

# Does Digitization Affect Social and Financial Performance in Microfinance Institutions?

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## Abstract

This research aims to explore the effects of the digitization of microfinance institutions (MFIs) on their social and financial performances, and on the trade-off between them given the double mission pursued by these institutions. To reach this objective, we performed ordinary least squares (OLS), logit, and two-stage least squares (2SLS) regressions on a sample of 331 microfinance institutions from the ATLAS database. Findings reveal evidence of significant mixed effects of digitization on social and financial performance indicators. They also show that there is no significant effect of digitization on trade-offs. The novel aspect of this research lies in the approach used to measure social performance which is proxied by the SPI4 -Social Performance Indicators- developed by Cerise and Social Performance Task Force (SPTF), while previous research on the topic have used social mission outcomes indicators. The SPI4 tool allows financial service providers to evaluate the implementation of Universal Standards for Social Performance Management (USSPM). This study also provides evidence on the effect that digitizing MFIs operations may have on trade-off between their social and financial performances. The findings have significant implications for institutions, especially on the way they can implement and interconnect their digitization process, USSPM and financial strategy. Firstly, the significant effect of digitization on social performance reveals synergies between the adoption and use of digital solutions and the implementation of good practices of SPM. Secondly, the mixed effects of adopting digital solutions on financial performance suggest that while this process appears to drive efficiency within institutions, it does not necessarily improve their profitability, since capital expenditure appears to increase more than profits. Finally, since digitization does not appear conducive to trade-off, MFIs should better align their financial and investment strategy with their social objectives when going digital.

## Keywords

digitization, microfinance, social performance, financial performance, trade-offs

## JEL classification

G21, G23, O33

## Introduction

From the outset, microfinance has been considered an effective way of addressing the problem of financial exclusion as it promotes the financial inclusion of segments of populations excluded from the mainstream financial system, namely low-income people, women,

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and people living in rural areas (Mersland et al., 2019; Mersland & Strøm, 2010) by providing them with tailored financial services. Over the years, several types of products, services, and solutions have been developed to meet their needs. These services and solutions include group lending with joint liability, savings groups, micro-insurance, life insurance, remittances, microfinance plus services (non-financial services), and so on (Armendariz & Labie, 2011; Gonzales et al., 2021; Kast et al., 2018; Labie, 2009; Lensink et al., 2018; Morduch, 1999; Platteau et al., 2017).

These solutions have contributed to the achievement of the purpose of microfinance regarding financial inclusion, namely, the achievement of positive social impacts by providing financial services to poor individuals or households who are excluded from the formal financial system (Hermes & Hudon, 2018), while maintaining financial sustainability (Bassem, 2009; Schreiner, 2002).

Thus, over the years, innovations in the microfinance industry have led to the provision of new solutions, notably digital services, through new technologies designed to better meet the needs of its target population (Disse & Sommer, 2020). Moreover, with the view of adapting themselves as effectively as possible to the changing realities, microfinance institutions have started digitalizing themselves (Ashta, 2018; Dorfleitner et al., 2022; Siwale & Godfroid, 2021).

The use of digital technology has demonstrated several benefits in many sectors (Arena, 2018; Maiti & Kayal, 2017). In the banking sector, digitalization can help mitigate risks and cope with crises (Romdhana, 2021). The integration of digital solutions can also increase banks' efficiency and competitiveness and boost their investments (Aguayo & Ślusarczyk, 2020). The positive effects of these solutions on bank performance and efficiency have been demonstrated (Forcadell et al., 2020). Banks offering digital services often see their profitability rise (Theiri & Hadoussa, 2023). The existence of a positive correlation between digitalization and banks' financial performance has also been highlighted in many studies (Chhaidar et al., 2022; Doran et al., 2022; Scott et al., 2017; Stefanovic et al., 2021; Theiri & Hadoussa, 2023).

In the microfinance industry, since the benefits of digitization are recognized for both beneficiaries and institutions (AFI, 2018; Hu et al., 2019), it appeared necessary to assess the extent to which this phenomenon might interact with performance in view of the double mission pursued by these institutions. However, only a few studies have examined this relationship. Moreover, these research works have come up with a variety of results and have used

conventional indicators to measure performance (Das & Laha, 2021; Dorfleitner et al., 2022; Yawouo, 2020). For social performance in particular, proxies used in these studies have not considered the whole process through which impact is generated. This is the case for the study by Dorfleitner et al. (2022), examining the relationship between performance in microfinance and the adoption of digital solutions and using share of female borrowers and average loan size as proxies for social performance. Since these measurements showed some limitations, there is a need to examine the effect of digitization on MFIs' performance using indicators considering the whole process, as synergies may exist between the social management process and digitization. This can help determine whether the changes brought by digitalization affect the social and financial performance of MFIs.

In this regard, the present study aims to complement previous research by using new data on MFIs digitization worldwide, with the objective of filling the gap in the literature on the relationship between microfinance and digitization. As mentioned, one of the main particularities of this study lies in the approach used to measure social performance. This approach differs from previous works using the social outreach of MFIs as an indicator of social performance. This one examines whether digitization may affect the level of implementation of universal standards of social performance management using the global score of the Social Performance Indicator Initiative (SPI) as a proxy for social performance. This indicator considers social performance from the perspective of its management, focusing on the practices implemented by institutions to achieve their outcomes (outreach), rather than looking solely at these outcomes as with conventional social performance indicators, such as the number of women borrowers (Bauwin, 2019). For financial performance, we use the operating expense ratio and return on assets as measurements. Although, digitization seems to reduce transaction costs (AFI, 2018; Wyman, 2011), the evidence of the profitability of MFIs when they go digital remains unclear since previous research as the one by Yawouo (2020) reveals that the use of information and communication technologies (ICTs) may have a negative effect on financial performance.

In addition to analyzing the effects of digitization on both financial and social performances separately, the major contribution of this study is to determine whether digitization entails trade-off between social and financial performance or not. Trade-offs occur when MFIs are not able to reach financial sustainability when they achieve their social goals or vice versa (Awaworyi Churchill, 2020). Therefore, this research examines

whether digitized MFIs are more likely or not to be both socially and financially performant.

The findings of this study may contribute to the literature on the linkages between digitization, micro-finance social and financial performance, and trade-offs while also providing insights to policymakers.

## Digitization and Performance in Microfinance

### *Digitization in Microfinance*

Microfinance is a dynamic industry, often integrating new products and services for the following reasons: fully achieving its mission, providing an adequate response to the problem of financial exclusion, and facing changes.

In the age of new technologies, the microfinance industry has adopted these innovations to run its activities and microfinance institutions have started going digital. Digitization in the microfinance sector refers to the use of new technological tools to offer services that are tailored to clients' needs (Manyika et al., 2016; Ozili, 2018) for better financial inclusion. It also refers to integrating technology into the way institutions are managed (Kaicer, 2020; Pytkowska & Korynski, 2017), as well as into their operations (Mia, 2020). Concretely, the digitization of MFIs implies on the one hand, the provision of digital financial services to clients (Dorfleitner et al., 2019), and on the other hand, the use of technological tools or digital solutions to carry out day-to-day management activities (Mia, 2020; Pytkowska & Korynski, 2017; Siwale & Godfroid, 2021; Yawouo, 2020). This involves introducing technological tools into internal procedures, customer relationship management, and service provision (Pytkowska & Korynski, 2017).

In practice, as part of their digitalization, MFIs can either digitize existing products and services as well as their procedures, offer new digital services, integrate digital solutions into their management and operations, or establish partnerships with other digital financial service or FinTech providers (AFI, 2018). Thus, a digitalized MFI is either one that uses technology in its day-to-day management, one using technology to offer services to its clients, or one doing both (Ashta, 2018; Pytkowska & Korynski, 2017; Siwale & Godfroid, 2021).

Owing to new technologies, microfinance institutions can provide their clients with online lending/digital loans, mobile applications, mobile payment methods, other mobile financial services, savings, and so on (Bharadwaj et al., 2019; Dorfleitner et al., 2019). As part of their management, they use computers, management and accounting software, credit scoring

tools, tablets, phones, management information systems (MIS), and even blockchains for data validation (Ashta, 2018; Moro-Visconti, 2021; Ozili, 2018; Siwale & Godfroid, 2021; Yawouo, 2020).

With regard to its operationalization, digitalization within microfinance institutions may include: use of Automated Teller Machines (ATM), mobile banking, mobile money (Pytkowska & Korynski, 2017; Siwale & Godfroid, 2021; Yawouo, 2020), use of credit scoring tools (Ashta, 2018; Pytkowska & Korynski, 2017; Siwale & Godfroid, 2021), introduction of online loan application, use of social media, internet banking and applications, cloud computing, crowdfunding platforms (Pytkowska & Korynski, 2017), collaboration with agent network (Siwale & Godfroid, 2021), use of digital solutions to deliver services (mobile phones, tablets, laptops) and enable clients to access information through mobile applications and website (Pytkowska & Korynski, 2017), use of information and communication technologies (ICTs) software, hardware and computers (Weber et al., 2012; Yawouo, 2020), use of internet and website (Yawouo, 2020).

The upward trend in the number of digitized MFIs and the number of digital solutions adopted suggests many benefits resulting from the digitization of MFIs. The use of digital solutions reduces transaction costs (AFI, 2018; Siwale & Godfroid, 2021) and improves MFIs' efficiency and risk management (AFI, 2018; Dorfleitner et al., 2019; Mia, 2020). In addition to the benefits for digital financial service providers, there are also many benefits for users, according to Ozili (2018).

Besides their benefits, some studies have also highlighted their drawbacks. According to Siwale and Godfroid (2021), digitalization weakens the relationship between clients and field agents, in this case, loan officers. This could make repayment more difficult and deteriorate the loan portfolio quality. There are also some risks related to clients' data privacy when MFIs are digital (AFI, 2018).

### *Performance in Microfinance*

Since the double bottom line is at the heart of micro-finance, MFIs pursue two objectives, social and financial ones (Ahmad et al., 2020; Armendariz & Labie, 2011; Bassem, 2012). While the social mission of microfinance institutions is offering financial services to the poor to bring them out of financial exclusion, their financial objectives consist of ensuring financial viability and self-sufficiency (Ahmad et al., 2020; Bassem, 2009; Hermes & Hudon, 2018; Schreiner, 2002).

The large debate in the microfinance literature on the simultaneous achievement of social and financial goals is at the origin of the concept of the microfinance

schism (Morduch, 1999). Two approaches are at the heart of the discussions and focus on the fight against poverty advocated by welfarists (Hashemi & Rosenberg, 2006) and on the financial sustainability or self-sustainability approach advocated by institutionalists (Bassem, 2012). While the first argue that microfinance should target very poor clients in order to bring them out of poverty by providing them with loans at subsidized interest rates (Schreiner, 2002), others argue that it is necessary for microfinance programs to be financially sustainable by targeting wealthier or less poor clients who are likely to bear higher interest rates (Hashemi & Rosenberg, 2006; Labie & Mees, 2005; Littlefield & Rosenberg, 2004; Zeller & Meyer, 2003). According to Noël and Ayayu (2009), MFIs do not have to choose between their social mission and consolidation of their funding sources. The latter must be viewed as a means of serving social mission.

This debate has led researchers to wonder about a possible trade-off between social and financial performance. Some authors have highlighted the existence of a trade-off (Cull et al., 2011; Ghosh & Tassel, 2008; Hermes et al., 2011). Other studies have not found any correlation between the two (Bassem, 2012; Lebovics et al., 2016; Meyer, 2019) or suggested synergies between financial and social performance instead of a trade-off.

According to Reichert (2018), the indicators used to measure performance may also determine the evidence of a trade-off. While the achievement of financial mission is relatively easy to measure using indicators, it is much more complex to evaluate social performance. Regarding financial performance indicators, the use of efficiency indicators tends to increase the likelihood of identifying a trade-off, whereas the use of risk indicators tends to decrease it. For social performance indicators, a trade-off is more likely to be confirmed in studies using the depth of outreach indicator, which is one of the two usual proxies for the social performance of MFIs. The depth of outreach is measured by loan size per borrower (Hossain et al., 2020) and/or the proportion of female and rural clients (Armendáriz & Szafarz, 2011; Mersland & Strøm, 2009, 2010; Quayes, 2019). The other usual proxy for social performance is the breadth dimension, commonly measured by the number of loans or active borrowers (Mersland & Strøm, 2009, 2010). Many studies have only focused on these two dimensions when examining social performance (Schreiner, 2002).

Nevertheless, as argued by Copestake (2007) and Beisland et al. (2021), these indicators have some limitations and have been criticized in the literature (Hermes & Hudon, 2019). They consider only one dimension of social performance and aspects related to

credit operations such as average loan size and the number of women borrowers (Bédécarrats et al., 2012; Hermes & Hudon, 2019). According to Hermes and Hudon (2019), they only offer a highly imprecise and indirect gauge of the extent to which MFIs fulfill their poverty reduction objectives, while social performance should consider the entire process through which an impact is generated (Hashemi, 2007). According to Elbakouchi et al. (2021), the measures of social performance should integrate an a priori approach that considers the means that MFIs use to reach their social objective and an a posteriori approach to measure the social performance of MFIs as perceived by its stakeholders, namely through the implementation of satisfaction surveys.

The a priori approach relates with the recently developed concept of Social Performance Management (SPM) in microfinance, referring to the work achieved by the Social Performance Task Force (SPTF), who has developed the Universal Standards for Social Performance Management (USSPM) (Beisland et al., 2021; Sene, 2020). These standards enable microfinance institutions to identify the level of achievement of the social objectives they have set and to put in place appropriate management practices to achieve them. According to Sene (2020), the introduction of SPM practices helps MFIs improve their targeting, adapt, and improve their services, better support the poorest, and reduce the risk of mission drift. The USSPM was first structured around six dimensions (Wardle, 2017): social objectives (US1), social commitments (US2), analysis of customer needs and preferences (US3), responsibility to customers (US4), responsibility to employees (US5), balance between financial and social performance (US6). Recently, an additional dimension has been added, namely environmental performance management (US7) (CERISE & SPTF, 2022). Each of these dimensions encompasses good practices of social performance management.

Various tools can be used to identify the USSPM level of implementation within MFIs, but Sene (2020) mentions that social audit is the most used tool. To this regard, the Social Performance Indicator Initiative (SPI) is considered to be the leading audit tool for social performance in microfinance (Mader, 2017; Pierna Sierra et al., 2020). It was developed by Cerise in 2001 and was updated in 2014 in its fourth version (SPI4) to fully align with the Universal Standards for Social Performance Management. These standards do not dictate the specific social objectives that an MFI should have but identify the management practices that enable it to progress towards its chosen objectives. The multidimensional concept of social performance management can overcome the weaknesses of



indicators previously used to measure the social performance of MFIs through their breadth and depth dimensions. [Hermes and Hudon \(2019\)](#) argue that this tool is a more advanced, complex, and holistic measure of social performance that will enable researchers to better analyze social performance. The tool is composed of various constantly updated questions about MFIS' operations. With this tool, MFIs have the opportunity to self-assess how they implement social performance outcomes ([Hermes & Hudon, 2019](#)). Furthermore, research considering this tool as proxy for social performance, have come up with satisfactory findings providing relevant insights. However, only a few studies ([Bauwin, 2019](#); [Bédécarrats et al., 2012](#)) used the SPM approach to measure social performance, as this approach is more recent than the result-based approach.

### *Impact of Digitization on Microfinance Performance*

In recent years, financial institutions have become increasingly digital, and microfinance institutions are no exception. There are several reasons why MFIs digitize their operations, among which improving financial inclusion, enhancing management practices, improving communication and customer service, improving repayment rates, create value, generating more income ([Geeta & Sivanand, 2020](#); [Kumar et al., 2010](#); [Pytkowska & Korynski, 2017](#)), and so on. In addition to these benefits, digitization may improve the performance of MFIs. To this end, previous research reveal that the adoption of digital solutions may affect both financial and social performance within institutions. This was the case for [Hartarska and Nadolnyak \(2008\)](#) and [Cull et al. \(2009\)](#) research, indicating that ICTs can also help improve the performance of MFIs.

Regarding its effect on social performance, adopting digital technology can enable MFIs to achieve their social mission. According to [Attali and Yann \(2007\)](#), the use of ICTs leads to an increase in outreach, and its adoption can lead to poverty reduction and better access to financial services ([Dorfleitner et al., 2019](#); [Mushtaq & Bruneau, 2019](#)). Digitizing operations can facilitate the provision of many small loans at lower cost to poor clients, women and rural communities ([Dorfleitner et al., 2022](#)), and thus contribute to MFIs' outreach. Furthermore, the use of digital tools can make it easier to monitor both activities and results and therefore, the achievement of social objectives as well as the integration of some of the USSPM. Considering digitization as a tool for management activities within institutions, evidence from [Yawouo \(2020\)](#) reveals that

the use of computers, the Internet and intranet by MFIs would improve their social performance. Other studies also support the argument of the positive relationship between digitization and social performance ([Dorfleitner et al., 2019, 2022](#)). In the light of these evidence, we formulate the following hypothesis:

**H1:** Digitization is positively related to social performance of microfinance institutions.

Besides, the integration of digital technology has the potential of enhancing some dimensions of financial performance such as efficiency, profitability and portfolio quality ([Dorfleitner et al., 2019](#); [Yawouo, 2020](#)). This can be possible through better cost management and thus more cost-efficiency, more profit and reduction of information asymmetry for lowering loan losses ([Benami & Carter, 2021](#); [Dorfleitner et al., 2022](#)). Findings of some studies show that the use of digitization for providing services to clients, notably through mobile banking, leads to a decrease in MFIs' operating costs and, therefore, to a decrease in interest rates for clients ([Kumar et al., 2010](#); [Wyman, 2011](#)). ICTs adoption may also enable an increase in the volume of operations and therefore, achieves economies of scale. This may enhance profit for the institutions and lower costs for their clients. Especially in developing countries, research findings indicate that the use of mobile banking technology makes MFIs more efficient ([Hanafizadeh et al., 2014](#); [Mishra & Bisht, 2013](#); [Shaikh & Karjaluo, 2015](#)). In the same vein, [Mathur and Ambani \(2005\)](#) show that the use of ICTs reduces risks and transaction costs and enhances transparency in MFIs in the Indian context. Considering MFIS' sustainability, [Das and Laha \(2021\)](#) highlight the existence of a positive and significant influence of ICTs on sustainability. However, when used by institutions as part of their internal procedures and management activities, digital solutions may have a negative effect on financial performance according to [Yawouo \(2020\)](#). Although previous studies reveal mixed effects of digitization on financial performance and the lack of consensus, we formulate the following hypothesis given that most of research have highlighted the positive effects:

**H2:** Digitization is positively related to financial performance of microfinance institutions.

Digitization, either product or process, has the potential to boost total factor productivity ([Anderton et al., 2023](#); [Gal et al., 2019](#); [Schubert et al., 2023](#); [Wang, 2023](#)) by overcoming the limitation of physical resources and increasing factor allocation efficiency

(Wang, 2023), at least in a medium run since it requires implementation costs and the development of staff's skills in the short run (Kohtamäki et al., 2020). By accelerating data flow and analysis of large quantities of information, it can also limit information asymmetry (Chen et al., 2022), what may lead to an increase in productivity (Wang, 2023). However, as mentioned by Anderton et al. (2023, 2), digitization is not “a ‘one-size-fits-all’ strategy that manage to deliver productivity gains to all firms alike”. Since productivity is reflected in MFIs' performance, synergies may exist between digitization and performance. This can be summarized by the following Cobb-Douglas function:

$$Y = A.K^{\alpha}.L^{\beta}.T^{\varphi}$$

where Y represents total productivity reflected in performance, and T accounts for technology or digital solutions.

For institutions offering technology-enabled services to their clients and simultaneously integrating technological tools into their day-to-day management, Weber et al. (2012) analyze the impact of ICTs on microfinance in Latin America. They find that the adoption of ICTs by MFIs leads to an increase in their depth of outreach and proximity to remote clients and to the improvement of their financial performance. While software tools were revealed to have an impact on financial performance, hardware, such as telephones and infrastructure, affected social performance. According to Dorfleitner et al. (2022), digitized MFIs can provide their clients with smaller loans without compromising their profitability, and thus achieve their social and financial objectives. Furthermore, since digitization should increase both financial and social performances according to the empirical evidence on the relationship between performances and adoption of digital solutions (Cull et al., 2009; Hartarska & Nadolnyak, 2008; Hermes et al., 2011), this indicates that digitization may enable to reduce such performances' trade-off. Therefore, we suggest the following hypothesis.

**H3:** Digitization reduces the likelihood of microfinance institutions experiencing a trade-off between social and financial performances.

## Data and Methodology

The data used in this study were obtained from a preliminary version of the Atlas<sup>1</sup> database, which collects data from more than 3000 microfinance institutions worldwide. These data focus on institutions in different regions and countries, and provide

information on a range of institutional issues, including financial and social performance as well as digitization aspects. We worked with a sample of 331 institutions selected on the basis of the availability of information on the use of digital solutions, the SPI4 score, and those with the highest scores for reliability of information with respect to social and financial performance data. This information is considered as cross-sectional data since they have been reported in 2022, even though they cover the period from 2016 to 2022.

To determine whether digitization affects MFIs social and financial performance, we used SPI4 global score (without the environmental dimension, namely US7 in Model 1 and including US7 in Model 2) to measure social performance. The SPI4 global score represents the average score of all USSPM dimensions. It is best suited for our analysis, as it measures social performance in the approach of its methodology instead of its results. This approach is relevant for this study, as we consider digitization as a process at the same level as USSPM, and expect specific results. Moreover, we assume that digitization may facilitate the implementation of USSPM dimensions, and that digitized MFIs may have a good level of USSPM implementation. Regarding financial performance, we consider the MFIs operating expense ratio (OER) (Model 3) and return on assets (ROA) (Model 4), as proxies for financial performance, with a high operating expense ratio corresponding to lower financial performance and high return on assets to higher financial performance. We also consider a trade-off between social and financial performance in MFIs as a dependent variable to determine if digitized MFIs are not more likely to be financially and socially performant at the same time (Model 5). We regress these dependent variables on the use of digital solutions as explanatory variable following the Cobb-Douglas model presented above that we linearized in removing irrelevant factors. We add to this model some control variables often used in the microfinance literature (Bauwin, 2019; Dorfleitner et al., 2022) such as type of institutions (TYPE) with a focus on non-banks financial institutions or NBFI, their size (SIZE), their location region (REG) with a focus on institutions from Sub-Saharan Africa, lending methodology (IND), and operating area (URB). This is in line with the model developed by Dorfleitner et al. (2022) in the analysis of the relationship between performance and digitization. We test this relationship on the following models, using these methods:

(1) OLS:

$$Y_i = \beta_0 + \beta_1 X_i + \beta_2 W_i + \varepsilon$$

(2) 2SLS:

$$\begin{cases} Y_i = \beta_0 + \beta_1 \beta X_i + \beta_2 \beta W_i + \varepsilon \\ X_i = \omega_0 + \omega_1 Z_1 + \omega_2 Z_2 + \varepsilon \end{cases}$$

(3) Logit since the dependent variable trade-off (TOFF) is a binary variable:

$$Y_i = \beta_0 + \beta_1 \beta X_i + \beta_2 \beta W_i + \varepsilon$$

$$L(Y_i) = \begin{cases} 1 & \text{if } Y_i > 0 \\ 0 & \text{if } Y_i \leq 0 \end{cases}$$

$Y_i$  represents dependent variables: social performance (SP) measured by the SPI4 global score first with six dimensions (Model 1) and then with seven dimensions (Model 2), financial performance (FP) measured first by OER (Model 3) and then by ROA (Model 4) and trade-off (TOFF) (Model 5); while  $X$  refers to the independent digit variable;  $W$  to vector of control variables; and  $Z$  to instruments.  $L(Y_i)$  is the likelihood of TOFF.

Table 1 presents descriptive statistics of the variables used in the models. It shows that the operating expense ratio and return on assets of the MFIs of the sample are 22% and 29% on average, respectively, while their average SPI4 global score reaches 69 out of 100 and 61 out of 100 when including the environmental dimension. This global score is the average of the scores obtained for all the dimensions. Each dimension was scored on a scale of 100.

Since we suspect a possible reverse causality between all the dependent variables in our models and the independent variable “Digit”, and since this causality could conceal an endogeneity problem for the digit variable, OLS estimators are no longer consistent. Thus, we conduct further regressions using instrumental variables (IV) methods, namely two-stages least squares (2SLS) for social and financial performance and Ivprobit for trade-off. To do this, we instrumented the explanatory variable assumed to be endogenous. The chosen instruments – digital applications for staff and mobile loan disbursement or repayment – are exogenous variables correlated to the independent

**Table 1.** Descriptive statistics.

Variables	Description	Obs	Mean	Std. Dev.	Min	Max
<i>OER</i>	Operating expenses in % of the gross loan portfolio	323	22%	23%	0%	167%
<i>GS</i>	Global score of the SPI4 with 6 dimensions	331	69	17	0	97
<i>GS7</i>	Score of the SPI4 including the environmental dimension	331	61	16	0	93
<i>ROA</i>	Return on assets (in %)	325	29%	88%	-54%	55%
<i>TOFF</i>	Trade-off, 1 if an MFI is socially but not financially, or financially but not socially performant, 0 if an MFI is both socially and financially performant. An MFI is considered as socially performant when the SPI4 global score is greater than or equal to 50 out of 100, and financially performant while the ROA value is between 1 and 2% or greater than 2% (according to the Benchmark standards provided by microfact and small enterprise education and promotion network). Thus, to measure the tradeoff, MFIs simultaneously having SPI4 scores of at least 50 and ROA of at least 1% were assigned a value of 1, and 0 otherwise.	331	-	-	0	1
<i>DIGIT</i>	Use of digital solutions in MFI, dummy variable, 1 if yes; 0 otherwise. Digital solutions include digital filed applications for staff, mobile loan disbursement/repayment, ATM, debit/credit cards, internet banking, online lending, mobile lending, and other mobile financial services	61	-	-	0	1
<i>SIZE</i>	MFI size, dummy variable, 1 if the MFI is of a large size; 0 otherwise (small or medium)	201	-	-	0	1
<i>TYPE</i>	MFI type according to legal status. Dummy variable 1 if NBFi; 0 otherwise	295	-	-	0	1
<i>REG</i>	MFI location region, dummy variable, 1 if the MFI is active in Sub-Saharan Africa; 0 otherwise	331	-	-	0	1
<i>URB</i>	MFI operating area, measured by the proportion of the urban gross loan portfolio on the overall gross loan portfolio (in decimal)	141	0.19	0.40	0	1
<i>IND</i>	Lending methodology, dummy variable, 1 if the MFI offers individual lending; 0 otherwise	320	-	-	0	1

endogenous variable and not correlated to the error term. These instruments proved to be valid after conducting the Sargan test, whose results indicate Prob > chi2 values over 0.05. Table 4 shows the results of the two-stage least squares regressions. To confirm the presence of endogeneity, we performed the Hausman test (see Appendix), whose results do not confirm the endogeneity of the Digit variable for all the model specifications, except for the one with OER as the dependent variable. This implies that there is no reverse causality between the other dependent variables and the Digit variable. Therefore, we consider the 2SLS regression results (Table 4) for robustness purposes to support those of the OLS (Table 3).

After performing the estimates, we checked whether the residues were normally distributed or not. Figure 1 in the Appendix shows that this is indeed the case. Furthermore, we performed the Breusch-Pagan test to detect possible heteroscedasticity problems (Wooldridge, 2015). The Breusch-Pagan test confirmed the existence of heteroscedasticity in the error term, with a probability below the 5% threshold, leading to the rejection of the homoscedasticity hypothesis, except for the Model 4. Thus, we used White’s method and ran the same models with robust standard errors. We also checked whether there were some multicollinearity issues with the VIF-variance inflation factor-, which all have values below 10 (see Appendix). Therefore, we conclude that there is no multicollinearity issue. Finally, we performed the Ramsey Reset test, which revealed that our models are well specified.

## Findings

Table 2 shows the matrix of correlations between the coefficients of the different variables included in the model. This shows that on the one hand, there is a positive but not significant correlation between the SPI4 global score and MFI digitization, and on the other hand, the operation expense ratio and return on assets are negatively but not significantly correlated with the use of digital solutions.

Table 3 shows the robust results of the OLS regressions with the global score and financial performance indicators (OER and ROA) as explanatory variables, with robust standard errors.

Regarding social performance, the coefficient of the SPI4 global score variable is positive and significant even when including the environmental dimension (Model 2). This implies that the use of digital solutions by microfinance institutions positively affects their social performance. Therefore, we assume that SPM good practices seem to be well implemented in digitized MFIs and that digitization may lead to an increase in social performance, with a significant effect. Our results also show that digitized MFIs in the form of non-banking financial institutions (NBFIs) have lower scores on social performance. This implies that the use of digital solutions may affect the NBFIs less than other types of MFIs.

For financial performance, our findings reveal that the use of digital solutions has a negative and significant effect on the operating expense ratio. This means that digitization may lead to a decrease in operating expenses, with a significant effect, and

**Table 2.** Correlation matrix.

	GS	GS7	OER	ROA	TOFF	DIGIT	TYPE	SIZE	REG	IND	URB
GS	1										
GS7	0.9829 <sup>a</sup>	1									
OER	-0.0219	-0.0115	1								
ROA	-0.0526	-0.0571	-0.0402	1							
TOFF	0.3141 <sup>a</sup>	0.3014 <sup>a</sup>	-0.0761	0.3845 <sup>a</sup>	1						
DIGIT	0.2005	0.2306	-0.2138	-0.0628	-0.1297	1					
TYPE	-0.0342	-0.0381	-0.0724	-0.0723	-0.0523	-0.0562	1				
SIZE	0.1761 <sup>a</sup>	0.2271 <sup>a</sup>	-0.1479 <sup>a</sup>	0.0258	0.0122	0.1771	-0.0250	1			
REG	-0.2328 <sup>a</sup>	-0.2367 <sup>a</sup>	0.2031 <sup>a</sup>	-0.0693	-0.1671 <sup>a</sup>	-0.1404	0.1039	-0.2274 <sup>a</sup>	1		
IND	-0.0171	0.0218	0.0573	-0.1461	0.0298	-0.0500	-0.0032	0.0986	0.0666	1	
URB	-0.1195 <sup>a</sup>	-0.1308 <sup>a</sup>	-0.0524	0.0394	-0.0927	-0.0766	-0.0121	-0.0775	0.0730	0.0973	1

<sup>a</sup>Significant at 5%.



**Table 3.** OLS and logit regression outcomes, Model 1–5.

	OLS	OLS	OLS	OLS	LOGIT
	Model 1	Model 2	Model 3	Model 4	Model 5
	GS	GS7	OER	ROA	TOFF
DIGIT	0.095** (0.038)	0.094** (0.030)	-0.157* (0.081)	-0.073* (0.039)	0.252 (0.874)
TYPE	-0.074* (0.041)	-0.089** (0.036)	0.082 (0.069)	0.050 (0.037)	0.383 (0.826)
SIZE	0.043 (0.039)	0.080** (0.038)	-0.021 (0.058)	-0.034 (0.037)	2.246* (1.246)
REG	-0.075 (0.044)	-0.065 (0.045)	0.161*** (0.055)	-0.013 (0.039)	1.143 (1.247)
IND	-0.005 (0.035)	0.023 (0.032)	0.017 (0.066)	-0.014 (0.038)	0.652 (0.961)
URB	-0.007 (0.058)	0.042 (0.051)	0.302* (0.158)	0.143** (0.063)	1.018 (1.664)
Const	0.808*** (0.060)	0.676*** (0.051)	0.121 (0.079)	0.041 (0.049)	-2.362 (1.575)
Prob > F/chi2	0.0310	0.0010	0.0083	0.0500	0.5256
R <sup>2</sup>	0.379	0.518	0.474	0.374	0.153

\*, \*\*, \*\*\* significance levels respectively at 10, 5 and 1%.

**Table 4.** IV regression outcomes \_Robustness check, Model 1–5.

	2SLS	2SLS	2SLS	2SLS	IVPROBIT
	Model 1	Model 2	Model 3	Model 4	Model 5
	GS	GS7	OER	ROA	TOFF
DIGIT	0.129** (0.053)	0.125** (0.051)	-0.244*** (0.084)	-0.057 (0.049)	0.036 (0.947)
TYPE	-0.084** (0.038)	-0.099*** (0.036)	0.110* (0.060)	0.045 (0.035)	0.291 (0.633)
SIZE	0.029 (0.037)	0.069* (0.036)	0.000 (0.060)	-0.038 (0.035)	1.320** (0.632)
REG	-0.077* (0.039)	-0.071* (0.038)	0.200*** (0.063)	-0.020 (0.037)	0.816 (0.668)
IND	-0.000 (0.039)	0.020 (0.038)	0.058 (0.063)	-0.021 (0.037)	0.668 (0.640)
URB	-0.011 (0.061)	0.037 (0.059)	0.321*** (0.972)	0.140 (0.057)	0.614 (1.018)
Const	0.799*** (0.048)	0.668*** (0.047)	0.139* (0.077)	0.038 (0.045)	-1.402 (0.927)
Prob > chi2	0.0067	0.0000	0.0000	0.0156	0.4161
R <sup>2</sup>	0.365	0.508	0.458	0.372	-
Sargan chi2	0.309	0.437	2.362	0.188	0.232
p-value (Sargan)	0.5780	0.5083	0.1242	0.6639	0.6269

\*, \*\*, \*\*\* significance levels respectively at 10, 5 and 1%.

therefore, to more efficiency. Regarding profitability, we find a significant but negative correlation between digitization and return on assets, in opposite to the literature and our hypothesis 2. This implies that digital solutions may negatively affect the profitability

of MFIs. For geographical region, MFIs located in Sub-Saharan Africa have a higher operating expenses ratio than others (those located in Latin America and the Caribbean, in the Middle East and North Africa, in Europe and Central Asia, and in South and

Southeast Asia), and therefore, a lower financial performance.

Regarding trade-off, findings reveal the absence of any significant correlation between MFI's digitization and trade-off (Model 5). The logit model estimation marginal effects are provided in the [Appendix](#). This result should have suggested that digitized MFIs are likely to be socially and financially performant simultaneously, but it does not as the effect of digitization on trade-off is not significant. Furthermore, the likelihood of the statistic Wald chi2 indicates that the logit TOFF model is not globally significant. This finding is thus not consistent with our third research hypothesis. Even if this is positive, it is still not significant. This result does not support the assumption that microfinance institutions tending to digitize themselves focus more on their financial mission than on their social mission. This might suggest that when going digital, MFIs are indirectly complying with the USSPM standards and better managing their costs, and therefore, they may be more socially and financially performant.

These findings are confirmed by the 2SLS estimation outcomes supporting the significant effect of digitization on social performance and efficiency and showing no significant influence of digitization on trade-off.

The evidence of a significant correlation between digitization and our explanatory variables leads us to fully validate our first hypothesis, and partially the second one, while the third is not supported by findings.

## Discussion

The issue of the double bottom-line remains at the heart of debates in microfinance. Since some researchers argue that MFIs should promote either their financial mission or their social objective, others suggest the possibility of synergy between these two missions for a balanced level of performance.

When time comes for institutions to go digital, it is crucial to consider the implications of this digitalization for MFIs' achievement of this double bottom line, and therefore, of both social and financial performances.

In this regard, the findings of this study show a positive correlation between digitization and the social performance of institutions, when considering six and seven dimensions of the USSPM, and thus support the first research hypothesis. These findings are consistent with those of [Yawouo \(2020\)](#), who also revealed the existence of a positive relationship between the use of digital solutions tools and MFIs' social performance. These results are also in line with those of [Weber et al. \(2012\)](#) and [Mushtaq and Bruneau \(2019\)](#), who measured social performance using a result-based rather

than process-based approach, using indicators such as depth of outreach, poverty indicators, and so on. This was also the case in [Yawouo \(2020\)](#). Despite the difference in the approach and indicators considered for social performance, these results are in line with those of previous studies.

This positive relationship between digitization and social performance measured through the perspective of its management suggests that deploying digital solutions might improve the level of implementation of the USSPM within MFIs, and therefore the achievement of their social mission. Digitization thus appears to be beneficial to the social performance of MFIs. Since social mission of MFIs may often include financial inclusion of poor and especially women access to loans, this suggests that digitization can promote both financial inclusion and women empowerment. This positive effect of digitization may be attributed to potential synergies that may exist between the USSPM practices and digitization process. This implies that fostering the adoption of digital solutions in MFIs may enhance the enforcement of social performance management standards and practices within these institutions.

For financial performance, findings reveal the existence of significant correlations between digitization and financial performance indicators. This significant relationship is negative when MFIs' operating ratio (OER) and profitability (ROA) are considered, and not fully consistent with the second hypothesis. This suggests that integrating digital solutions within MFIs may decrease operating expenses, and thus, increase MFIs cost efficiency, in line with studies by [Kumar et al. \(2010\)](#), [Wyman \(2011\)](#), [Hanafizadeh et al. \(2014\)](#), [Shaikh and Karjaluoto \(2015\)](#), [Mushtaq and Bruneau \(2019\)](#), and [Yawouo \(2020\)](#). It is therefore not expensive for microfinance institutions to maintain digital infrastructure, update software, applications, and websites, and regularly renew their Internet and cloud subscriptions. This implies that maintenance activities as well as subscriptions for digital solutions, and so on, would not be costly for MFIs. Besides, the existence of a negative relationship between digitization and ROA suggests that adopting digital solutions may decrease MFIs' profitability, which is inconsistent with empirical studies such as those conducted by [Weber et al. \(2012\)](#), [Pytkowska and Korynski \(2017\)](#), and [Das and Laha \(2021\)](#). This negative effect of MFIs digitization on profitability may be attributed to the fact that adopting digital solutions entails additional assets for institutions in terms of investments, although additional income is not necessarily immediately generated and even in case of its increase. Thus, the return on assets ratio decreases. This finding aligns with arguments provided by [Dorfleimer et al. \(2022\)](#) who suggest that the integration of digital solutions into financial institutions entails huge

financial resources in terms of investment, while there is not in return any additional income from potential additional interest charged to clients. This means that even when MFIs must deal with additional investments costs when they go digital, they do not expect higher financial revenues from charging more clients. These results may seem ambiguous, but it is not the case because OER and ROA do not assess the same aspect of financial performance. OER is an efficiency indicator measuring the cost of delivering loan services while ROA captures the efficiency with which the IMF is managing its investments to generate profit. Thus, at time  $t$ , a decrease of OER does not imply an increase of ROA.

Our results also show that digitization may not lead to a trade-off nor to synergies between social and financial performance, which is not consistent with the third hypothesis. Even if they indicate that digitization may reduce ROA, this does not mean that it prevents MFIs from being both socially and financially performant. Indeed, digitized MFIs can provide their clients with smaller loans without affecting too much their profitability, and thus achieve their social and financial objectives as suggested by (Dorfleitner et al., 2022).

Overall, the results thus support the existing literature by confirming a positive relationship between the adoption of digital solutions and performance. While our study indicates a positive effect of digitization on performance, the one conducted by Dorfleitner et al. (2022) examining this relationship in the opposite direction, show a positive effect of performance on digitization. Nevertheless, by using 2SLS regressions, we were able to show that our results do not suffer from reverse causality problems.

These findings have significant implications for institutions and how they can implement and interconnect their digitization process, universal standards for social performance management and financial strategy. Firstly, the significant effect of digitization on social performance reveals synergies between the adoption and use of digital solutions and the implementation of good practices of SPM. This implies that the digitization process can enable MFIs to achieve their social mission and goals. Secondly, the mixed effects of adopting digital solutions on financial performance suggest that while this process appears to drive efficiency within institutions, it does not necessarily improve their profitability, since capital expenditure appears to increase more than profits. MFIs should take this into account when digitizing. Finally, since digitization does not appear conducive to trade-off, MFIs should better align their financial and investment strategy with their social objectives when going digital, in order to achieve

better synergies between their social and financial performance.

## Conclusion

This study aims to examine the extent to which MFIs' digitization may affect their social and financial performance, and whether going digital may favor MFIs performance trade-off. To this end, we perform OLS, 2SLS, and logit regressions on data from 331 institutions provided by the Atlas dataset.

The findings reveal the existence of a significant and positive relationship between digitization and social performance measured through the SPI4 global score when considering six and even the seventh dimension of USSPM. This suggests that integrating digital solutions in MFIs might lead to better implementation of the USSPM within these institutions. We also found a significant relationship between digitization and MFIs' efficiency, suggesting that maintaining digital infrastructure and tools as well as leading digital operations may not be costly for MFIs. Regarding the profitability dimension of MFIs' financial performance, digitization may have a negative effect on ROA. By contrast, the analysis of the relationship between digitization and trade-off does not provide any evidence of a significant effect of digitization on trade-off.

Based on these findings, recommendations can be formulated at the MFIs and country levels. MFIs should embrace digitization for better implementation of USSPM and for more cost-efficiency. They should also enforce the implementation of smart campaign practices and all practices regarding clients' protection, especially those related to data privacy when going digital. MFIs should also think about how to increase their profitability with digitization as findings suggest that there is no improvement in ROA when they go digital. At the country level, governments should better support institutions when they go digital by providing them with the required and adequate infrastructure and a better regulatory framework tailored for digital financial activities. In Sub-Saharan Africa in particular, where negative effects are observed regarding social performance and efficiency, governments should promote a favorable business environment. This environment will attract more fintech investors and may help institutions optimize their profit.

The main contribution of this study lies in its focus on addressing the trade-off issue between social and financial performance when microfinance institutions go digital. This research is also the first one to provide empirical evidence on the relationship between digitization and social performance measured from the perspective of its management with the SPI4 global score, reflecting the level of implementation of USSPM within MFIs.

The main limitation of this study lies in the fact that panel data were not available and therefore not used in the analysis to determine the effects of MFIs' digitization on their performance over time. Future research should, therefore, focus on this issue and on the question of the effect of digitization on each USSPM dimension. In the same vein, a deep analysis on how digital technology in MFIs may affect women empowerment will be relevant. The question of the interaction terms between the socio-demographic characteristics of MFIs and digitization should also be addressed.

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### Data Availability Statement

The data that support the findings of this study are available from ATLAS but restrictions apply to the availability of these data, which were used under license for the current study, and so are not publicly available. Data are however available from the authors upon reasonable request and with permission of ATLAS.

### Note

1. Atlas is a data platform mainly managed by the international rating agency dedicated to inclusive finance which provides institutional, credit and social ratings using the methodology developed by the SPTF-Cerise, a joint-venture between Cerise, a French non-profit specialized in the implementation of social performance management in microfinance, and the Social Performance Task Force, a non-profit membership organization who aims to help impact-driven financial service providers to put low-income customers at the centre of their preoccupations. The Atlas database contains data on financial and social performances, pricing and client protections over 4,791 financial service providers across 147 countries from the following regions: Europe and Central Asia, Latin America and the Caribbean, Middle East and North Africa, South and Southeast Asia, Sub-Saharan Africa. Data are provided by several actors such as individual or international networks of financial service providers, professional associations, investors, rating agencies, research institutes,... The database encompasses general information

on institutions such as their legal status, mission, location region, operating area, products offered, number of clients and branches, as well as specific information on their pricing, financial situation, social performance, client protection, digital infrastructures, and more others.

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## Appendices

### Appendix 1. Hausman/Endogeneity Test

	Chi2	Prob > chi2
SP	1.84	0.9334
OER	27.24	0.0001
ROA	0.42	0.9987
TOFF	1.50	0.9594

Appendix 2

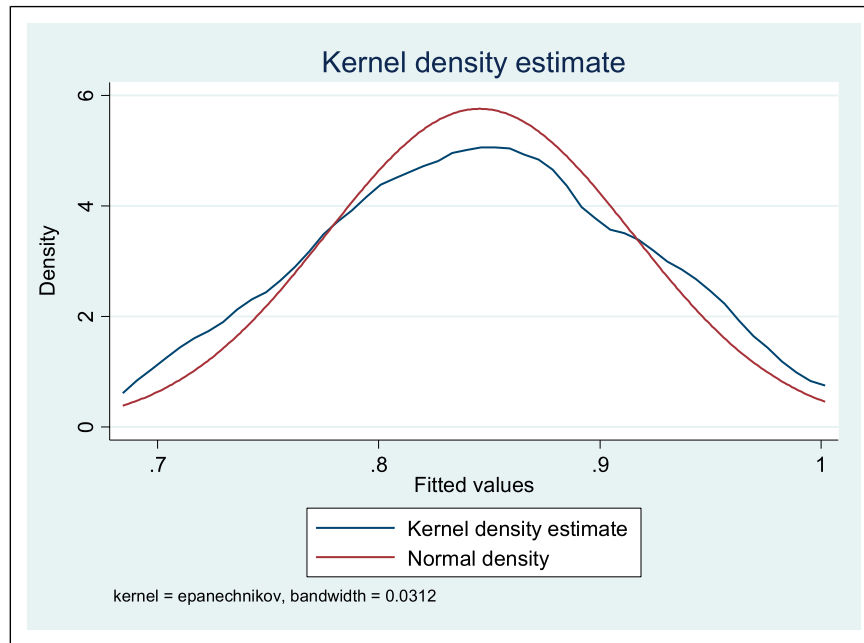


Figure 1. Standard errors distribution.

Appendix 3. VIF Values

Variable	VIF	1/VIF
SIZE	2.29	0.436096
IND	1.68	0.595144
URB	1.59	0.628654
TYPE	1.39	0.719018
REG	1.37	0.728138
DIGIT	1.22	0.822711
Mean VIF	1.69	

Appendix 4. Marginal effects for logit regression

Variable	dy/dx	Std. Err.	z	P> z
DIGIT	0.063	0.217	0.29	0.772
TYPE	0.095	0.202	0.47	0.639
SIZE	0.508	0.231	2.20	0.028
REG	0.272	0.276	0.99	0.323
IND	0.158	0.225	0.70	0.481
URB	0.253	0.415	0.61	0.542