysis to determine the factors affecting outreach and sustainability of MFIs in MENA countries.

The main goal of using (CI) is to explore MF's performance among MENA countries, which will help in examining the contribution of several MFIs in achieving social objectives, serving the needs of the low-income people, and achieving financial self-sufficiency and sustainability, in hopes of informing policies related to the microfinance sector.

System 3:

$$OI_{it} = \alpha + \beta_1 SI_{it} + \beta_2 CAR_{it} + \beta_3 PAR_{it} + \beta_4 SIZE_{it} + \varepsilon_{it}$$

$$SI_{it} = \alpha + \beta_1 OI_{it} + \beta_2 CAR_{it} + \beta_3 PAR_{it} + \beta_4 SIZE_{it} + \beta_5 FB_{it} + \varepsilon_{it}$$

Although simultaneous equation model is applied in A.K. Kar (2013) study based on instrumental variable approach to show the effect of sustainability on the depth of outreach, and not in the opposite direction, this study examines the bidirectional relationship between sustainability and outreach using 2SLS model. In addition, the study constructed sustainability and the depth of outreach indices based on confirmatory factor analysis and used them as the dependent variables. However, the dependent variables in this study are in index form only in the robustness checks, and TOPSIS method is used instead of factor analysis to construct the indices. Whereas MENA is one of the seven regions applied in the study, our samples are extracted only from MENA region. The period of the study is short and old (from 2000 to 2007), whereas the period of this study is from 1999 to 2018.

6. Results and discussion

6.1. Descriptive statistics

Table 3 shows the descriptive statistics for the variables used in the study. Referring to the table, on average, outreach index (OI) is 0.087, with a standard deviation of 0.106, suggesting that there are considerable variations between the sample institutions and/or years in social performance according to outreach. According to Table 2, some sampled MFIs are unsustainable and therefore can't cover their costs, referring to high deviation of operational self-sufficiency from the mean of 337.853, and very low mean of sustainable index of 0.001. Portfolio at risk for the past 30 days shows a mean of 6.28 percent. This value indicates loan default risk in the reveal sampled MFIs, which shows that the sampled MFIs are consistently matched and relatively encouraging. The minimum value of PAR30 is zero which also indicates low defaults rates as no loans were 30 days overdue. Also, size variable which is generated by taking natural log of total assets shows that about 15.986 percent of sampled MFI's assets are sufficient.

Additionally, the mean value for the average loan balance per borrower is approximately \$808.119, with a maximum average loan balance of \$14,152, a minimum average loan balance of \$33 and a standard deviation of 304. This means that MFIs from different MENA countries reach

Table 3. Descriptive Statistics

	N	Mean	Std. Deviation	Minimum	Maximum
SI	1399	0.001	0.0270	0.000	0.749
OSS	702	142.539	337.853	−43.310	8121.880
OI	725	0.087	0.106	0.057	1.000
LNAB	720	9.499	1.680	3.611	13.067
LBB	700	808.119	1130.827	33	14,152
FB	634	59.433	28.681	0.000	100
ROA	632	2.373	10.868	−87.980	32.820
ROE	633	−6.128	268.134	−6355.790	693.510
CAR	693	58.528	28.612	0.160	147.550
PAR	619	6.288	12.534	0.000	95.730
SIZE	718	15.986	1.667	8.659	19.784

poor clients. Average loan size can be used as a proxy of depth which reflects the relative volume of funds being supplied to an average borrower. The natural log of number of active borrowers for MFIs is 9.499 percent on average. The maximum percentage of borrowers is 13.067, while the minimum is 3.611. Most MFIs served mostly women as the average percentage of female borrowers is 59.433 percent. Additionally, some other MFIs served only women which is evident from the maximum percentage of female borrowers (100 percent), while some other MFIs served mostly men, which is represented by the minimum percent of female borrowers (0 percent). Average ROA and ROE in our sample are 2.373 percent and −6.128 percent, respectively, where the minimum values are −87.980 percent and −6355.790 percent and confirm that MFIs reported relatively no satisfactory financial performance over the study period. The mean value for the capital asset ratio is approximately 58.528 percent, with a maximum capital asset ratio of 147.550 percent, a minimum of 0.160 percent, and a standard deviation of 28.612 percent.

In addition, Table 4 presents the results related to three of unit root tests based on the intercept models. The null hypothesis of each one of these tests states that the variable's data have unit root. Therefore, to have stationary data, the null hypothesis should be rejected. All variables are defined in Table 1, except OI(d), which means the first difference of the outreach index (OI) variable. It is evident that all variables, except OI variable, have stationary data at the level of each variable, at the 1 percent significance level in at least one test out of the three tests employed. Thus, the stationarity of first difference of OI variable is tested. Table 3 shows that OI(d) variable is stationary at the 1 percent significance level in the three tests used. Therefore, the outreach index variable is used in the subsequent analyses in the first difference form.

7. Empirical results

Table 6 presents the results of 2SLS regression model for the two equations illustrated in system 1 in the methodology section. Sustainability measured by operational self-sufficiency (OSS) and breadth of outreach measured by the natural log of the number of active borrowers (LNAB) are the two dependent variables in this system. OLS estimates are not consistent, and 2SLS model should be used because the null hypothesis of Hausman test is rejected at the 1 percent significance level (P. value = 0.000, 0.000 in OSS and LNAB models, respectively). In addition, all instruments used are valid because the null hypothesis of Sargan over-identification test is not as shown in Table 5

It is evident from Table 6 that the relationship between OSS (sustainability) and LNAB (breadth of outreach) goes from breadth of outreach to sustainability, and not in the opposite direction. More specifically, all independent variables in the first model, where OSS is the dependent variable,

Table 4. Unit Root Tests

Variable	Levin, Lin, and Chu	Fisher-ADF	Fisher-PP
SI	−5.044*** (0.000)	225.045*** (0.000)	364.073*** (0.000)
OSS	−13.5564*** (0.000)	158.830*** (0.000)	200.695*** (0.000)
OI	6.596 (1.000)	56.493 (0.994)	46.385 (1.000)
OI(d)	−5.052*** (0.000)	148.302*** (0.000)	145.272*** (0.000)
LNAB	−6.074*** (0.000)	120.027** (0.013)	398.681*** (0.000)
LBB	−3.623*** (0.000)	81.271 (0.681)	121.485** (0.011)
FB	−8.061*** (0.000)	136.332*** (0.000)	177.214*** (0.000)
ROA	−5.954*** (0.000)	119.005*** (0.005)	317.592*** (0.000)
ROE	32.735 (1.000)	132.201*** (0.000)	215.518*** (0.000)
CAR	−8.237*** (0.000)	121.510** (0.015)	126.036*** (0.007)
PAR	−334.897*** (0.000)	128.087*** (0.001)	184.850*** (0.000)
SIZE	−6.883*** (0.000)	113.976 (0.102)	277.894*** (0.000)

Note: ***, **, * indicate significance at the 1 percent, 5 percent, and 10 percent, respectively, and the definition of variables is presented in Table 1.

Table 5. Hausman test and Sargan over-identification test

Test	Chi-Sq. Statistic	Prob.
Hausman test (OSS)	35.043	0.000
Hausman test (LNAB)	146.933	0.000
Sargan over-identification test	0.028	0.869

are significant at 1 percent significance level. However, in the second model, where LNAB is the dependent variable, all independent variables are insignificant in that model, as shown in Table 6. It means that increasing the number of borrowers would help the MFIs to reduce the average operating costs, and to improve their sustainability accordingly. This result is consistent with the study of Githaiga (2022) and means that increasing the number of borrowers would help MFIs to achieve economies of scale, reduce the average operating costs, and improve sustainability.

Whereas LNAB, CAR, and PAR variables have significant positive signs in the first model, SIZE and FB variables have negative ones. Capital-asset ratio (CAR) is used as an inverse measure for leverage in both outreach and sustainability models. The positive sign of CAR indicates less leverage and better assets quality and liquidity, lower credit risk, and higher sustainability. This result is consistent with Abu Wadi et al. (2022) in their study carried out in the MENA region. In addition, the negative sign of SIZE variable could be justified by the finding of Gibson's (2012) study, who found that young MFIs have larger number of active borrowers compared to matured ones. Consequently, sustainability could increase with the increase in the breadth of outreach. Moreover, the negative sign of the percentage of female borrowers (FB) variable is in line with Hermes et al. (2011) and Khan et al. (2016), who found that the focus on women clients increases the chances of lower rates of loan repayments, which adversely affects the sustainability of MFIs. However, the positive sign of portfolio at risk (PAR) variable is unexpected. Therefore, the analysis is repeated after excluding the PAR variable, and the same positive sign of LNAB variable is documented.

The significant positive impact of breadth of outreach (measured by LNAB) on sustainability (measured by OSS) supports the first sub-hypothesis (H1a). However, the insignificant impact of sustainability on depth of outreach rejects the second sub-hypothesis H2a. A positive relationship between breadth of outreach and sustainability may be justified due to the fact of economics of

Table 6. The Results of 2SLS Regression Model Using Sustainability and breadth of outreach as Endogenous Variables (System 1)

		Coef.	Std. Err.	T	P> t
OSS	LNAB	276.890	79.454	3.48	0.001***
	CAR	2.315	0.720	3.21	0.001***
	PAR	5.028	1.863	2.70	0.007***
	SIZE	-229.744	68.460	-3.36	0.001***
	FB	-4.167	1.271	-3.28	0.001***
	CONS	1267.810	393.782	3.22	0.001***
LNAB	OSS	-0.084	0.136	-0.62	0.538
	ROA	0.544	0.843	0.65	0.519
	ROE	0.000	0.002	0.21	0.833
	CAR	0.001	0.030	0.03	0.974
	PAR	0.042	0.112	0.38	0.707
	SIZE	0.722	0.446	1.62	0.106
	CONS	7.376	16.895	0.44	0.663

Endogenous variables: OSS, LNAB

Exogenous variables: CAR, PAR, SIZE, FB, ROA, ROE

Note: ***, **, * indicate significance at the 1 percent, 5 percent, and 10 percent, respectively, and the definition of variables is presented in Table 1.

scale, that cost advantages reaped by MFIs when lending become efficient. So reaching more borrowers (increasing number of borrowers) will increase the volume of sell; and increasing volume of sell is one method to boost profitability, and then financial sustainability (Kinde, 2012). Likewise, Kereta (2007) proves that outreach and financial sustainability are complementary. Since the number of borrowers increases, MFIs enjoy economies of scale and therefore decrease costs which improve their financial sustainability. The same argument, that increasing outreach and sustainability are complementary objectives since larger numbers of borrowers help MFIs attain economies of scale and reduce costs, was confirmed by some literature (Christen & Drake, 2002; Mersland & Strøm, 2010; Woller, 2000; Zerai & Rani, 2012). Also, Quayes & Khalily (2014) confirm that companies tend to be more efficient if they maximize the quantity of an output for certain quantity of inputs, i.e., operate at the lowest cost of inputs for a certain quantity of output.

Table 8 shows the results of 2SLS regression model for the two equations illustrated in system 2. Sustainability measured by OSS and depth of outreach measured by average loan balance per borrower (LBB) are the two dependent variables in this system. Table 7 All instruments used are also valid because the null hypothesis of Sargan over-identification test is not rejected.

Based on the results of Table 8, LBB (as an inverse measure for depth of outreach) significantly affects OSS (sustainability) with a negative sign, and OSS doesn't affect LBB. Consequently, hypothesis H1b – which shows the impact of depth of outreach on sustainability – should be accepted, and and hypothesis H2b -which shows the relationship in the opposite direction- should be rejected. To detail, in the first model which employs OSS as a dependent variable, LBB has

Table 7. Hausman test and Sargan over-identification test

Test	Chi-Sq. Statistic	Prob.
Hausman test (OSS)	33.756	0.000
Hausman test (LBB)	83.713	0.000
Sargan over-identification test	0.000	0.987

a significant negative coefficient at 1 percent significance level (P. value = 0.008). It means that sustainable institutions tend to have smaller average loan sizes, suggesting that pursuit of profit and outreach to the poor can go hand in hand. This result is consistent with the studies of Rahman and Mazlan (2014), Quayes (2015), Githaiga (2022), and Navin and Sinha (2021) who found that average loan balance per borrower, which is an inverse measure for depth of outreach, has a negative impact on the MFIs' sustainability.

In addition, FB variable has a significant negative sign, and variables CAR and SIZE have positive signs at the five percent significance level in this model as expected. However, all independent variables are insignificant in the second model which uses LBB as a dependent variable.

The previously mentioned results mean that on the one hand, outreach (both breadth and depth) significantly affects sustainability, which means accepting the first main hypothesis (H1). On the other hand, however, sustainability doesn't affect both dimensions of outreach. Thus, the second main hypothesis (H2) should be rejected. Furthermore, by rejecting the second hypothesis, the third hypothesis (H3), which suggests that the relationship between outreach and sustainability is bidirectional, should be rejected too.

Table 8. The results of 2SLS regression model using sustainability and depth of outreach as endogenous variables (System 2)

Two-stage least-squares regression

		Coef.	Std. Err.	T	P> t
OSS	LBB	−0.404	0.152	−2.66	0.008***
	CAR	2.119	0.889	2.38	0.017**
	PAR	1.877	1.567	1.20	0.231
	SIZE	37.562	15.987	2.35	0.019**
	FB	−4.756	1.873	−2.54	0.011**
	CONS	−6.691	205.040	−0.03	0.974
LBB	OSS	65.261	105.254	0.62	0.535
	ROA	−422.392	653.597	−0.65	0.518
	ROE	−1.353	1.774	−0.20	0.843
	CAR	−1.912	23.295	−0.08	0.935
	PAR	−42.176	87.190	−0.48	0.629
	SIZE	177.361	348.591	0.51	0.611
	CONS	−9312.725	13,124.760	−0.71	0.478

Endogenous variables: OSS, LNAB

Exogenous variables: CAR, PAR, SIZE, FB, ROA, ROE

Note: ***, **, * indicate significance at the 1 percent, 5 percent, and 10 percent, respectively, and the definition of variables is presented in Table 1.

8. Robustness checks

The validity of the previous findings are checks based on several ways as follows:

8.1 (I) Using outreach and sustainability indices

A.K. Kar (2013) argues that the use of different proxies may result in diverse research findings. Thus, it might be useful to use outreach and sustainability indices, combining many variables, to measure MFIs' performance. To check the sensitivity of results to the method used to measure the dependent variables used in the study, two indices are developed. The first one is the outreach index (OI) based on the natural log of the number of active borrowers (LNAB) and the average loan

balance per borrower (LBB) variables. The other one is the sustainability index (SI) relied on operational self-sufficiency (OSS), return on assets (ROA), and return on equity variables. The technique of order preference by similarity to ideal solution (TOPSIS) is used to develop both indices as described in the research methods section. Whereas the data of the outreach index (OI) is not stationary at their level, they are stationary at the first difference. As a result, the first difference of the OI variable is used in this study to express this variable.

OI and SI are the endogenous variables in system three presented in research methods. 2SLS could only be used to check the determinants of outreach index (OI), because the order condition of the sustainability index (SI) equation is violated. However, the null hypothesis of Hausman test, which says that OLS estimates are consistent, is not rejected because P value of that test (0.16159) is greater than five percent. Thus, 2SLS model is not the appropriate model in that case. Alternatively, the appropriate model could be pooled OLS, fixed effects, or random effects model. Based on the results of Hausman test for correlated random effects (P value = 0.9391), the best model is the random effects model. Table 9 shows the determinants of outreach index (OI) based on the random effects model.

The results of Table 9 confirm the main results that sustainability (measured here by SI) is not a significant determinant of outreach (measured here by OI). The only significant variable is SIZE with positive sign. Moreover, repeating the analysis using the components of the sustainability index (SI) i.e., OSS, ROA, and ROE, gives the same conclusion.

Table 9. The determinants of outreach index (OI) using random effects model based on 524 unbalanced firm/year observations

Variable	Coefficient	Std. Error	t-Statistic	Prob.
C	-0.064	0.024	-2.630	0.009
SI	-0.013	0.071	-0.183	0.855
CAR	0.000	0.000	-1.263	0.207
PAR	-0.0002	0.000	-1.301	0.194
SIZE	0.005	0.001	3.405	0.0007***

8.2. (II) Excluding MFIs with few data

The period of study extends from 1999 to 2018 with more than 20 years. Some MFIs have data for one or two years over this period, and the current study results may be sensitive to depending on the firms with few data. Therefore, the study is repeated after imposing a criterion that MFIs should have data for at least five years to be included in the sample (25 percent of the study period). This procedure resulted in excluding 14 MFIs from the sample (one in Egypt, six in Iraq, two in Lebanon, one in Syria, one in Palestine, two in Yemen, and one in Sudan), and the sample size is reduced from 70 to 56. The results are the same as the main ones. These results are not reported here for the sake of brevity.

8.3. (III) Changing the effects specification method

The 2SLS results shown in Tables 6 and 8 use pooled OLS as the effects specification method. However, the results may differ using the appropriate method. Therefore, the analyses in these tables are repeated after choosing the suitable method. The likelihood ratio test for redundant fixed effects is used to compare pooled OLS with fixed effects methods. The null hypothesis of this test states that the pooled OLS method is better. Thus, if the null hypothesis of this test is rejected, the fixed effects method is better. Then, Hausman test for correlated random effects is used to

compare fixed and random effects methods. If the null hypothesis of this test is not rejected, the random effects method is better. Otherwise, the fixed effects method is better. To save space, only the results are shown without details.

The 2SLS model is used based on the cross-section fixed effects to show the impact of outreach on sustainability. Breadth of outreach measured by the natural log of the number of active borrowers (LNAB) has the expected significant positive impact on sustainability measured by the operational self-sufficiency (OSS). The percentage of female borrowers (FB) and SIZE also have significant negative signs as in the main models. However, all independent variables in the model including depth of outreach (measured by the average loan balance per borrower (LBB)) are not significant. Therefore, outreach significantly affects sustainability but only through breadth of outreach.

The impact of sustainability (OSS) on breadth of outreach (LNAB) using 2SLS based on the cross-section fixed and period fixed methods shows that the only significant variable is SIZE with positive sign. In addition, all variables are insignificant in the model, indicating the impact of sustainability (OSS) on depth of outreach (LBB) using 2SLS based on the cross-section fixed method. These results confirm the insignificant impact of sustainability on outreach.

To sum up, the robustness checks confirm the significant impact of outreach on sustainability, and the insignificant impact in the opposite direction.

9. Summary and conclusions

Based on a sample from MENA region during the period from 1999 to 2018, this study is conducted to test the bidirectional relationship between sustainability and outreach. Operational self-sufficiency (OSS) is the proxy used to measure sustainability. In addition, outreach encompasses two dimensions, namely breadth and depth. Moreover, sustainability and outreach are regarded as endogenous variables because they are determined within the system. Consequently, the models of our study may be affected by the endogeneity problem. A simultaneous equation model (SEM) is conducted to consider this problem based on the two-stage least squares (2SLS or TSLS) regression.

2SLS regression results conclude that achieving outreach does not contradict with achieving sustainability. In other words, there is no trade-off between outreach and sustainability as they are complementary objectives. This result is consistent with the studies of Rahman and Mazlan (2014), Quayes (2015), Githaiga (2022), and Navin and Sinha (2021), among others, using different study sample. However, it contradicts with the argument that MFI's sustainability could be lower in MFIs with high depth of outreach because of their expected high transaction, administrative, monitoring, and/ or delegating costs. This contradiction could be attributed to the cultural differences between MENA region and other regions. According to Zainuddin et al. (2020), MENA countries have high power distance and uncertainty avoidance, and low individualism, which may justify the positive relationship between depth of outreach-sustainability. This positive relationship could also be analyzed from the cost efficiency perspective, as studied by Cozarenco et al. (2022) in their multinational study on 861 MFIs from 78 countries. The cost efficiency perspective needs further investigation in future studies on the MENA region.

Although the current study is applied to the same MENA region as the study of Abu Wadi et al. (2022), the conclusion is different. Both breadth and depth of outreach have an insignificant impact on sustainability measured by operational self-sufficiency in Abu Wadi et al. (2022) study. This could be attributed to ignoring the endogeneity problem in their study, which sheds light on the importance of facing the endogeneity problem using the simultaneous equation model (SEM).

This study contributes to the MFIs' literature, especially in MENA countries, by several means. First, it examines the bidirectional relationship between sustainability and outreach after considering the endogeneity problem based on SEM. Second, it covers the whole period available at MIX market database from 1999 to 2018. Third, the robustness of results is validated based on several means. Fourth, outreach and sustainability indices are developed using TOPSIS method. As far as the authors know, this is the first study in microfinance that creates an outreach index using this technique.

The complementarity of outreach and sustainability is very encouraging for both the welfarists who seek to employ MFIs to reduce poverty and institutionists who defend achieving financial sustainability. Research in that field could be continued by employing other measures for sustainability, outreach, and their indices using simultaneous equation model (SEM) to deal with the endogeneity problem. Additionally, examining the impact of corporate governance on sustainability and outreach requires more research. Finally, examining the impact of macroeconomic variables, lending methodology, and revenue diversification on the financial and social performance of MFIs requires more attention.

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References

- Abdulai, A., & Tewarib, D. D. (2017). Determinants of microfinance outreach in Sub-Saharan Africa: A panel approach. *Acta Commercii*, 17(1), 1–10. <https://doi.org/10.4102/ac.v17i1.414>
- Abrar, A., & Javaid, A. Y. (2016). The Impact of capital structure on the profitability of microfinance institutions. *South Asian Journal of Management Sciences*, 10(1), 21–37. <https://doi.org/10.21621/sajms.2016101.03>
- Abu Wadi, R., Bashayreh, A., Khalaf, L., & Abdelhadi, S. (2022). Financial sustainability and outreach in microfinance institutions: evidence from MENA countries. *Journal of Sustainable Finance and Investment*, 12(1), 238–250. <https://doi.org/10.1080/20430795.2021.1964814>
- Ahmed, I., Ibrahim, Y., & Minai, M. S. (2018). Capital structure and outreach nexus of microfinance institutions: New evidences from the society of Muslim economies. *SSRN Electronic Journal*. <https://doi.org/10.2139/ssrn.3278443>
- Alattas, N. F., & Tayachi, T. (2021). Microfinance in the Middle East and North Africa. *PalArch's Journal of Archaeology of Egypt/egyptology*, 18(13), 725–735.
- Anisul Islam, M., & Nasreen, F. (2018). The effects of capital structure on the performance of microfinance institutions in Bangladesh. *Journal of Business Studies*, XXXIX(1), 201–224. [https://fbs-du.com/news_event/191561027658\(Page%20201-224\).pdf](https://fbs-du.com/news_event/191561027658(Page%20201-224).pdf)
- Ario, A. (2020). *Lending methodologies, sustainability and depth of outreach of microfinance institutions in Indonesia*. [Unpublished doctoral dissertation]. Victoria University, Australia. https://vuir.vu.edu.au/42003/1/ARIO_Ario-thesis_nosignature.pdf
- Asteriou, D., & Hall, S. G. (2007). *Applied econometrics: A modern approach* (2nd ed.). Palgrave Macmillan.
- Bansah, E. D. (2021). *Examining potential linkages between sustainability and outreach: Perspectives from the microfinance sector of Ghana*. [Unpublished master's thesis], University of Pavia.
- Bayai, I., & Ikhida, S. (2016). Financing structure and outreach of selected SADC microfinance institutions (MFIs). *Corporate Ownership and Control*, 13(3continued2), 284–292. <https://doi.org/10.22495/cocv13i3c2p3>
- Bhanot, D., & Bapat, V. (2015). Sustainability index of Micro Finance Institutions (MFIs) and contributory factors. *International Journal of Social Economics*, 42(4), 387–403. <https://doi.org/10.1108/ijse-01-2014-0001>
- Blanco-Oliver, A., Reguera-Alvarado, N., & Veronesi, G. (2021). Credit risk in the microfinance industry: The role of gender affinity. *Journal of Small Business Management*, 59(2), 280–311. <https://doi.org/10.1080/00472778.2020.1844487>
- Brooks, C. (2008). *Introductory econometrics for finance* (2nd ed.). Cambridge University Press.
- Carrillo, N. R., & Reviakin, A. (2022). *Sustainable Finance in the MENA Region: State of Development, Challenges, and Opportunities*. Report of the SANAD Fund for MSMEs Technical Assistance Facility, November 2022.
- Christen, R. P., & Drake, D. (2002). The new reality of microfinance. In D. Drake & E. Rhyne (Eds.), *The commercialization of microfinance. Balancing business and development* (pp. 2–22). Kumarian Press.
- Churchill, S. A. (2018). Sustainability and depth of outreach: Evidence from microfinance institutions in sub-Saharan Africa. *Development Policy Review*, 36(1), 35–50. <https://doi.org/10.1111/dpr.12362>
- Churchill, S. A. (2020). Microfinance financial sustainability and outreach: Is there a trade-off? *Empirical Economics*, 59(3), 1329–1350. <https://doi.org/10.1007/s00181-019-01709-1>
- Churchill, S. A., & Marr, A. (2017). Sustainability and outreach: A comparative study of MFIs in South Asia and Latin America and the Caribbean. *Bulletin of Economic Research*, 69(4), 19–41. <https://doi.org/10.1111/boer.12100>

- Cozarenco, A., Hartarska, V., & Szafarz, A. (2022). Subsidies to microfinance institutions: How do they affect cost efficiency and mission drift? *Applied Economics*, 54(44), 5099–5132. <https://doi.org/10.1080/00036846.2022.2041176>
- Cull, R., Demirgüç-kunt, A., & Morduch, J. (2007). Financial performance and Outreach: A Global Analysis of Leading Microbanks. *The Economic Journal*, 117(517), F107–F133. <https://doi.org/10.1111/j.1468-0297.2007.02017.x>
- De Crombrughe, A., Tenikue, M., & Sureda, J. (2008). Performance analysis for a sample of microfinance institutions in India. *Annals of Public and Cooperative Economics*, 79(2), 269–299. <https://doi.org/10.1111/j.1467-8292.2008.00362.x>
- Efendic, V., & Hadziahmetovic, N. (2017). The social and financial efficiency of microfinance institutions: The case of Bosnia and Herzegovina. *South East European Journal of Economics and Business*, 12(2), 85–101. <https://doi.org/10.1515/jeb-2017-0018>
- Ek, S. (2011). *The implications of financial sustainability in the microfinance industry*. [Unpublished master's thesis], KTH Industrial Engineering and Management.
- El-maksoud, S. A. (2016). *Performance of microfinance institutions*. [Unpublished doctoral dissertation]. Cardiff Metropolitan University, Cardiff School of Management.
- Francis, M. E. (2013). Determinants of Commercial Bank Profitability in Sub-Saharan Africa. *IJEF*, 5(9). <https://doi.org/10.5539/ijef.v5n9p134>
- Gibson, A. B. (2012). Determinants of operational sustainability of micro finance institutions in Kenya. In *MBA. School of Business, University of Nairobi*, November 2012, 1–63.
- Githaiga, P. N. (2022). Revenue diversification and financial sustainability of microfinance institutions. *Asian Journal of Accounting Research*, 7(1), 31–43. <https://doi.org/10.1108/ajar-11-2020-0122>
- Gizaw, M., Kebede, M., & Selvaraj, S. (2015). The impact of credit risk on profitability performance of commercial banks in Ethiopia. *African Journal of Business Management*, 9(2), 59–66. <https://doi.org/10.5897/ajbm2013.7171>
- Hartarska, V. (2005). Governance and performance of microfinance institutions in Central and Eastern Europe and the Newly Independent States. *World Development*, 33(10), 1627–1643. <https://doi.org/10.1016/j.worlddev.2005.06.001>
- Hartungi, R. (2007). Understanding the success factors of micro-finance institution in a developing country. *International Journal of Social Economics*, 34(6), 388–401. <https://doi.org/10.1108/03068290710751803>
- Hermes, N., Lensink, R., & Meesters, A. (2011). Outreach and efficiency of microfinance institutions. *World Development*, 39(6), 938–948. <https://doi.org/10.1016/j.worlddev.2009.10.018>
- Hoque, M., Chishty, M., Holloway, R., & Hoque, M. (2011). Commercialization and changes in capital structure in microfinance institutions An innovation or wrong turn? *Managerial Finance*, 37(5), 414–425. <https://doi.org/10.1108/0307435111126906>
- Hulme, D., & Arun, T. (Eds.). (2009). *Microfinance: A reader*. Routledge.
- Hwang, C. L., & Yoon, K. (1981). *Multiple attribute decision making: Methods and applications*. Springer-Verlag. <https://doi.org/10.1007/978-3-642-48318-9>
- Kar, A. K. (2012). Does capital and financing structure have any relevance to the performance of microfinance institutions? *International Review of Applied Economics*, 26(3), 329–348. <https://doi.org/10.1080/02692171.2011.580267>
- Kar, A. K. (2013). Double bottom lines in microfinance: Are they mutually exclusive? *Journal of Small Business & Entrepreneurship*, 26(1), 87–107. <https://doi.org/10.1080/08276331.2012.761804>
- Kereta, B. (2007). *Outreach and financial performance analysis of Microfinance Institutions in Ethiopia*. African Economic Conference, Addis Ababa.
- Khachatryan, K., Hartarska, V., & Grigoryan, A. (2019). Performance and capital structure of microfinance institutions in eastern Europe and Central Asia. *Eastern European Economics*, 55(5), 395–419. <https://doi.org/10.1080/00128775.2017.1336064>
- Khalaf, L., & Saqfalhait, N. I. (2019). *Social outreach of microfinance institutions in Arab Countries*. The 9th International Economics Conference, April 2019, Yarmouk University, Irbid, Jordan. April 2019. <https://www.researchgate.net/publication/344173868>
- Khan, W., Naz, A., Shah, I., Khan, F., Alam, A., & Khan, N. (2016). Measuring mission drift in emerging economies: An evidence from Pakistan microfinance network. *Journal of Applied Environmental and Biological Sciences*, 6(6), 20–27.
- Kinde, B. A. (2012). Financial sustainability of microfinance institutions (MFIs) in Ethiopia. *European Journal of Business and Management*, 4(15), 1–10.
- Kyereboah-Coleman, A. (2007). The impact of capital structure on the performance of microfinance institutions. *Journal of Risk Finance*, 8(1), 56–71. <https://doi.org/10.1108/15265940710721082>
- Lislevand, C. J. (2012). *The effect of capital structure on microfinance institutions performance*. [Unpublished master's thesis], University of Agder.
- Long, G., & Marwa, N. (2015). Determinants of financial sustainability of microfinance institutions in Ghana. *Journal of Economics and Behavioral Studies*, 7(4), 71–81. [https://doi.org/10.22610/jeb.v7i4\(j\).595](https://doi.org/10.22610/jeb.v7i4(j).595)
- Louis, P., Seret, A., & Baesens, B. (2013). *Financial efficiency and social impact of microfinance institutions using self-organizing maps*. *World Development*, 46(1), 197–210. <https://doi.org/10.1016/j.worlddev.2013.02.006>
- Masood, O., Masood, O., & Ashraf, M. (2012). Bank-specific and macroeconomic profitability determinants of Islamic banks. *Qualitative Research in Financial Markets*, 4(2/3), 255–268. <https://doi.org/10.1108/17554171211252565>
- Mersland, R., & Strøm, R. Ø. (2010). Microfinance mission drift? *World Development*, 38(1), 28–36. <https://doi.org/10.1016/j.worlddev.2009.05.006>
- Meyer, R. (2002). *Track Record of Financial Institutions in Assisting the Poor in Asia*, Asian Development Bank (ADB). Research Paper Series No. 49
- Millson, H. F. (2013). *The trade-off between sustainability and outreach: the experience of commercial microfinance institutions* [Unpublished doctoral dissertation]. Haverford College.
- Narwal, K. P., & Yadav, M. K. (2014). Impact of Characteristics on Outreach and Profitability of Microfinance Institution in India. *International Journal of Financial Management*, 4(3), 50–57.
- Navajas, S., Schreiner, M., Meyer, R. L., Gonzalez-vega, C., & Rodriguez-meza, J. (2000). Microcredit and the poorest of the poor: Theory and evidence from Bolivia. *World Development*, 28(2), 333–346. [https://doi.org/10.1016/s0305-750x\(99\)00064-0](https://doi.org/10.1016/s0305-750x(99)00064-0)
- Navin, N., & Sinha, P. (2021). Social and financial performance of MFIs: Complementary or compromise? *Vilakshan - XIMB Journal of Management*, 18(1), 42–61. <https://doi.org/10.1108/xjm-08-2020-0075>
- Nyanzu, F., Peprah, J. A., & Ayayi, A. G. (2019). Regulation, outreach, and sustainability of microfinance

- institutions in Sub-Saharan Africa: A multilevel analysis. *Journal of Small Business Management*, 57 (sup2), 200–217. <https://doi.org/10.1111/jsbm.12467>
- Osotimehin, K. O., Jegede, C. A., & Akinlabi, B. H. (2011). Determinants of microfinance outreach in South-Western Nigeria: An empirical analysis. *International Journal of Management and Business Studies*, 1(1), 001–007.
- Parvin, S. S., Hossain, B., Mohiuddin, M., & Cao, Q. (2020). Capital structure, financial performance, and sustainability of micro-finance institutions (MFIs) in Bangladesh. *Sustainability (Switzerland)*, 12, 15. <https://doi.org/10.3390/su12156222>
- Perera, S., Skully, M., & Chaudrey, Z. (2012). Determinants of Commercial Bank Profitability: South Asian Evidence. *AJFA*, 5(1). <https://doi.org/10.5296/ajfa.v5i1.3012>
- Pollinger, J. J., Outhwaite, J., & Cordero-Guzmán, H. (2007). The question of sustainability for microfinance institutions. *Journal Of Small Business Management*, 45(1), 23–41. <https://doi.org/10.1111/J.1540-627X.2007.00196.X>
- Ponce, L. A., Rocha, A. R., & Navarro, R. P. (2021). A causality approach in the analysis of the trade-off between financial sustainability and Outreach. *Finance Research Letters*, 42, 101920. <https://doi.org/10.1016/j.frl.2021.101920>
- Quayes, S. (2015). Outreach and performance of micro-finance institutions: A panel analysis. *Applied Economics*, 47(18), 1909–1925. <https://doi.org/10.1080/00036846.2014.1002891>
- Quayes, S., & Khalily, M. A. (2014). Efficiency of Microfinance Institutions in Bangladesh. *Economics Bulletin*, 34(3), 1512–1521.
- Rahman, M., & Mazlan, A. (2014). Determinants of financial sustainability of microfinance institutions in Bangladesh. *International Journal of Economics and Finance*, 6(9), 107–116. <https://doi.org/10.5539/ijef.v6n9p107>
- Rai, A. A., & Rai, S. (2012). Factors affecting financial sustainability of microfinance institutions. *Journal of Economics and Sustainable Development*, 3(6), 1–9.
- Ramírez Rocha, A., Cervantes Zepeda, M., & Bernal Ponce, L. A. (2019). The determinants of outreach and profitability in MFI's: A structural equation approach. *REMEF*, 14(1), 129–146. <https://doi.org/10.21919/remef.v14i1.363>
- Reichert, P. (2018). A meta-analysis examining the nature of trade-offs in microfinance. *Oxford Development Studies*, 1–23. <https://doi.org/10.1080/13600818.2018.1427223>
- Sebhatu, K. T. (2011). Management of savings and credit cooperatives from the perspective of outreach and sustainability: Evidence from Southern Tigray of Ethiopia. *Research Journal of Finance and Accounting*, 2(7/8), 10–23.
- Shahzad, U. B. (2015). *Performance Measurement of South Asian Microfinance Institutions*. [Unpublished doctoral dissertation]. Massey University, Newzeland.
- Towo, N., Mori, N., Ishengoma, E., & McMillan, D. (2019). Financial leverage and labor productivity in microfinance co-operatives in Tanzania. *Cogent Business & Management*, 6(1). <https://doi.org/10.1080/23311975.2019.1635334>
- Vichore, S., & Deshpande, S. (2012). Microfinance in India- A comprehensive analysis of the growth and performance of MFI's. *The International Journal's Research Journal of Social Science and Management*, 2(1), 51–56.
- Wagenaar, K. (2012). Institutional Transformation and Mission Drift in Microfinance. *Working paper of the centre of development studies*. University of Cambridge.
- Wasiaturrehman, A. S. R., Sari, T. N., Sari, T. N., Hudaifah, A., & Hudaifah, A. (2020). Breadth and depth outreach of Islamic cooperatives: Do size, non-performing finance, and grant matter? *Heliyon*, 6(7), e04472. <https://doi.org/10.1016/j.heliyon.2020.e04472>
- Woller, G. (2000). *Poverty lending, financial self-sufficiency, and the six aspects of outreach*. The SEEP Network: Poverty Lending Working Group.
- Wooldridge, J. M. (2013). *Introductory econometrics: A modern approach* (5th ed). South-Western, Cengage Learning.
- Zainuddin, M., Mahi, M., Akter, S., & Yasin, I. M. (2020). The role of national culture in the relationship between microfinance outreach and sustainability: A correlated random effects approach. *Cross Cultural & Strategic Management*, 27(3), 447–472. <https://doi.org/10.1108/CCSM-12-2019-0219>
- Zainuddin, M., & Yasin, I. M. (2019). The trade-off debate in microfinance: A review of the theoretical and empirical literature. *Enterprise Development and Microfinance*, 30(1), 36–54. <https://doi.org/10.3362/1755-1986.18-00027>
- Zerai, B., & Rani, L. (2012). Is there a tradeoff between outreach and sustainability of micro finance institutions? Evidence from Indian microfinance institutions (MFIs). *European Journal of Business and Management*, 4(2), 90–98.



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