No 515

MARCH 2023

CefES

Center for European Studies

PAPER SERIES

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Lucia Dalla Pellegrina, Damla Diriker, Paolo Landoni, Davide Moro, Mahinda Wijesiri

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Efficiency and Outreach in the European Microfinance Sector

Lucia Dalla Pellegrina
Department of Economics, Management and Statistics (DEMS)
University of Milano-Bicocca, Milano, Italy
and Centre for European Research on Microfinance (CERMi)
lucia.dallapellegrina@unimib.it ; https://orcid.org/0000-0002-3648-7506
Corresponding author

Damla Diriker
KIN Center for Digital Innovation
Vrije Universiteit, Amsterdam, Netherlands
d.diriker@vu.nl ; https://orcid.org/0000-0002-0995-8819

Paolo Landoni
Department of Management and Production Engineering
Politecnico di Torino, Torino, Italy
paolo.landoni@polito.it ; https://orcid.org/0000-0001-5079-1101

Davide Moro
Department of Management and Production Engineering
Politecnico di Torino, Torino, Italy
davide.moro1@outlook.it ; https://orcid.org/0000-0002-7587-2001

Mahinda Wijesiri
Faculty of Business Administration
Memorial University of Newfoundland, Canada
mahinda2003@yahoo.co.uk

ABSTRACT

This paper contributes to a growing body of literature on microfinance institutions, where the equilibrium between social and financial sustainability is one of the hottest topics. However, the evidence regarding this relationship in the European microfinance sector is scarce. In the current study, we intend to fill this knowledge gap. Specifically, using an original dataset obtained from a survey conducted in 2016-2017 on 159 Microfinance institutions (MFIs) operating in 38 European countries, we investigate whether pursuing proactive social sustainability can improve financial sustainability, measured by technical efficiency. Overall, our results show that MFIs that are more likely to comply with their social sustainability objectives (especially on the extensive margin, with a higher number of loans granted and on the intensive margin, by serving a higher share of women) are also doing well financially. The only aspect on which social sustainability does not seem to have a positive effect on financial sustainability is the financing of the poorest through the provision of small-scale loans. These peculiarities are somehow common to other non-European contexts. On the other hand, a phenomenon that seems peculiar to the European context is that larger MFIs, especially those operating in a context not subject to stringent financial regulation tend to show a comparative advantage and better withstand competition from the traditional banking sector. Our results are robust to alternative measures of financial sustainability and to the use of the Generalized Method of Moments (GMM) and Instrumental Variable (IV) estimation techniques to overcome the problem of endogeneity.

PLAIN ENGLISH SUMMARY

This research reveals that European Microfinance Institutions that more tightly pursue social objectives are also more likely to be financially sustainable. However, the financial performance of EU microfinance providers seems limited by severe regulatory restrictions compared to countries outside the EU.

The microfinance sector underwent a significant global expansion in recent years, creating chances for underprivileged and vulnerable groups, particularly women entrepreneurs, to start their businesses. The balance between social and financial sustainability is one of the most hotly debated themes in a growing number of studies, although there is little evidence of this link in the European microfinance sector. In this paper, we provide one of the first pieces of evidence of this relationship in the European context. Our research reveals that European Microfinance Institutions that more tightly pursue social objectives are also more likely to be financially sustainable. Our findings have important implications for researchers, policymakers, and society as a whole. The critical aspect of European MFIs appears to be their greater reliance on subsidies and incentive schemes at the national and EU levels, as well as regulation that is ill-suited to the microfinance sector. Smaller and less regulated MFIs appear, indeed, to achieve a double bottom line more easily. Thus, a more structured regulatory framework that is more focused on social sustainability variables could improve microfinance conditions in the coming years, especially given that the number of MFIs will vary with the growing number of people rationed from the traditional credit circuit.

Keywords: Microfinance, European Union, social sustainability, outreach, mission drift, financial sustainability.

JEL: G21, I32, L26, O16

1. INTRODUCTION

Since the advent of microfinance in the 2000s, the number of microfinance institutions (MFIs) has grown dramatically (Hermes and Lensink, 2007; Vanroose and D'Espallier, 2013). Between 2009 and 2018, the number of borrowers who benefited from MFIs' services increased by 43%, from 98 million to 139.9 million worldwide, reaching an estimated loan portfolio of 113.7 billion euros (Microfinance Barometer, 2019). Given this rapid proliferation, MFIs need to adapt to the different contexts in which they operate and fulfill their mission of enhancing the access of the poorest to financial services (i.e., social sustainability) while ensuring the financial sustainability of their projects.

However, this is a daunting task to achieve, partly due to the inevitably high fixed and operating costs combined with the smaller-sized loans of MFIs (Abrar and McMillan, 2019) and the considerable financial burden associated with the provision of Business Development Services (BDS). Since the financial and social goals largely influence both the operating and the administrative expenses associated with the provision of loans (Abrar and McMillan, 2019), it is documented that fulfilling greater social sustainability by reaching the poorest classes of the population may undermine financial sustainability due to the impossibility of shifting these costs on the most disadvantaged economic groups. Nonetheless, MFIs have started to adapt their business practices to become self-sufficient (Ledgerwood, 1999; Christen, 1998; Morduch, 1999). In addition to competition from the traditional banking sector, this effort resulted in the entire sector undergoing a remarkable shift from emphasizing the social goal of poverty reduction to the economic goal of sustainable and market-based financial services. Consequently, while the high-interest rates of microfinance loans have long been criticized, in the past few years, the debate over the trade-off between social and financial sustainability has further surged (Zerai and Rani, 2012; Copestake, 2007; Cull et al., 2007; Kar, 2013).

Given the urgency of tackling global poverty, it is essential to examine the performance (both in terms of social and financial sustainability) of MFIs. Specifically, in Europe, there are growing concerns regarding the gradual yet steady increase in the number of people at risk of poverty and social exclusion (World Bank, 2018)[1] due to ongoing crises such as the Covid-19 pandemic and the war. However, despite the growing interest in this topic, existing studies seem to offer limited help in understanding the relationship between social and financial sustainability in European MFIs for several reasons. In general, there are no widely accepted indicators or summarized measures to assess the social sustainability of an MFI (Schreiner, 2002). As a result, while some studies have shown empirical evidence of a trade-off between social and financial sustainability (Cull et al., 2007;

[1] https://www.worldbank.org/en/topic/poverty

Hishigsuren, 2007; Mersland and Strom, 2010, to mention just a few), others questioned its validity (Quayes, 2015), or even found complementarities between the two (Woller, Dunford, and Woodworth 1999; Paxton et al. 2000; Rhyne 2001; Woller 2002). Likewise, there are a plethora of available variables to measure financial sustainability. Some balance sheet indicators may suggest good financial sustainability of an institution on one ground, others less so on other grounds, making it impossible to compare one institution with another. Thus, despite the large number of empirical contributions showing that microfinance programs can contribute to addressing gender issues and the development of local economies, whether increasing social sustainability while being financially sustainable is possible and how to achieve this is inconclusive. Finally, the trade-off (or complementary) between social and financial sustainability seems to depend on the context in which these relations are analyzed. Yet, empirical studies on this relationship within the European context are limited.

Furthermore, the European MFI context is particularly interesting for studying the relationship between social and financial sustainability. One of the most significant challenges is competition with traditional intermediaries rather than competition within the microfinance sector. Indeed, in poorer countries, MFIs tend to compete among themselves, while threats from the banking sector are limited, as the latter is inaccessible to most of the population. On the contrary, European MFIs are relatively smaller than those operating in less developed countries (LDCs). While this can represent an advantage as they can still reach significant economies of scale while growing, it can also put them in a disadvantageous position compared to traditional banks that offer small-scale loans on an often standardized basis, not requiring physical collateral (in most cases a pledgeable income comes into play).[2] Most of the competitive advantage of the traditional banking sector stems from the possibility to cross-subsidize their activities. This induced some European MFIs to create partnerships with banks to benefit from more advantageous funding costs, while contextually offering their experience in assisting the weakest segments of the population by designing more tailored products for marginal customers. Second, the European microfinance sector is also considerably younger, heavily dependent on private and public subsidies with products oriented toward labor markets (Chmelíková et al., 2019) compared to the other MFIs worldwide. We argue that these features may considerably affect the trade-off between social and financial sustainability. The still small size of the European MFIs confirms that the growth of these institutions is held back, not so much by a limited demand for microloans but due to institutional factors and bank competition.

[2] See Chmelíková et al. (2019) for an in-depth discussion on the peculiarities that characterize European microfinance providers compared to advanced microfinance providers in developing economies.

To address this gap in the literature, we examine whether there is a trade-off between social and financial sustainability in European MFIs by Using data on 159 MFIs from 28 European countries from a survey conducted by the authors with the support of the European Microfinance Network (EMN) and the Microfinance Centre (MFC). We adopted technical efficiency as the financial sustainability indicator, measured through Data Envelopment Analysis (DEA), followed by regression analysis. Overall, empirical evidence shows a significant and positive relationship between social and financial sustainability variables on the extensive margin (breadth of social sustainability) and a positive correlation on the intensive margin (depth of social sustainability), specifically concerning the service of female borrowers. Instead, an inverse relationship between financial and social sustainability is observed on the intensive margin in terms of service of the poorest through small-scale loan provision.

Our results suggest that social sustainability, in terms of the diffusion of MFI services to a large number of (especially female) customers, tends to support the improvement in the financial sustainability of European MFIs. On the other hand, European MFIs seem not to have yet found a method of increasing their financial sustainability by offering truly small-sized loans to the poorest, an aspect deserving further research. Furthermore, by refining the empirical analysis, we find confirmation of the impediment that the regulation of MFIs, especially in Western Europe, constitutes to the development of the microfinance sector.[3] Financially weakest borrowers, indeed, are more likely to need support through ancillary services to credit that require high expenses compared to the relatively small size of loans.

The paper is organized as follows. In the next section, we present the literature on microfinance focusing on financial and social sustainability debate, with a focus on Europe. In section three, we discuss the empirical framework. In section four, we report our baseline findings. In section five, we test competing theories and hypotheses about the role of incentives, MFIs' size, geography, and regulation, whereas in section six, we conduct robustness checks related to the endogeneity of the main explanatory variables. Finally, in section seven we discuss the implications of our study.

2. LITERATURE BACKGROUND

2.1 Microfinance sector in Europe

[3] For instance, several European countries, such as former Soviet republics are experiencing substantial development of the microfinance sector and related problems, especially in terms of regulatory design, including unfair fees, high interest rates, the imposition of interest rate caps, and late cooperation between credit organizations (see for instance Khachatryan and Avetisyan, 2017).

The European microfinance sector is characterized by high growth rates and strong heterogeneity in the methods and services[4]. European MFIs, especially those established in Eastern countries, offer a range of products and services besides credit, such as financial support for education and advisory tools for entrepreneurs in the form of BDS. Additionally, while business-type micro-credits are the majority of loans, European MFIs also accord personal micro-credits aimed at helping clients deal with purely individual needs, such as emergency and housing-related expenses.

Significant heterogeneities are also found in terms of the characteristics of the institutions (Cozarenco, 2015; Cozarenco and Szafarz, 2018). The main actors providing microloans in Europe are Non-Governmental Organizations (NGOs), Banks, Non-Bank Financial Institutions (NBFI), and Cooperatives/ Cooperative Credit Banks. In addition, due to the differences in their historical development, European MFIs are profoundly different compared to those operating in less-developed contexts. The microcredit sector is younger and heavily dependent on private and public subsidies (Schiltz, 2018), especially in Western countries where high bank penetration can also represent an impediment to the microfinance sector (Cull *et al.,* 2014).

In general, MFIs operating in the European Union are more regulated than those operating outside the EU, although the EU leaves the task of designing regulations to individual member states. There are restrictions on interest rates, loan size (Cozarenco and Szafarz, 2016), tax schemes, and legal entities, with different specifications depending on the home country and type of institution.[5]

In some countries where there is specific Microfinance legislation, such as Italy, France, and Ireland, it is more common for MFIs to enter into a competitive mechanism with the traditional banking system, although they are penalized by not being allowed to collect savings. This forces MFIs to find alternative ways to refinance themselves, often through subsidies. Also, privileging loans to micro-enterprises allows MFIs to cope with banks' competitive advantages, thanks to the possibility of exploiting pledgeable incomes to increase loans' NPV. Setting various forms of non-physical collateral, such as co-signment requirements, seems driven by similar purposes (Dalla Pellegrina and Scollo, 2016; Guinnane, 2011).

In other countries, such as Germany and Serbia, there is a bank monopoly for lending. In such contexts, it is more common to observe forms of collaboration between MFIs and banks, as the former are not allowed to disburse micro loans on their own. Also, high minimum capital requirements to

[4] This heterogeneity is related to the heterogeneity between the different European countries. In particular, there are differences between EU and non-EU as well as Western and Eastern and North and South Europe in terms of labor costs, financial inclusion (Brown et al., 2016), and income level (Beckfield, 2006). However, these countries are gradually converging.

[5] We will deepen the analysis of the role of regulation and its relationship with MFI's financial and social sustainability in the following sections.

legally perform credit, such as those required in Greece, represent another reason that pushes MFIs to engage in partnerships with bank intermediaries (Cozarenco 2015).

Finally, in Europe, an important alternative to microfinance is represented by crowdlending, primarily through the development of ICT and peer-to-peer (P2P) lending platforms. This phenomenon has grown significantly during the last decades mainly because it allows a considerable reduction in operating costs. Crowdlending, in 2020, generated consumer, business, and property loans for $5.2 billion in Europe and $4,75 million in the UK (Ziegler et al., 2021).

2.2 The debate on Social and Financial Sustainability

Mia et al. (2019) assert that the literature of the last decade relating to microfinance reveals a change in the research aims, previously focused mainly on the impact evaluation of the microfinance instrument, then increasingly concerned about an institutional analysis of the context. Social sustainability has become one of the primary concerns. It is defined in the literature as the degree of market penetration of an MFI (CGAP 2016).[6] It can be evaluated in terms of breadth, depth, length, scope, worth, and cost. The breadth of social sustainability, which is related to the number of people reached by the service of the institute, and the depth, which is associated with the degree of vulnerability of the customers served by the institute, certainly play a central role. Scholars have used different proxies of MFIs' breadth and depth of social sustainability.

The current debate on MFIs' financial and social sustainability has led to discordant opinions and results in the literature. Most of the empirical literature on LDCs points out how the two objectives might contradict each other, supporting the theory that there is a trade-off between reaching the poorest individuals and the financial sustainability of an institution. Reaching the poorest sections of the population could lead to increased administrative costs and a greater likelihood of default by debtors, resulting in a worsening of the institution's financial sustainability. The most acknowledged studies are those of Hulme and Mosley (1996) and Gonzalez and Rosenberg (2005). Also, Olivares-Polanco (2005), from the analysis of the data of 28 MFIs operating in Latin America between 1999 and 2001, finds a compromise to allow for balancing social and financial sustainability. Similar results have been obtained by Makame and Murinde (2006), who conducted a study using panel data from 33 East African MFIs between 2000 and 2005.

Several other studies highlight a negative correlation between financial and social sustainability. Cull et al. (2007) studied the financial sustainability of 124 MFIs from 49 different geographical contexts, identifying an inverse proportionality between the social depth and the

[6] https://www.cgap.org/

financial sustainability of the reference institution. Hermes et al. (2011), using stochastic frontier analysis on a sample of over 1300 observations worldwide, find that MFIs with a lower average loan balance are less efficient, supporting the hypothesis of an inverse relationship between social and financial sustainability. Abate et al. (2014) analyzed the effect of imposing a financial sustainability commitment on Ethiopia's traditional social mission microfinance providers. Their results also show that microfinance providers closest to the best practices have higher average loan sizes and a lower percentage of women among borrowers, confirming that achieving financial and social sustainability simultaneously is a daunting task for MFIs.

For many scholars (see, for instance, Paxton and Cuevas, 2002), a possible explanation of this trade-off is that transaction costs would increase in obtaining information on the creditworthiness of poorer customers. These costs have a significant fixed component, so unit costs for small savings or loans would be relatively high compared to larger financial transactions. This inverse proportionality between unit transaction costs and transaction size typically generates a trade-off between social and financial sustainability.

Navajas et al. (2000), in a study conducted on five MFIs in Bolivia, show that lenders tend to serve not the poorest but the individuals closest to the poverty line. Similar behavior is present in most microfinance organizations. Underlying this may be the lower probability of being creditworthy by the poorest. Concerns about credit recovery performance can also impact the incentives of field workers to lend and collect credit, in ways that could overcome concerns to ensure that women or the very poor – being part of the depth-of-outreach purposes – develop meaningful control over their investment activities (Aubert et al., 2009; Goetz and Gupta, 1996).

Nonetheless, for Zeller and Johanessen (2008), an efficient MFI that reaches only microentrepreneurs above the poverty line could contribute to higher poverty reduction, at the macro level, than an MFI that reaches the poorest but is financially unsustainable (i.e., it needs subsidies). Due to spill-over effects, clients of the most efficient MFIs could significantly help the poorest by creating new jobs. The efficient MFIs may also eliminate the need for government or donor subsidies over time. Furthermore, improving MFIs' financial sustainability could enable MFIs to reach the poorer population, which is usually linked to high management and control costs regarding credit size. Loans to the poorest are associated with difficulties in managing costs and increasing risk. Nawaz (2010), for example, in his study conducted in a village in Bangladesh where several microfinance programs have been active for over five years, notes that less efficient institutions have more difficulty reaching the poorest.

Quayes (2012), in a study using one-year cross-section data from 702 MFIs operating in 83 states, provides empirical evidence of a non-uniform relationship between financial and social

sustainability. By dividing the sample according to the level of disclosure, the analysis shows a trade-off between the breadth of social sustainability and financial sustainability for low-disclosure MFIs, while highlighting a positive relationship between the breadth of social sustainability and financial sustainability for high-disclosure MFIs. An increase in the depth of social sustainability also seems to increase the likelihood of financial sustainability for high-disclosure MFIs, while not affecting low-disclosure institutions.

Hence, the trade-off may not necessarily hold or be contingent on the credit market conditions and the institutional environment where an MFI operates. The "context matters" is precisely what motivated the present study on the European microfinance market. Armendàriz and Szafarz (2011), for example, state that it becomes difficult to analyze institutions operating in contexts with a relatively low percentage of poverty, as it could be wrongly assumed that these institutions have moved away from their initial social objectives. Therefore, the different reference contexts of financial institutions must play a key role in assessing the results of the other studies.

3. EMPIRICAL FRAMEWORK: DATA, VARIABLES, AND MODEL OF ANALYSIS

3.1 The survey

This research is conducted using a unique dataset based on a survey administered by the authors with the support of the European Microfinance Network (EMN) and Microfinance Centre (MFC) (see Diriker et al., 2018) that was submitted to European Microcredit institutions based in 38 European countries.[7]

The initial survey was sent to the universe of 616 MFIs that are either members of the EMN and MFC or non-members.[8] This is the most comprehensive list of all institutions that are known to provide microfinance services and products in countries that are members, candidates, and potential candidates of the European Union. The survey was written in English, and translations into Bulgarian, French, German, Hungarian, Italian, Polish, Romanian, and Spanish were provided. It was submitted on March 21st, 2018, and five reminders followed to non-responsive MFIs, including emails and calls. It included qualitative and quantitative questions related to the main characteristics of the MFIs, their social and financial sustainability, and several quantitative and qualitative variables regarding the activity of the MFIs referring to the years 2016 and 2017.

[7] Two Turkish MFIs were also contacted. Actual response rates reduce the sample used for the empirical analysis sto 20 countries.

[8] The relative number of European MFIs is relatively low, estimated to range between 500 and 700 institutions (Bendig *et al.* 2014).

On May 18th, 2018, the survey was closed; of the overall MFIs contacted, 159 responded, with a response rate of 34%. Therefore, the total sample used for the empirical analysis includes 159 MFIs.[9] The main descriptive statistics from the original survey on European MFIs are reported in Table 1.[10] Notice, in particular, that the institutions contacted are MFIs providing only microloans. Apart from a few cases, they are not branches of larger institutions that also offer microfinance products, but rather pure microfinance institutions of relatively small size (as can be seen by the low average number of employees, on average 99 per institution, Table 1) which reasonably operate within the national borders.

Most European NGOs surveyed started their activities before 2005.[11] Government agencies and private banks have approached this sector more recently. Overall, 40% of the respondent MFIs were non-governmental organizations (NGOs), 29% were non-bank financial institutions, 19% were cooperative banks or financial cooperatives, and 12% were private and state banks and various government bodies.[12]

Considering the main fields of activity of the various MFIs, we can see that for banks, both private and state-owned, microcredit represents an ancillary activity. This consideration also holds for a significant percentage of government agencies. On the contrary, almost all cooperatives/cooperative banks and a significant portion of NBFIs and NGOs are specialized in the microcredit sector, which represents the focus of their activity.[13]

Figure 1 shows where the respondent institutions are geographically located, whereas in Figure 2 we report the share of MFIs according to their mission.

3.2 Variable measurement

3.2.1 Dependent variable: efficiency as a measure of financial sustainability

[9] The response rate per country is highly variable. A quantification of the country-bias is available in Appendix A, Table A1. In particular, the degree of over-representativeness of some Eastern European countries (Romania, Hungary, Kosovo, and Bosnia-Herzegovina, in particular) is relatively high. This could make the results of the empirical estimation sensitive to the characteristics of the MFIs of these countries, emphasizing the estimated results among some peculiarities typical of MFIs operating in Eastern Europe. For this reason, in the rest of the analysis an estimate is made of the phenomena investigated on separate samples in Western European countries on the one hand and Eastern European countries on the other (see Section 5).

[10] T-tests for mean comparison of financial indicators between our sample and the European MFIs available from the MIX Market database have also been performed. Results do not show any substantial discrepancies. See Appendix B, Table B9.

[11] Notice that the European microfinance sector is relatively young compared to LDCs. Before 1990, only 8% of the MFIs interviewed started their activities. Nonetheless, the number of new MFIs increased until 2000-2004, but since then, it has started slowing down (European Microcredit Survey 2016-2017).

[12] There are only two state banks in the study. State-owned banks are German, as in Germany the microfinance sector has traditionally been bank-based. Conversely, in Albania, Montenegro, and United Kingdom, the majority of survey participants are NBFIs (respectively, 100%, 100%, and 81%).

[13] The countries with a higher concentration of MFIs whose main activity is micro-credit are from Eastern Europe, specifically Albania, Bulgaria, Romania, Bosnia-Herzegovina, and Montenegro. Among the states with the greater percentage of MFIs whose focus is not the microcredit programs, we find instead Spain, Greece, and France.

Financial ratios and technical efficiency are the metrics that are most frequently used among the diverse range of representative measurements of firm performance. Studies that use the frontier efficiency methodology to measure the financial sustainability of MFIs place a strong emphasis on the necessity of using this measure as a sound and accurate indicator of financial sustainability (e.g., Gutierrez-Nieto et al. 2007; Haq et al. 2010; Hermes et al. 2011; Servin et al. 2012; Wijesiri et al. 2017; Van Damme et al. 2016). Thus in our study, we measure the financial performance of European MFIs using the frontier efficiency methodology. With a rigorous methodology drawn from microeconomic theory, frontier efficiency approaches account for variations in input usage and output production in multi-input, multi-output firms (Charnes et al., 1978). These approaches, according to Demerjian et al. (2012), perform better than one-dimensional metrics in two important ways. The first benefit of this methodology is an ordinal ranking of relative efficiency in relation to the Pareto-efficient frontier – the best performance that can be practically achieved. Regression analysis and ratio comparisons are two examples of parametric methods that assess performance relative to average performance, which is disproportionately lowered by underperforming peers. Second, frontier efficiency methods don't impose an explicit, ad hoc weighting system while evaluating performance. However, widely used performance indicators can't account for variations in the input-output mix of different organizations because they assume that inputs and outputs are equally worth across organizations (Charnes et al., 1978; Demerjian et al., 2012).

We specifically use the Data Envelopment Analysis (DEA) to obtain the technical efficiency as the performance measure. DEA mathematical formulation can deal with both CCR (Charnes–Cooper–Rhodes, see Charnes et al., 1978) and BCC (Banker–Charnes–Cooper, see Banker et al., 1984) models. The CCR model assumes that each DMU operates with Constant Returns to Scale (CRS). It provides the overall technical efficiency of each DMU, aggregating pure technical efficiency and scale efficiency into a single value. The BCC model assumes Variable Returns to Scale (VRS) between inputs and outputs and delivers the measurement of pure technical efficiency. Both models can be formulated in either input orientation (the ability to minimize inputs when outputs are given) or output-oriented (maximization of outputs given a certain bundle of inputs). Our study adopts this latter approach because MFIs struggle to maximize outputs given limited available inputs. Moreover, we use the BCC model using the VRS assumption as differences in operational size may affect efficiency (Widiarto and Emrouznejad, 2015; Wanke et al., 2022).

An important aspect when calculating efficiency scores is selecting the input and output variables that determine an MFI's complex production function. There continues to be some debate about the explicit definition of the inputs and outputs of a financial institution. The literature suggests two main approaches to identifying inputs and outputs in the formal

financial sector: production and intermediation approaches. Both approaches apply the traditional microeconomic theory of the firm to banking and differ only in the specification of banking activities (Das & Ghosh, 2006). On the one hand, under the production approach pioneered by Benston (1965), banks are primarily viewed as providers of services to customers. The intermediation approach, on the other hand, views financial institutions as intermediaries between investors and savers. Deposits are used by banks to produce interest-earning assets (loans, securities, and investments). Operating expenses and interest expenses are included as inputs, while loans and other major assets are included as outputs in this approach.

The appropriateness of each approach varies according to the circumstances (Das & Ghosh, 2006). In our study, we follow Yaron's (1994) framework and Gutierrez-Nieto's (2007) and we do not strictly categorize MFIs under any of the above approaches due to the diverse nature of their operations. Consistent with earlier studies (Gutiérrez-Nieto et al., 2007 and 2009; Bassem, 2008 and 2014; Wijesiri et al., 2017; Widiarto and Emrouznejad, 2015; Piot-Lepetit & Nzongang, 2014) and given data availability, we select three inputs (total assets, operating expenses and the total number of employees) and one output variable (financial revenues). We used financial revenues as the output because MFIs that cannot generate enough revenue are unable to operate sustainably (Gutiérrez-Nieto et al., 2007; Bassem, 2014). Table 2 presents the inputs and outputs used in the DEA analysis along with descriptive statistics, the mean, and the standard deviation. All financial variables are measured in euros, except the number of employees.

Although the traditional DEA model has many desirable features and is widely used to measure the relative efficiency of firms, it has some limitations. One such is that it has no statistical properties and consequently the efficiency measure is sensitive to variations in the sample configuration (Simar and Wilson, 2000; Uribe-Bohorquez et al., 2019). Thus, traditional DEA applications offer only point estimates without a sense of the sampling variation associated with them. To overcome this drawback, Simar and Wilson (2000) propose a homogeneous bootstrap algorithm that combines the conventional DEA model with the bootstrap technique to infer the statistical properties of efficiency scores. This technique consists of a simulation of a true sampling distribution by mimicking a data-generating process, using the outputs from DEA (Simar and Wilson, 1998 and 2000; Wanke, 2012). Our study uses the homogeneous bootstrap algorithm proposed by Simar and Wilson (2000) to obtain bias-corrected efficiency scores.[14] Country-wise efficiency scores are reported in Figure 3.

3.2.2 Explanatory variables: social sustainability measures

[14] Refer Simar and Wilson (1998 and 2000) for the detailed information about bootstrap algorithm we used in our analysis.

Our main explanatory variables in the regression analysis that follows are MFIs' social sustainability measures. We measure MFIs' social sustainability in terms of breadth and depth.

Breadth of social sustainability (Breadth): Breadth is represented by the number of clients. It indicates the extent to which MFIs accomplish their primary missions on an extensive margin (Quayes, 2015). Breadth matters because of budget constraints; the wants and needs of the poor exceed the resources earmarked for them (Schreiner, 2002). However, lending with much breadth may be costly for MFIs, because the most trustworthy clientele is normally served first, while extending loans on the extensive margin could include the less preferential, typically riskier, and less trustworthy borrowers. In our analysis, we use the number of active borrowers as a proxy for the breadth of social sustainability.[15]

Depth of social sustainability (Depth): It is the social value of net gain, where the net gain is worth to clients minus the cost to clients (Schreiner, 2002). It is a measure of the quality of reaching out to the poor. However, direct measurement of depth through income or wealth is difficult. IN the microfinance literature, the most common indicators for depth are the percentage of women borrowers (***Depth_Women***) and the average loan balance per borrower divided by the GDP per capita (***Depth_Alb***).

On the one hand, the percentage of women borrowers is widely used as a depth of social sustainability indicator because loans to women have higher marginal impacts than those granted to men (Pitt & Khandker, 1998). According to CGAP (2017)[16], nearly one of every three women in the world is excluded from the formal financial system. It reveals that women are 7 percent less likely than men worldwide to have simple transactional accounts, and this discrepancy is greater among the poor. The extent of women's financial exclusion around the world makes it evident that greater emphasis is required to be paid to including women in the labor market to attain universal financial access. Not just in developing nations, but even in developed nations like Europe, where women entrepreneurs struggle the most to run and expand a business, access to money continues to be the biggest barrier. Even though European Union regulations aim to use every tool at their disposal to assist female entrepreneurship and increase the number of women in the workforce, various financial and non-financial hurdles can prevent women from having sufficient access to money (EU, 2021). Because of this, we particularly included the proportion of female borrowers as a proxy for the depth of outreach.

On the other hand, small-scale loans indicate the client's poverty level (Cull et al., 2009). The smaller the average loan balance (i.e., the lower *Depth_Alb*) (normally in relation to some measure

[15] To avoid that the breadth of social sustainability captures pure scale effects, in the regressions we include the size of each MFI (in the form of total assets) among the control variables.

[16] https://www.cgap.org/blog/5-challenges-womens-financial-inclusion

reflecting the standard of living), the greater the depth of social sustainability. Although deep social sustainability increases social benefits, it also usually increases social costs because it increases the per-unit cost of supply (Schreiner, 2002). As a result, disbursements of smaller loans can negatively impact MFI's financial returns. However, if smaller borrowers come up with better repayment rates, reduced-scale loans can have a positive impact on financial sustainability (Quayes, 2015), i.e. *Depth_Alb* has a negative relationship with financial sustainability.[17] The average loan balance per borrower is measured in monetary units. However, the same amount of money may mean different things in different countries depending on the average per capita income (Quayes, 2015; Gutiérrez-Nieto et al., 2009; Chmelíková et al., 2019). Since our sample includes MFIs in different countries in Europe, we divide the average loan balance per borrower by the GDP per capita to normalize the variation in income across countries.

3.2.3 Covariates

According to the existing literature, several control variables are used in our empirical analysis. We specifically used two types of covariates, i.e., MFI and country-specific controls. First, consistent with earlier literature, MFI-specific controls are grouped into 5 categories: size; age, regulatory status; leverage; legal types. Moreover, economic indicators, such as GDP and GDP growth, are included as country-specific covariates. The latter relates to the home country, which is also the country of operation, given the relatively small dimension of the MFIs in the sample. In particular, country-level variables are a good substitute for country fixed effects.[18]

Age: The age of an MFI indicates its experience and managerial ability. It is quantified as the number of years since its establishment. The longer the MFI's existence, the more it gains in terms of managerial experience, as its knowledge of the market and clients is reasonably deeper. Hence, older and more experienced MFIs should tend to better manage short-term losses than younger ones. However, the literature provides mixed evidence on the influence of the age of an MFI on its financial sustainability. For example, some studies (e.g., Ledgerwood, 1998) show that financial sustainability improves as MFIs become more mature. On the contrary, Hermes et al. (2011) reveal that age can be negatively associated with MFIs' sustainability. Their findings suggest that newer MFIs may leapfrog older institutions in terms of the financial sustainability of their activities. The expected effect is undetermined.

[17] In other words, *Depth_Alb* is an inverse measure of social sustainability, the larger the loan balance, the lower the social outreach.

[18] In fact, the inclusion of country fixed effects would involve a too large loss in terms of degrees of freedom compared to the small number of available observations.

MFIs size (Size): Size can influence financial sustainability as it reflects a firm's ability to compete with peers in the market. We use the logarithm of the total assets as a proxy of MFIs' size.

Regulatory status (Regulated): Regulatory process entails costs that can harm MFIs' financial sustainability. However, regulated MFIs are more likely to access low-cost depositor funding and gain clients' trust, and consequently improve their financial sustainability (Mersland and Strøm, 2009). In our analysis, we use the regulatory status as a dummy variable that is equal to one if an MFI is regulated and zero otherwise. In the baseline regressions, we will use the Regulated in a broad sense variable, we will then deepen the analysis using more specific regulatory measures, such as interest rate caps, and formulate some specific hypotheses regarding their effect on financial sustainability.

Leverage: We control for the MFI's leverage using the debt-to-equity ratio. On the one hand, financial leverage has been widely suggested as a potential factor affecting financial sustainability in light of the possibility that it could address agency problems in firms (Pham and Tram, 2020), a theory that may apply to MFIs as well. On the other hand, being a measure of risk, we expect that leverage could also negatively affect MFIs' financial sustainability, as excessive risk undertaking (especially in the form of risky assets) may deteriorate their loan portfolio. Hence the expected effect is undetermined.

MFIs' legal type: MFIs in our sample exist in four main types: Cooperatives (COOP), Non-Governmental Organizations (NGOs) Non-Bank Financial Intermediaries (NBFI), and Banks (residual category). Each of them has different agency and governance problems (Tchakoute-Tchuigoua, 2010); hence the relative weight of dual objectives adopted by them may be different according to their legal type (Servin et al., 2012). In particular, there is evidence that MFIs' sustainability can be affected by the preferences of their stakeholders and funding agencies (see Khachatryan et al., 2017 on Eastern Europe and Central Asia). We account for the effects on the outcome of MFIs due to their different objectives, including their legal types as covariates (Yimga, 2018). Also, the type of institution will be subject to more in-depth investigations in the remainder of the empirical analysis.

Finally, we include per capita gross domestic product (***GDP***) (constant 2015 US$) and ***GDP growth***, as they can impact the financial sustainability of MFIs.

3.3 Model of analysis

To determine the relationship between MFIs' financial and social sustainability, the following regression model is estimated:

$$\theta_{it} = \beta_0 + \beta_1 \text{Outreach}_{it} + \beta_2 \text{X}_{it} + \lambda_t + \varepsilon_{it} \quad (1)$$

where θ_{it} is the financial sustainability of the i^{th} MFI is measured by efficiency in year t, while Outreach_{it}, X_{it} are respectively our measures of social sustainability (explanatory variables) and covariates which were detailed in the previous sub-section. We include a year dummy variable (λ_t) to address potential time effects. ε_{it} is a zero-mean error term.

Since the efficiency score is continuous but falls between 0 and 1, ordinary least squares (OLS) regression is not appropriate. Turner et al. (2004) recommend using Tobit regression in such situations. However, Simar and Wilson (2007) argue that DEA efficiency estimates may be correlated with each other, and consequently yield inconsistent and biased estimates in the second stage. They propose an alternative double bootstrap procedure that permits the valid inference in the second-stage regression while simultaneously constructing confidence intervals and producing standard errors for the efficiency scores. We, therefore, use the truncated bootstrap methodology to support the base Tobit output. The bootstrap estimates are produced using 2000 bootstrap replications (Simar and Wilson, 2007).

4. RESULTS

4.1 Descriptive statistics

Table 3, Panel A, presents the summary statistics for all the variables used in the regression. As we have seen from Table 2, the efficiency scores of MFIs in Europe have an average value of 0.465.[19] Concerning explanatory variables, the breadth (*Breadth*) of social sustainability, measured by the number of active borrowers, has a mean of 9,343. In terms of depth of social sustainability, the outstanding loan balance divided by per capita GDP (*Depth_Alb*) exhibits a mean of 0.251, while, on average, the percentage of women (*Depth_Women*) is 44%. Table 3 also shows that MFIs have on average 20 years of operation (*Age*), while on average 77% of MFIs are regulated by the banking authorities. Finally, nearly 41% MFIs in our sample are NGOs, 25% are NBFI, 32% are credit cooperatives, and less than 2% are banks. Debt-to-Equity (*Leverage*) is 3 on average.

[19] This value is slightly less than to the mean efficiency score (0.588) of MFIs in Eastern Europe and Central Asia reported in Khan and Shireen (2020).

4.2 Correlations among the variables

The correlation matrix of the dependent and independent variables is presented in Table 4. Coefficients show that social sustainability indicators sometimes exhibit a significant correlation (*Depth*_WOMEN) with financial sustainability. This provides partial tentative support for the hypothesis that at least part of MFIs' social sustainability commitments could have a positive impact on financial sustainability, measured by efficiency. Explanatory variables are occasionally correlated with efficiency.

4.3 Regression results

In Table 5, columns (a)-(b) we present the results of the Tobit and Truncated bootstrap regressions, respectively. Overall, results are comparable across techniques. [20]

The breadth of social sustainability (*Breadth*) is positive and significant ($p < 0.01$), suggesting that European MFIs that seek to expand their financial inclusion on the extensive margin exhibit greater efficiency. Also, the percentage of women borrowers (*Depth*_WOMEN) has a positive and significant relationship with efficiency scores ($p < 0.05$), indicating that gender plays a noteworthy role in determining the financial sustainability in Europe, not unlike what emerges from similar analyses on MFIs outside the European context.

On the one hand, these are both signals of possible complementarities between the two bottom-line purposes of MFIs (social sustainability and financial sustainability). On the other hand, positive and significant ($p < 0.01$) coefficients are also observed for the *Depth_Alb* variable, suggesting that increases in the loan size have a positive impact on European MFIs' financial sustainability. This finding is consistent with most of the previous research, also regarding less developed contexts (Hermes et al., 2011; Mia et al., 2019) that shows that MFIs that focus more on wealthier clients (i.e., are less socially sustainable) tend to be more financially sustainable. This trade-off between social and financial sustainability is typically attributable to the relatively high transaction costs associated with small loans; thus, increased depth of social sustainability comes at higher service and administrative costs.

Overall, these preliminary findings suggest that efficiency scores and both the breadth and the depth-side of social sustainability measured by the share of women borrowers could foster financial sustainability. However, a trade-off exists between financial sustainability and the depth side of social sustainability measured by average loan size.

[20] Columns (c)-(f) alternatively include *Breadth* and *Depth_Women.*

Turning to the control variables, the baseline regressions document several significant relations, although any substantial differences compared with the microfinance environment outside Europe are observed. The coefficient of MFIs' age seems to have a positive and significant ($p < 0.1$) effect on financial sustainability, indicating that older MFIs are more efficient, confirming the previous analysis by Ledgerwood (1998). MFIs' size measured by the log of total assets exerts a negative and significant relationship on efficiency ($p < 0.1$), suggesting that larger MFIs could be less efficient.[21]

The dummy *Regulated* exhibits positive and significant parameters ($p < 0.01$). This result confirms earlier findings (eg., Strøm et al., 2014; Iqbal and Ehsan, 2019) and is consistent with the proposition that MFIs with reasonably riskier portfolios due to weaker regulatory controls earn lower returns and are less self-sufficient. However, none of the legal types of institutions exerts a significant influence on efficiency. This may be due to the high correlation between the variable Regulation and the legal types (see Table 4). We will go in depth with the standards of regulation in the European context in the next sections.

Finally, the coefficient concerning the relationship between leverage and financial sustainability is negative, but not statistically significant. This suggests that leverage does not exert any perceptible bearing on financial sustainability or plays an ambiguous role, as discussed above.

4.4 Regression results with efficiency score calculated assuming an input-oriented model

Our main analysis is based on the assumption that MFIs strive to maximize outputs given limited available inputs. However, there are some possibilities that MFIs are unable to increase outputs mainly due to reasons such as geographical characteristics and regulatory restrictions, and therefore, they tend to lower inputs to increase their efficiencies (Widiarto and Emrouznejad, 2015). Thus, to provide a broad comparison, we start repeating our main regressions with efficiency scores obtained assuming input-oriented VRS. Results are reported in Table 6. We obtain outputs that are comparable to those of the main analysis in Table 5.

5. TESTING ALTERNATIVE HYPOTHESES: THE ROLE OF SUBSIDIES, INTEREST RATES, GEOGRAPHICAL CHARACTERISTICS, AND REGULATION

5.1 The role of subsidies

[21] Notice that higher total assts (i.e., larger MFIs) does not necessarily imply that these institutions also pursue lending on the extensive margin (high breadth of social sustainability). Indeed, they may offer few loans of relatively high amount than smaller MFIs with higher breadth of social sustainability which offering a larger number of small-sized loans.

The welfare system of European countries provides generous state interventions on the microcredit market. This is because microcredit is considered a full-fledged social policy instrument addressing both the labor market failure and the credit market failure (De Bandt and Nowak, 2006). Like MFIs worldwide, European MFIs receive also private grants (Hudon and Traca, 2011). In general, because European MFIs are highly publicly or privately subsidized they are likely to be closely scrutinized by the regulators, who monitor the fulfillment of their social mission of serving disadvantaged populations (Cozarenco and Szafarz, 2018).

On the one hand, the presence of subsidies in MFIs' balance sheets could be the result of the effort of awarded financial support thanks to better financial sustainability. In turn, subsidies may represent an extra source of (costless) input that can help MFIs reduce operating expenditures, with the result of better financial performance. On the other hand, however, subsidies may be a means to lower per-loan costs and thus achieve higher financial sustainability. If one of these hypotheses holds, we would observe a positive relationship between the a mount of subsidies received and MFIs' financial sustainability.

However, subsidies could also constitute a disincentive to efficient behavior on the part of MFIs which are less stimulated to pursue an efficient cost management policy (Yunus, 2007, Armendáriz et al., 2011). In this case, a negative relationship between the amount of subsidies received and MFIs' financial sustainability would follow.

In our sample, 39 MFIs are subsidized.[22] To provide a comparison between the different theories on the role of subsidies in our context, we repeat the main regressions by including the amount of grants and subsidies received by each MFI at the end of the year. The regression output is reported in Table 7. Estimates provide evidence of a negative relationship between the amount of subsidies received and the financial sustainability of the MFIs, supporting the disincentive hypothesis described above. The parameters associated with the social sustainability variables do not differ from those of the main analysis in Table 5.

5.2 Interest rates

As we have previously pointed out, since the pursuit of social objectives leads to an increase in operational and administrative expenses associated with the provision of loans (Abrar and McMillan, 2019), MFIs, especially those not subsidized, pass these costs on to the most disadvantaged economic groups. to be financially sustainable (Ledgerwood, 1999; Christen, 1998;

[22] The fact that only a share (although substantial compared to that observed in other contexts) of MFIs are subsidized, does not allow the inclusion of subsidies in the estimation of the efficient frontier (i.e., the variable would contain an excessive number of zeros).

Morduch, 1999). We, therefore, expect MFIs that charge higher interest rates to perform better from a financial point of view.

In consideration of the fact that interest rates vary substantially with the type of loan (Section 3.2), in the regression analysis, we consider separately the samples of MFIs that provide business credit from those that provide personal loans. The regression output (Table 8) confirms the hypothesis that higher interest rates, ceteris paribus, are associated with higher economic sustainability of MFIs. This does not apply to personal loans, probably because restrictions on rates aimed at consumer protection prevent MFIs from passing on the higher costs of managing the loan to the borrowers. We will explore these aspects further in the analysis.

5.3 Divide sample

5.3.1 MFI size, geographical region, loan type, and interest rate regulation

To refine our analysis, we tested specific hypotheses dividing our sample according to some criteria on which we ground our assumptions. The choice of the breakdown criteria was driven by substantial differences among sub-groups of MFIs in Table 3 (Panel B). Specifically, we split the database into different categories of MFIs according to size, geographical area, presence of specific regulations on interest rates, and type of loan.

5.3.2 MFI size

We test the hypothesis that larger MFIs may record higher efficiency, possibly benefitting from higher-scale economies and lower operating costs. Our idea is that larger MFIs support their better financial sustainability by using a more standardized approach to lending, reaching efficiency through better performance on extensive margin but at the price of drifting from more vulnerable, less financially competent, and needy customers, often requiring BDS and other tailored forms of financial assistance beside credit.

Simple mean comparisons in Table 3 (Panel B) indicate that larger MFIs (total assets greater than 1,000,000 euros) offer larger loans in relation to per capita GDP (0.29 versus 0.23), serve a lower percentage of women (25% against 26% of smaller MFIs) and offer more loans on the extensive margin (8,437 average borrowers against 6,792 of smaller MFIs). They are also more efficient than small MFIs (efficiency score of 0.49 against 0.45 for smaller MFIs).

The regression output of the analysis for the divided sample based on size confirms this pattern (Table 9, Panel A). The coefficients concerning the relationships between the *Breadth* of social and financial sustainability of both large and small MFIs are positive and statistically significant, but those

for big MFIs are larger in magnitude. This suggests that MFIs' commitment to financial inclusion in terms of the number of clients served exerts a noticeable bearing on financial sustainability, especially for larger MFIs. However, the higher magnitude of the coefficient associated with *Depth_Alb* in larger MFIS is supportive of our hypotheses that they more heavily exploit loan size to achieve higher efficiency, while drifting from social sustainability objectives.

In addition, the non-significant coefficient associated with social sustainability measured by Depth_*Women* in large MFIs indicates that their financial sustainability is not leveraged by lending to women. This relationship is instead positive and significant for smaller MFIs, providing further support to our hypothesis that larger MFIs tend to achieve higher efficiency through the extensive margin, but at the price of drifting from more vulnerable customers. In other words, smaller MFIs tend to care more about women borrowers and this brings them more advantages in terms of financial sustainability. This does not seem to be a particularly surprising result in consideration of the fact that the smaller MFIs are represented by NGOs and the cooperative sector, which tend to care more for disadvantaged customers by also providing non-business services, such as health and education programs, especially to women. At the same time, consolidated evidence of microfinance is confirmed, such that serving female customers leads to better economic outcomes thanks to women's better ability to manage loans and pay them back on time.

5.3.3 Loan type

Loan types, business or personal, may also have significant effects on MFIs' efficiency. Summary statistics (Table 3, Panel B) indicate that personal loans tend to be of smaller amounts (*Depth_Alb* 0.19 on per capita GDP) compared to business loans (*Depth_Alb* 0.33 on per-capita GDP). Additionally, MFIs offering greater shares of personal loans look also more committed to women borrowers (*Depth_Women* 31%) compared to MFIs offering business loans (*Depth_Women* 25%).[23]

We test the hypothesis that the greater social sustainability of MFIs offering personal loans is supported by their positive relationship with a higher percentage of women served and smaller loan sizes. The regression outcome should therefore represent a corollary of the implications derived in terms of asset size in the previous sub-section, given that larger MFIs tend to be more business-oriented, while smaller MFIs tend to be more oriented towards offering personal loans and greater attention to serving the poorest (Table 3, Panel A).

Table 9 (Panel C) reports the regression results for the divided sample according to the type of loan offered. Overall, the regression outcome suggests that MFIs that offer personal loans are more

[23] Notice that the two samples of business and personal loans tend to overlap for MFIs that offer both types of loans.

likely to achieve financial sustainability by serving a higher percentage of female clientele, reproducing the results obtained by dividing the MFIs according to their size.

5.3.4 Geographical area

In this and the following subsection, we aim at deepening the analysis of MFIs' geographical location and country regulation. We posit that the main differences between MFIs established in Western Europe, compared to those operating in Eastern Europe are mostly driven by regulatory constraints (Cozarenco and Szafarz, 2016 and 2018). Precisely, we test the hypothesis that Western MFIs are subject to a more binding regulatory framework than their Eastern counterparts and this puts them in a more disadvantageous position in terms of financial sustainability. Furthermore, since regulation may pertain to UE institutions,[24] we also performed regressions only on the sub-sample of non-EU countries.[25]

Precisely, we test the hypothesis that MFIs operating in the EU (especially Western) experience difficulties in leveraging efficiency on a depth dimension due to regulatory constraints. Too restrictive regulations, such as interest ceilings and limits on loan amounts are an example of curbing the possibility to cover the relatively higher operational costs stemming from serving the weaker clientele through small and tailored loans. To comply with financial sustainability, MFIs often need to shift part of these costs onto borrowers, but regulation may impede them to do it.

Conversely, MFIs in countries outside the EU and less-regulated countries in the EU (like former transition countries) can more easily lend to the poorest and most disadvantaged fringes of the population without being subjected to strict constraints in the terms of the loan disbursement and interest rate regulation.

Summary statistics (Table 3, Panel B) show that the MFIs in the Non-EU have a larger loan portfolio (9,111 borrowers on average, against 7,611 and 6,858 of Eastern and Western MFIs, respectively), and offer higher amounts over per capita GDP (0.30 against 0.28 and 0.13 of the overall Eastern MFIs and Western counterparts). Like the rest of Eastern European MFIs, they serve a greater percentage of women (32%), compared to 23% of Western European MFIs. Non-EU MFIs are also the most efficient (efficiency score of 0.60 against 0.50 for the overall set of Eastern European MFIs, and 0.34 for Western MFIs).

The regression results for the divided sample according to geographical macro-areas (Table 9 (Panel B)) suggests that deeper involvement of Eastern MFIs in social sustainability helps them to achieve a greater level of financial sustainability, especially on the intensive margin. The parameters

[24] For instance, the European Commission proposed in 2011 the European Code of Good Conduct for Microcredit Provision, with the hope of setting standards for microfinance stakeholders (European Commission, 2013).
[25] Non-EU MFIs are a subset of the sample of Eastern MFIs.

associated with *Depth_Women* are indeed significant, contrary to what happens for Western MFIs. Eastern MFIs also show a significant parameter associated with *Depth_Alb*, possibly indicating that less strict regulation on loan amounts allows them to extend more credit in the form of business loans, of larger amounts.[26] Overall, MFIs' financial sustainability in Eastern regions is sensitive to both the breadth and depth of social sustainability, whereas those in Western Europe are sensitive only to the breadth of social sustainability. Overall, our hypothesis that MFIs operating in the EU (especially Western) cannot leverage efficiency on a depth dimension is confirmed.

5.3.5 Regulation on interest rate caps

To go further in depth with the regulatory aspects, we focus on the regulation imposing limits on the interest rate. From the economic side, although low interest rate ceilings fall under client protection, they impede the financial sustainability of MFIs as the latter cannot easily cover the higher operational costs associated with BDS provision to the weaker clientele, as detailed above (Bellazzecca and Biosca, 2017).

With the Consumer Credit Directive of 2008 (Directive 2008/48/EC), the EU has proceeded with the harmonization of consumer-related rules in the different Member States. The applicable caps vary with the MFI's legal status (bank versus non-bank), the type of loans (business versus personal), and their duration and size (Cozarenco and Szafarz, 2018). The wide range of credit products and associated interest rate ceilings does not allow us to comprise them all in our empirical study, given that the gaps between the market interest rates and the maximum interests allowed on each type of credit vary by country, through time, and by financial product. In addition, the existence of legal rules as such does not reveal how effective these rules are.

Considering all these aspects, we opted for the inclusion of a dummy indicating countries where ceilings are imposed by national laws. According to a country-report conducted by Reifner et al. (2010), the nations imposing interest rate ceilings as of March 2010 were: Greece, Ireland, Belgium, France, Germany, Italy, Netherlands, Poland, and Spain.[27] In our analysis we use the partition indicated by Maimbo and Gallegos (2014), dividing the sample into countries where the regulation imposes restrictions on interest rates and unrestricted countries.

In our sample, besides the existence of general regulation on financial institutions, the MFIs subject to interest rate caps are less efficient (average DEA efficiency score of 0.28) compared to the

[26] According to EMN, half of the European countries impose loan ceilings, ranging from EUR 5,000 for personal microloans granted by licensed French MFIs to EUR 2,500,000 for business microloans by non-bank Finnish institutions (Cozarenco and Szafarz, 2019). In addition, as already mentioned, the European Commission recommends a EUR 25,000 ceiling (European Commission, 2013).

[27] The true incidence of interest rate caps is difficult to quantify for non-EU members, if only because most of them are not subject to such restrictions.

rest of the sample (average DEA efficiency score of 0.50). The sample of MFIs operating in countries with regulatory limits to interest rates serve a lower average number of borrowers (6,584 compared to 7,631 of the unrestricted interest rate sample), have fewer women customers (23% against 26%), while granting lower average loan amounts over per capita GDP (0.24 against 0.33) (Table 3, Panel B).

Table 9 (Panel D) reports the regression results for the divided sample according to whether an MFI is established in a country where the regulation imposes interest rate caps. The results substantially reproduce what has been observed in terms of a geographical partition. It is no coincidence that the presence of interest rate restrictions is more frequent in Western European countries, which in general are subject to more restrictive financial regulation. A noticeable effect is observed in terms of obstacles that interest rate caps represent for the service of weaker female customers and, its negative consequences to the achievement of efficiency objectives through the service of this fringe of potential debtors. This is evidenced, specifically, by the negative coefficient associated with the *Depth_Women* variable in the regressions in Table 9.

6. ROBUSTNESS ANALYSIS

6.1 Tackling endogeneity of social sustainability measures: GMM and IV estimation

An important issue in studying the relation between efficiency levels and financial indicators is the direction of causation. This direction is not clear ex-ante, meaning that the endogeneity of some variables involved in the model may be a concern. Endogeneity problems, in general, have been widely studied in the econometrics literature (see, for instance, Angrist et al., 1996; Antonakis et al., 2010; Wooldridge, 2010). However, within the microfinance literature dealing with the financial – social sustainability relationship, this issue has not received much consideration.

In our specific context, although the use of MFIs' covariates and country-specific indicators allows us to minimize the possible bias in estimating the impact of social sustainability on MFIs' financial sustainability, endogeneity and the consequent inconsistent estimation of some key social sustainability variables cannot be ruled out. Specifically, simultaneity and time-invariant unobserved heterogeneity across MFIs could give rise to undesired correlation phenomena between proxies of social sustainability and the error term in equation (1). We chose to limit this problem by exploiting the presence of allegedly exogenous variables in both GMM and Instrumental Variable (IV) regressions.

In particular, there are two hypotheses on which we rely to motivate the choice of IVs. The first is the fact that some covariates (namely, COOP NGO NBFI, and *Leverage*) are not significant

in the Tobit and Truncated baseline regressions of Table 5. This suggests that these variables can reasonably be considered exogenous with respect to the (unexplained component of) efficiency. This should safely allow us to consider them as possible instruments for social sustainability.[28]

In addition, we use the lagged value of the efficiency estimate as an additional instrument for social sustainability.[29] This is likely to be correlated with the endogenous variables in the next year under the hypothesis that relatively highly efficient MFIs in the previous year can devote more resources to social objectives in the following year, relaxing somehow the constraints set up to manage competition with their counterparts. The degree of exogeneity of the lagged efficiency scores in *t-1* depends on how current performance in *t* is related to past performance. If the hypothesis according to which autocorrelation is not strong, the instrument can be considered exogenous. We will check both the exogeneity and the strength hypotheses in the IV setup, performing the appropriate diagnostic tests.

The results obtained through GMM and 2SLS, along with associated tests are reported in Table 10. GMM in column (a) is formerly conducted considering all the three proxies of social sustainability (*Breadth*, *Depth_Women*, and *Depth_Alb*) as endogenous, using the full set of covariates and the lagged efficiency score as instruments. In this case, the parameters associated with *Breadth* and *Depth_Women* social sustainability indicators turn significant in promoting MFIs' efficiency and the estimated parameters are fully comparable with those of the baseline regressions in Table 5. *Depth_Alb* , instead, is no more significant, indicating possible endogeneity of the trade-off between this measure of social sustainability and loan dimension in the baseline regressions.

However, the GMM technique does not allow accurate diagnostics in terms of the quality of the instruments, which IV estimates can instead provide. Therefore, in Column (b) we proceed to the IV estimation using the Two-Stage Least Squares (2SLS) estimator, again considering all the covariates and the lagged efficiency score as instruments in the first estimation stage. Under this condition, the results obtained through the GMM regressions of column (a) are confirmed and parameters associated with the social sustainability variables do not differ to a large extent. Nonetheless, although the Hansen J statistic (overidentification test of all instruments, i.e.) can be considered satisfactory in terms of exogeneity requirements, the Kleibergen-Paap rk LM statistic (Underidentification test) is sometimes unsatisfactory, and the Kleibergen-Paap rk Wald F statistic does not exclude the possibility that the instruments are weak.

To enhance the role of the IVs, we choose to instrument one endogenous variable at a time. Furthermore, we opt for considering as exogenous only the variables that were not significant in the

[28] Hansen J statics tests will be computed to verify the exclusion hypothesis.
[29] Note that due to the one-year lag of the efficiency score only a cross-sectional estimate for the year 2017 is allowed.

baseline regressions of Table 5 (COOP, NGO, NBFI, *Leverage*, GDP, and GDPG, also adding the lagged efficiency score), while treating *Age Size* and *Regulated* as endogenous (included instruments), as they turned significant in baseline regressions.

We observe that both the volume of clients served (*Breadth*) and the percentage of female customers (*Depth_Women*) are still significant in promoting MFIs' efficiency (Columns (c) and (d), respectively) and the associated effects are larger than in the baseline regressions, possibly reflecting a negative type of endogeneity among the variables at stake. Conversely, the link that goes from social sustainability in terms of service to the poorest customers (*Depth_Alb*) to MFIs' efficiency is still not confirmed causally, excluding the possibility of a trade-off between financial sustainability and the *Depth_Alb* measure of social sustainability.

As expected, as far as diagnostics are concerned, the Kleibergen-Paap rk LM statistic becomes significant by instrumenting one social sustainability variable at a time, except in column (d) where it is only significant at the 20% level. Still, according to the Kleibergen-Paap rk Wald F statistic, the instruments appear somewhat weak, although the values of the F statistic are larger than in the simultaneous instrumentation of all the social sustainability variables.[30]

Finally, the exogeneity of the instruments is still supported by the Hansen J statistic, except in Column (e).

6.2 Impact of Social Sustainability on alternative Financial Sustainability measures

In support of the output obtained in the previous sub-section, we analyze the impact of the social sustainability variables on financial sustainability measures alternative to efficiency scores.

Specifically, we consider two measures of general profitability, Return on Assets (ROA) and Return on Equity (ROE), and one related to the specific profitability of the loan portfolio (Portfolio yield). Then, we analyze the role of social sustainability on the financial sustainability of MFIs using Operational self-sufficiency (OSS), as well as the risk of the loan portfolio. In particular, it is recognized that the portfolio at risk may play a role in MFI's financial sustainability (Mersland and Strøm, 2009). It is measured by the fraction of the loan portfolio 30 days overdue (PAR30). Finally, we analyze the effects of social sustainability measures on the costs of MFIs (Operational Expenses and Financial Expenses).

[30] In light of our concerns about weak instruments, we further investigated the robustness of our study model using the Lewbel (2012) instrumental variable approach, which has been frequently employed in prior research (Bhattacharya et al., 2020; Grohmann et al., 2018; Chauhan and Kumar, 2019). In contrast to the traditional 2SLS estimates, this method has the benefit that it does not rely on conventional instruments and instead uses heteroskedasticity limits to obtain identification without exclusion restrictions (Grohmann et al., 2018). This technique creates instrumental variables that are correlated with endogenous variables by taking advantage of the heteroskedasticity in the error process (Dong et al., 2018). The regression output is reported in Appendix B (Table B8). Results do not show any substantial difference compared to those obtained in the main analysis.

In Table 11 we report a summary of the analysis of the impact of the social sustainability variables on the various financial sustainability and risk indicators.[31] From the overall results obtained using different estimation techniques (OLS, GMM, IV) it can be observed that the Breadth of social sustainability plays a significant and positive role in MFIs' profitability (positive coefficient of *Breadth* on ROA and ROE) and their financial sustainability (positive coefficient of *Breadth* on OSS), confirming the previous analysis. Although, on the one hand, granting a greater number of loans seems to take place at the expense of the portfolio profitability (as indicated by the significant and negative parameter of *Breadth* on Portfolio Yield), on the other hand, it seems to involve a substantial reduction in the risk of the portfolio (as shown by the significant and negative parameter of *Breadth* associated with PAR30) and reduction of both Operational and Financial expenses. Therefore, it appears that cost reduction and lower risk generated by the extension of the number of loans override the effect of the lower profitability of the portfolio, inducing a net beneficial impact on the MFIs' performance in terms of profitability and financial sustainability.

From the depth of social sustainability side, it is interesting to observe how the presence of a greater share of female clients (*Depth_Women*) induces a positive and significant increase in Operational Self Sufficiency (positive coefficient of *Depth_Women* on OSS), while smaller loans (Depth_Alb) tend to significantly improve both profitability and financial sustainability of the MFIs (positive coefficients of ROE, ROA, and OSS). Under this perspective, it is noteworthy observing that an increase in the intensive margin through the granting of smaller-scale loans appears to have a positive effect on the profitability of MFIs through the reduction of risk (negative coefficient of *Depth_Alb* on PAR30) and Operational and Financial expenses (negative coefficient of *Depth_Alb* on both Operational Expense ratio and Financial Expense ratio), despite the lower profitability of the loan portfolio (negative coefficient of *Depth_Alb* on Portfolio Yield).

7. CONCLUSION

This research aimed to investigate the relationship between European MFIs' social sustainability and their financial sustainability, proxied by efficiency measures. Using original data from a survey conducted by the authors with the support of the European Microfinance Network (EMN) and the Microfinance Centre (MFC), we carried out an analysis in the understudied context of the European microfinance sector, which differs from that of LDCs, in that it is characterized by younger and relatively smaller microcredit providers, regulated under several different country standards, higher reliance on subsidies, and relatively scarce attention to female borrowers.

[31] The complete regression output is reported in Appendix B (Tables B1-B7).

We found that social sustainability on an extensive margin (measured by the volume of clients served) can promote MFIs' efficiency. This result is robust to several checks, including MFI's size, geographical area, loan type, regulatory features, and possible endogenous nature among the key variables. The relationship between social sustainability on the intensive margin (service of female customers and the poorest) is instead conditional upon the size and geographic location of MFIs, while the causal link that goes from social sustainability in terms of service to the poorest customers to MFIs' efficiency is sometimes questionable, deserving some further research to be investigated.

Specifically, we provide evidence of a positive effect of the depth of social sustainability in the form of loans provision to female borrowers on MFIs' financial sustainability (confirming the evidence of other studies, such as Aubert et al., 2009; Goetz and Gupta, 1996, among others), this link is stronger for Eastern European MFIs, smaller and less regulated institutions, mainly providing personal loans. Conversely, the depth of social sustainability in the form of financing the very poor (small-sized loans) seems to adversely affect financial sustainability (confirming the evidence of other studies conducted in the non-European contexts, such as Navajas et al., 2000 in Bolivia): apart from Western European and more strictly regulated institutions (especially through the imposition of interest rate caps), which do not show any relationship between loan size and financial sustainability, all other MFIs tend to show a positive relationship between loan size and financial efficiency. On the one hand, financing the poor may reduce portfolio risk (confirming previous evidence that the poor can be reliable borrowers), while, on the other hand, it may also reduce profitability (as perhaps the relatively high unitary costs per loan cannot be shifted on borrowers due the constraint represented by interest rates ceilings, confirming Paxton and Cuevas, 2002 and several other related studies).

To overcome these difficulties, MFIs (especially those established in the Western EU) heavily rely on public and private subsidies, also seeking to find partnerships with banks to achieve better financial performance. However, in our study, we find that a higher degree of subsidization is negatively related to financial performance, possibly because subsidies represent a form of disincentive to increase efficiency. In addition, finding partnerships with banks may involve a drift to more standardized lending, which come at the expense of providing more tailored products, which may particularly benefit small and more vulnerable borrowers, such as women.

Further research could focus on the saving promotion by the MFIs, which could represent a form of loanable assets alternative to more expensive fund provision. The breadth of social sustainability seems indeed positively associated with the mobilization of savings, as observed by Khachatryan et al. (2019). Also, solutions that can improve the use of internal (financial, as well as human) resources by MFIs while not penalizing their social sustainability would be welcome in the coming years. Reasonably, as was the case for the period 2007-2013, programs and agreements at the

national and EU level will be renewed or improved to bring them into line with the evolution of microfinance. A review of the JASMINE (Joint Action to Support MFIs) program should be geared towards changes both in terms of the number of beneficiary MFIs (increase from 70 MFIs to a fixed quota per country) and in terms of initiatives. Therefore, not only a definition of the funds to be distributed to MFIs but also a path of support and advice for better management of internal resources is needed. A project to supervise and coordinate national regulatory bodies could also enable each country to have legislation that is as accurate and appropriate to its context.

Robustness analysis conducted in this study on individual measures of financial sustainability, such as ROA, ROE, OSS, etc., seems to indicate that an increase in both the extensive and intensive margins of social sustainability appears to have a positive effect on the profitability of European MFIs through the reduction of the loan risk and MFIs' costs, despite the lower profitability of the loan portfolio, inducing positive net benefits on MFIs' profitability.

The overall view shows a sector that is operatively ready to serve increasing volumes of poor customers and more female borrowers. However, the critical aspect of European MFIs seems to be their higher reliance on subsidies and incentive schemes for microfinance at the national and EU level, along with a regulation that is scarcely tailored to the microfinance sector (see details in Cozarenco and Szafarz, 2016 and 2018). A structured regulatory framework, more focused on social sustainability variables could therefore improve microfinance conditions in the years to come, especially considering that the number of MFIs will vary with the growing number of individuals rationed from the traditional credit circuit. Indeed, recent repeated crises may both increase the number of poor and exacerbate banks' reluctance to grant credit, due to increased risk. Nonetheless, smaller and possibly less regulated MFIs, seem to more easily accomplish social sustainability.

Looking at the future of the European micro-credit sector, it is possible to foresee an increase in both supply and demand, guaranteed by the evolution of the MFIs already established in this area and the entry of new ones. Effective achievement of the objectives of social inclusion of individuals and SMEs will require the support of national regulatory bodies, which should evolve appropriately to provide legislation that promotes the financial sustainability of MFIs without disqualifying their social character. Finally, future research points toward further investigating the causal link between the pursuit of the depth of social sustainability and financial sustainability.

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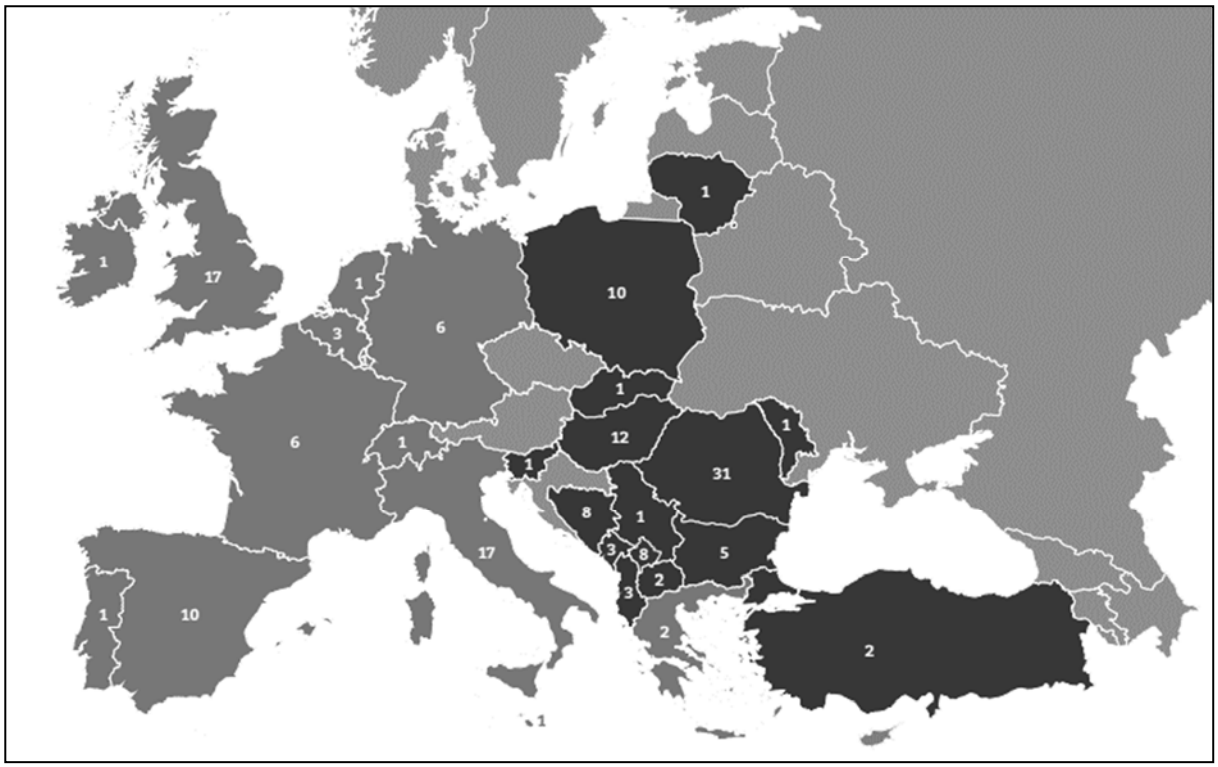
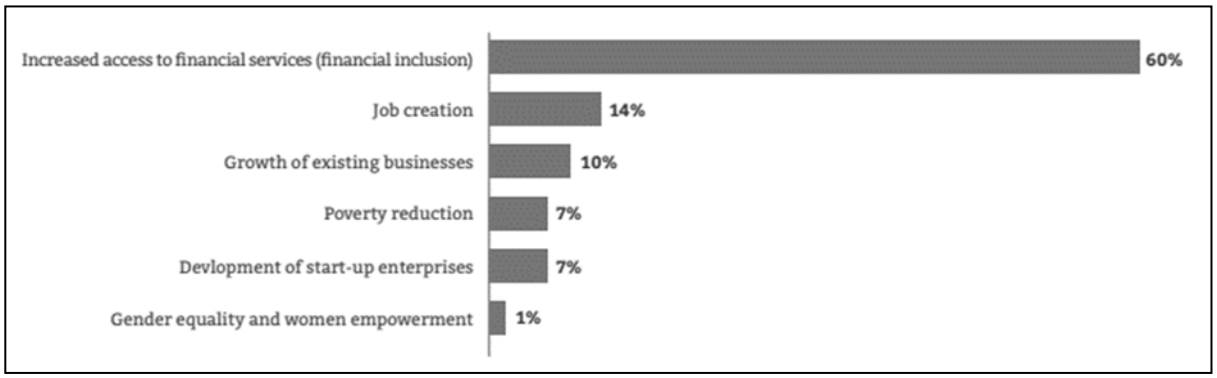
TABLES AND FIGURES

Figure 1 - MFIs by country and region (respondent institutions)



Notes. Source: European Microcredit Survey 2016-2017

Figure 2 - Share of MFIs by mission



Notes. Source: European Microcredit Survey 2016-2017

Figure 3 - Country wise Mean efficiency scores

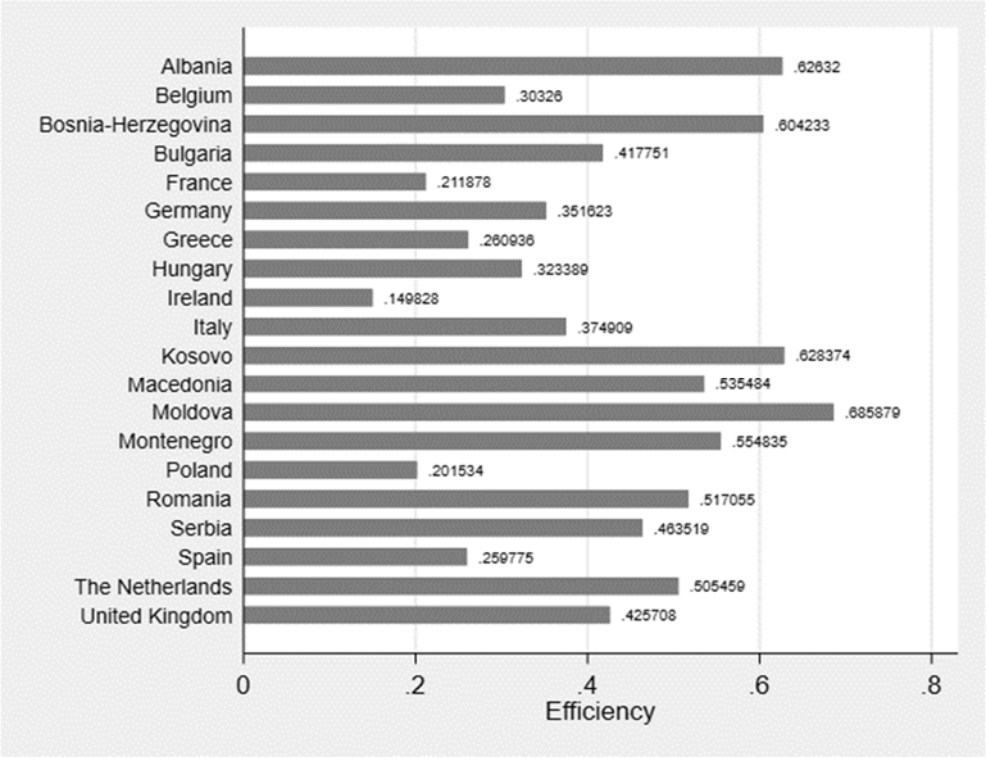


Table 1 – Main descriptive statistics from the original survey on European MFIs, 2016-2017

Variable	N	Mean	Std. Dev.	Min	Max
Average loans per MFI 2016 (number)	135	6762	24571	2	263768
Average loans per MFI 2017 (number)	138	7162	27395	5	301418
Average business loans per MFI 2016 (number)	99	3895	10859	2	57400
Average business loans per MFI 2017 (number)	102	3987	11161	2	61000
Average personal loans per MFI 2016 (number)	76	6938	24324	3	209259
Average personal loans per MFI 2017 (number)	77	7555	28007	1	243472
Average loan size 2016 (euro)	130	6376	8184	1	66667
Average loan size 2017 (euro)	131	6643	8003	1	54409
Average business loan size 2016 (euro)	94	8625	7946	1	61340
Average business loan size 2017 (euro)	95	8999	7485	1	54409
Average personal loan size 2016 (euro)	75	3061	9040	1	66667
Average personal loan size 2017 (euro)	76	3098	7694	1	50000
Percentage of women borrowers (business loans) 2016	81	0.396	0.226	0	1
Percentage of women borrowers (business loans) 2017	83	0.405	0.224	0	1
Percentage of women borrowers (personal loans) 2016	70	0.486	0.216	0	1
Percentage of women borrowers (personal loans) 2017	73	0.477	0.220	0	1
Average business loan term (in months)	93	45	24	1	120
Average personal loan term (in months)	77	31	18	5	120
Average number of employees 2016	147	98	368	1	3679
Average number of employees 2017	147	100	363	1	3644
Annual interest rate average 2016-17 (business loans)	92	0,109	0,080	0,002	0,343
Annual interest rate average 2016-17 (personal loans)	77	0,176	0,149	0,012	0,950

Notes. Own elaboration on data from European Microcredit Survey 2016-2017.

Table 2 - Descriptive statistics of inputs and outputs for DEA

Variables	Definition	N	Mean	Std. Dev.
Inputs:				
Total assets (’000)	Total of all net assets (Euro)	159	33800	147000
Number of employees	Number of individuals who are actively employed by the MFI	159	55	87
Operating expenses (‘000)	Expenses related to operations (Euro)	159	2085	5035
Output:				
Financial revenue (‘000)	Revenue generated from the gross loan portfolio and investments(Euro)	159	3545	14400

.Average values 2016-2017

Table 3

PANEL A – Descriptive Statistics for regression analysis

variable	N	Mean	Std. Dev.	min	Max
Efficiency	159	0.465	0.196	0.036	0.922
Breadth ('000) [(a)]	159	9.343	32.662	0	301.418
Depth_Women [(b)]	159	44	22	0	97.5
Depth_Alb [(c)]	155	0.251	0.370	0	2.225
Age	159	20.044	13.089	1	64.000
Size ('000) [(d)]	159	33800	147000	50	1420000
Large MFIs [(e)]	63				
% Business loans		84			
% Personal loans		42			
Small MFIs [(f)]	93				
% Business loans		49			
% Personal loans		73			
Regulated	159	0.774	0.420	0	1.000
COOP	159	0.321	0.468	0	1.000
NGO	159	0.409	0.493	0	1.000
NBFI	159	0.252	0.435	0	1.000
Bank	159	0.019	0.136	0	1.000
Leverage	159	3.049	4.473	0	35.651
Subsidies if Regulated ('000 €)	120	1,184	4,228	0	2,4200
Subsidies if non Regulated ('000 €)	39	246	646	0	2587

(a) Nr borrowers; (b) % over total borrowers; (c) Outstanding loan balance divided by per capita GDP; (d) Total assets; (e) Total assets greater than 1,000,000 €; (f)Total assets lower than 1,000,000 €

PANEL B – Descriptive Statistics for regression analysis: Subsamples

	Small (N=93)				Large (N=63)			
Variable	Efficiency	Breadth	Depth_Wom	Depth_Alb	Efficiency	Breadth	Depth_Wom	Depth_Alb
Mean	0.453	6.792	26.322	0.231	0.485	8.437	24.898	0.290
Std. Dev.	0.176	1.597	15.756	0.390	0.224	2.089	18.713	0.341
	West (N=32)				East (N=124)			
Variable	Efficiency	Breadth	Depth_Wom	Depth_Alb	Efficiency	Breadth	Depth_Wom	Depth_Alb
Mean	0.341	6.858	22.584	0.130	0.498	7.611	26.564	0.283
Std. Dev.	0.190	2.644	16.195	0.153	0.186	1.748	17.130	0.401
					Non-UE (N=44)			
				Variable	Efficiency	Breadth	Depth_Wom	Depth_Alb
				Mean	0.600	9.111	32.404	0.296
				Std. Dev.	0.109	0.977	24.479	0.144
	Business (N=99)				Personal (N=107)			
Variable	Efficiency	Breadth	Depth_Wom	Depth_Alb	Efficiency	Breadth	Depth_Wom	Depth_Alb
Mean	0.435	7.229	25.073	0.325	0.528	8.189	30.751	0.186
Std. Dev.	0.217	2.317	20.312	0.441	0.167	1.553	17.492	0.163
	i cap (N=26)				i no cap (N=130)			
Variable	Efficiency	Breadth	Depth_Wom	Depth_Alb	Efficiency	Breadth	Depth_Wom	Depth_Alb
Mean	0.285	6.584	23.281	0.328	0.502	7.631	26.241	0.240
Std. Dev.	0.184	2.907	16.946	0.520	0.179	1.698	16.995	0.336

Average values 2016-2017

Table 4 – Correlation between Financial sustainability (Efficiency), Social sustainability measures, and Covariates

	Efficiency	Breadth	Depth_ Women	Depth_ Alb	Age	Size	Regulated	COOP	NGO	NBFI	Bank	Leverage
Efficiency	1											
Breadth	0.0859	1										
Depth_Women	0.256**	0.135	1									
Depth_Alb	0.0176	-0.0535	-0.306***	1								
Age	0.239**	-0.0730	0.0421	-0.104	1							
Size	0.177*	0.548***	0.113	-0.0359	-0.0317	1						
Regulated	0.484***	-0.125	0.0374	-0.115	0.120	0.0315	1					
COOP	0.209**	-0.137	0.0840	-0.278***	0.465***	-0.291***	0.366***	1				
NGO	-0.160*	-0.0570	-0.00593	0.233**	-0.0808	0.0739	-0.450***	-0.571***	1			
NBFI	-0.0281	-0.0313	-0.0998	0.0535	-0.365***	0.102	0.164*	-0.400***	-0.480***	1		
Bank	-0.0486	0.765***	0.0505	-0.0557	-0.141	0.401***	-0.152	-0.0969	-0.116	-0.0815	1	
Leverage	-0.0928	0.00498	-0.162*	-0.169*	-0.0719	0.192*	0.0926	-0.146	-0.0834	0.238**	0.0443	1

Pearson correlation; *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively.
Average values of the variables 2016-2017

Table 5 – Financial sustainability and social sustainability: Tobit and Truncated regressions - Efficiency-oriented VRS

DEPENDENT VARIABLE Efficiency	Tobit	Truncated	Tobit	Truncated	Tobit	Truncated
	(a)	(b)	(c)	(d)	(e)	(f)
Outreach variables						
Breadth	0.0567***	0.0597***			0.0641***	0.0679***
	(5.069)	(4.887)			(5.923)	(5.695)
Depth_Women	0.0017**	0.0018**	0.0029***	0.0031***		
	(2.178)	(2.181)	(3.610)	(3.578)		
Depth_Alb	0.151***	0.162***	0.0675*	0.0764*	0.137***	0.148***
	(3.878)	(3.887)	(1.774)	(1.872)	(3.518)	(3.537)
MFI specific controls						
Age	0.00197*	0.00206*	0.00202*	0.00216*	0.00193*	0.00202*
	(1.919)	(1.914)	(1.826)	(1.832)	(1.854)	(1.843)
Size	-0.0246*	-0.0256*	0.0204**	0.0242**	-0.0282**	-0.0297**
	(-1.918)	(-1.837)	(2.030)	(2.128)	(-2.185)	(-2.118)
Regulated	0.126***	0.135***	0.177***	0.198***	0.123***	0.130***
	(3.171)	(3.119)	(4.271)	(4.297)	(3.046)	(2.972)
COOP	0.0362	0.0362	-0.0691	-0.0726	0.0464	0.0491
	(0.281)	(0.268)	(-0.503)	(-0.499)	(0.355)	(0.358)
NGO	0.0138	0.0107	-0.0850	-0.0872	0.0232	0.0223
	(0.119)	(0.0881)	(-0.689)	(-0.665)	(0.198)	(0.181)
NBFI	0.0403	0.0392	-0.0847	-0.0935	0.0488	0.0503
	(0.337)	(0.312)	(-0.668)	(-0.696)	(0.401)	(0.394)
Leverage	-0.000633	-0.000486	-0.00124	-0.00106	-0.00200	-0.00199
	(-0.224)	(-0.158)	(-0.405)	(-0.321)	(-0.713)	(-0.646)
Country specific controls						
GDP	-0.0187	-0.0185	-0.0519***	-0.0544**	-0.0150	-0.0144
	(-0.968)	(-0.897)	(-2.638)	(-2.567)	(-0.769)	(-0.689)
GDPG	-0.00384	-0.00395	0.00241	0.00350	-0.00600	-0.00626
	(-0.359)	(-0.343)	(0.210)	(0.277)	(-0.555)	(-0.538)
year	0.0133	0.0139	0.00236	0.00139	0.0155	0.0161
	(0.490)	(0.478)	(0.0804)	(0.0438)	(0.562)	(0.545)
Constant	0.372	0.346	0.432	0.363	0.392	0.366
	(1.245)	(1.079)	(1.339)	(1.017)	(1.294)	(1.123)
R-squared (from linear regression)[(1)]	0.5003	0.5003	0.4164	0.4164	0.4848	0.4848
Adj R-squared (from linear regression)[(1)]	0.4536	0.4536	0.3664	0.3664	0.4406	0.4406
No. MFIs	153	153	153	153	153	153

*, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively; t stat from robust std. errors in parenthesis.

[(1)] Linear regression was performed on the same specification and using the same set of explanatory variables as in Tobit and Truncated regressions

Table 6 – Financial sustainability and social sustainability: Tobit and Truncated regressions - Input-oriented VRS

DEPENDENT VARIABLE Efficiency	Tobit	Truncated
Breadth	0.0561***	0.0589***
	(4.717)	(4.546)
Depth_Women	0.00136*	0.00146*
	(1.669)	(1.650)
Depth_Alb	0.213***	0.229***
	(5.154)	(4.912)
Covariates	Yes	Yes
Constant	1.380***	1.438***
	(4.351)	(4.174)
R-squared (from linear regression)[(1)]	0.4328	0.4328
Adj R-squared (from linear regression)[(1)]	0.3798	0.3798
No. MFIs	153	153

*, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively; t stat from robust std. errors in parenthesis.

[(1)] Linear regression was performed on the same specification and using the same set of explanatory variables as in Tobit and Truncated regressions

Table 7 – Financial performance and social performance: Tobit and Truncated regressions - Subsidies

DEPENDENT VARIABLE Efficiency	Tobit	Truncated
Breadth	0.0553***	0.0574***
	(5.065)	(4.826)
Depth_Women	0.00200***	0.00214***
	(2.650)	(2.671)
Depth_Alb	0.169***	0.180***
	(4.398)	(4.402)
Subsidies[(2)]	-0.00687***	-0.00757***
	(-2.861)	(-2.888)
Covariates	Yes	Yes
Constant	0.131	0.109
	(0.434)	(0.337)
R-squared (from linear regression)[(1)]	0.5257	0.5257
Adj R-squared (from linear regression)[(1)]	0.4776	0.4776
No. MFIs	153	153

*, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively; t stat from robust std. errors in parenthesis.

[(1)] Linear regression was performed on the same specification and using the same set of explanatory variables as in Tobit and Truncated regressions

[(2)] log of amount (Euro)

Table 8 – Financial sustainability and social sustainability: Tobit and Truncated regressions – Interest rates

DEPENDENT VARIABLE Efficiency	Tobit Business loans	Truncated Business loans	Tobit Personal loans	Truncated Personal loans
Breadth	0.0513***	0.0549***	0.0767***	0.0804***
	(4.009)	(3.803)	(4.369)	(4.218)
Depth_Women	0.000977	0.00106	0.00248***	0.00254***
	(1.134)	(1.131)	(3.223)	(3.227)
Depth_Alb	0.159***	0.173***	0.702***	0.718***
	(4.075)	(4.004)	(6.564)	(6.394)
Interest rate business loans[(2)]	0.00762***	0.00793**		
	(2.641)	(2.524)		
Interest rate personal loans[(2)]			0.00147	0.00150
			(1.308)	(1.293)
Covariates	Yes	Yes	Yes	Yes
Constant	0.138	0.0803	0.306	0.298
	(0.406)	(0.215)	(1.038)	(0.992)
R-squared (from linear regression)[(1)]	0.6127	0.6127	0.5634	0.5634
Adj R-squared (from linear regression)[(1)]	0.5466	0.5466	0.4969	0.4969
No. MFIs	92	92	77	77

*, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively; t stat from robust std. errors in parenthesis.

[(1)] Linear regression was performed on the same specification and using the same set of explanatory variables as in Tobit and Truncated regressions

[(2)] Annual rate, average 2016-2017 (percentage points)

Table 9 Financial sustainability and social sustainability relationship by MFI size and geographical regions

DEPENDENT VARIABLE Efficiency	A Dimension assets <=10,000,000		B Geography(1)			C Loan Type		D Interest rate caps	
	Large	Small	West	East	Non-UE	Business	Personal	Cap	No Cap
Breadth	0.0910***	0.0568***	0.0716**	0.0844***	0.00703	0.0868***	0.0595***	0.149***	0.0447***
	(4.390)	(4.556)	(2.451)	(4.264)	(0.136)	(5.094)	(4.279)	(3.692)	(2.709)
Depth_Women	-0.00151	0.0034***	0.00113	0.00180**	0.00120	0.0017*	0.0028***	-0.00491**	0.00240***
	(-1.279)	(3.508)	(0.391)	(2.154)	(1.519)	(1.937)	(3.526)	(-2.276)	(3.025)
Depth_Alb	0.289***	0.110***	0.204	0.188***	0.486**	0.718***	0.157***	0.219	0.176***
	(3.750)	(2.846)	(0.539)	(4.353)	(2.438)	(6.255)	(3.608)	(1.390)	(3.553)
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	1.745**	0.184	-1.675	0.410	-0.453	0.438	0.352	1.756	-0.150
	(2.224)	(0.533)	(-0.727)	(1.080)	(-1.114)	(1.220)	-1.112	(0.764)	(-0.445)
R-squared	0.604	0.595	0.362	0.483	0.503	0.585	0.556	0.821	0.497
No. MFIs	61	94	33	126	50	97	107	25	128

*, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively

Linear probability model; t stat from robust std. errors in parenthesis.

(1) UE members are as of January 2016.

Table 10 – Financial sustainability and social sustainability: GMM and IV (Two-Stage Least Squares) regressions

DEPENDENT VARIABLE	(a)	(b)	(c)	(d)	(e)
Efficiency	GMM	2SLS	2SLS	2SLS	2SLS
Breadth	0.0678***	0.0577***	0.150***		
	(3.604)	(2.622)	(3.996)		
Depth_Women	0.00561*	0.00949*		0.0159***	
	(1.793)	(1.655)		(2.850)	
Depth_Alb	0.116	0.116			0.137
	(1.092)	(0.836)			(1.082)
Covariates	Yes	No	Yes	Yes	Yes
Constant		-0.237*	0.946**	-0.214	-0.190
		(-1.744)	(2.210)	(-0.605)	(-0.806)
No. MFIs	154	77	77	77	77
R-squared		0.8219	0.8215	0.7031	0.8933
Kleibergen-Paap rk Wald F statistic		1.480	3.415	4.450	3.913
Kleibergen-Paap rk LM statistic		9.688	15.471	11.464	24.838
Chi-sq P-val		0.3764	0.0506	0.1768	0.0017
Hansen J statistic (overidentification test of all instruments)		10.285	5.935	6.238	17.295
Chi-sq P-val		0.2456	0.5474	0.5123	0.0156
t-statistics in parentheses *** p<0.01, ** p<0.05, * p<0.1		Instrumented: Breadth Depth_Women Depth_Alb	Instrumented: Breadth	Instrumented: Depth_Women	Instrumented: Depth_Alb
			Included instruments: age size regulated	Included instruments: age size regulated	Included instruments: age size regulated
		Excluded instruments: age size regulated COOP NGO NBFI leverage gdp gdpg Efficiency_1	Excluded instruments: COOP NGO NBFI leverage gdp gdpg Efficiency_1	Excluded instruments: COOP NGO NBFI leverage gdp gdpg Efficiency_1	Excluded instruments: COOP NGO NBFI leverage gdp gdpg Efficiency_1

*, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively; t stat from robust std. errors in parenthesis.

Table 11 – Impact of Social sustainability on alternative measures of financial sustainability – OLS, GMM and IV (Two-Stage Least Squares) regressions

	(a) OLS	(b) GMM	(c) IVREG	(d) IVREG	(e) IVREG	(f) IVREG
Breadth	ROA (+)* OSS (+)** Ptf.Yld (-)*** PAR30 (-)** Op.Exp. (-)*** Fin.Exp. (-)**	ROE (+)* PAR30 (-)*** Op.Exp. (-)***	PAR30 (-)** Fin.Exp. (-)**	ROA (+)* ROE (+)* OSS (+)** Ptf.Yld (-)** Op.Exp. (-)***	-	-
Depth_Women	OSS (+)**		OSS (+)**	-	OSS (+)***	-
Depth_Alb	OSS (+)** Ptf.Yld (-)** PAR30 (-)*** Op.Exp. (-)***	ROA (+)*** ROE (+)** PAR30 (-)*** Fin.Exp. (-)*	ROA (+)** PAR30 (-)***			ROA (+)** PAR30 (-)***
Covariates	Yes	Yes	No	Yes	Yes	Yes
Instrumented			Breadth Depth_Women Depth_Alb	Breadth	Depth_Women	Depth_Alb
Included instruments				age size regulated	age size regulated	age size regulated
Excluded instruments			age size regulated COOP NGO NBFI risk leverage gdp gdpg Efficiency_1	COOP NGO NBFI risk leverage gdp gdpg Efficiency_1	COOP NGO NBFI risk leverage gdp gdpg Efficiency_1	COOP NGO NBFI risk leverage gdp gdpg Efficiency_1

Variables significantly affected by outreach indicators are reported in each cell with corresponding parameter signs in brackets. See the Appendix for complete regression Efficiency. Significance levels expressed by asterisks (from estimates performed using robust std. errors): *, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively

APPENDIX A

Sample representativeness

Table A1– Survey: contacted institutions, respondents, country bias

Country	No. Sample respondents	% Sample respondents	No. MFIs contacted	% MFIs contacted	Bias (country over-representativeness)
	(a)	(b)	(c)	(d)	(b)-(d)
Romania	52	32.7	52	8.5	24.2
Hungary	19	11.95	31	5.17	6.78
Kosovo	14	8.81	16	2.67	6.14
Bosnia-Herzegovina	14	8.81	33	2.84	5.97
Macedonia	4	2.52	4	0.67	1.85
Montenegro	4	2.52	6	1	1.52
Albania	4	2.52	9	1.5	1.02
Moldova	2	1.26	2	0.33	0.93
The Netherlands	2	1.26	5	0.5	0.76
Ireland	2	1.26	4	0.67	0.59
Belgium	2	1.26	5	0.83	0.43
Serbia	2	1.26	5	0.83	0.43
France	4	2.52	15	2.5	0.02
Cyprus	0	0	1	0.17	-0.17
Denmark	0	0	1	0.17	-0.17
Finland	0	0	1	0.17	-0.17
Luxembourg	0	0	1	0.17	-0.17
Greece	1	0.63	5	0.83	-0.2
Norway	0	0	2	0.33	-0.33
Slovenia	0	0	2	0.33	-0.33
Switzerland	0	0	2	0.33	-0.33
Turkey	0	0	2	0.33	-0.33
Croatia	0	0	3	0.5	-0.5
Czech Republic	0	0	3	0.5	-0.5
Estonia	0	0	3	0.5	-0.5
Malta	0	0	3	0.5	-0.5
Austria	0	0	4	0.67	-0.67
Latvia	0	0	4	0.67	-0.67
Lithuania	0	0	5	0.83	-0.83
Portugal	0	0	6	1	-1
Slovakia	0	0	6	1	-1
Sweden	0	0	9	1.5	-1.5
Bulgaria	5	3.14	36	6	-2.86
Spain	4	2.52	46	7.67	-5.15
United Kingdom	8	5.03	62	10.5	-5.47
Germany	2	1.26	57	9.5	-8.24
Poland	6	3.77	73	12.16	-8.39
Italy	8	5.03	92	15.34	-10.31

APPENDIX B

Impact of social sustainability on alternative measures of financial sustainability

Table B1 – Impact of social sustainability on alternative measures of financial sustainability: ROA – GMM and IV (Two-Stage Least Squares) regressions

DEPENDENT VARIABLE	(a)	(b)	(c)	(d)	(e)	(f)
ROA	OLS	GMM	IVREG	IVREG	IVREG	IVREG
Breadth	0.627*	0.485	-0.564	0.793*		
	(1.869)	(0.941)	(-0.581)	(1.736)		
Depth_Women	-0.00239	0.0592	0.120		0.0452	
	(-0.123)	(0.787)	(1.010)		(0.866)	
Depth_Alb	1.541	9.245***	10.14**			8.145**
	(1.306)	(3.316)	(2.478)			(2.131)
Covariates	Yes	Yes	No	Yes	Yes	Yes
Constant	16.20		1.913	19.32**	13.38	10.52
	(1.477)		(0.353)	(2.041)	(1.172)	(0.866)
No. MFIs	153	77	77	77	77	77
R-squared		0.0407				
Weak identification test (Kleibergen-Paap rk Wald F statistic)			0.0418	0.337	0.332	0.180
Chi-sq P-val			0.425	0.0558	0.130	0.00120
Under identification test (Kleibergen-Paap rk LM statistic)			1.318	3.892	4.673	4.246
Hansen J statistic (overidentification test of all instruments)			0.717	0.158	0.143	0.172
Chi-sq P-val			8.090	13.75	11.20	23.88
Instrumented			Breadth Depth_Women Depth_Alb	Breadth	Depth_Women	Depth_Alb
Included instruments				age size regulated	age size regulated	age size regulated
Excluded instruments			age size regulated COOP NGO NBFI risk leverage gdp gdpg Efficiency_1	COOP NGO NBFI risk leverage gdp gdpg Efficiency_1	COOP NGO NBFI risk leverage gdp gdpg Efficiency_1	COOP NGO NBFI risk leverage gdp gdpg Efficiency_1

*, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively; t stat from robust std. errors in parenthesis.

Table B2 – Impact of social sustainability on alternative measures of financial sustainability: ROE – GMM and IV (Two-Stage Least Squares) regressions

DEPENDENT VARIABLE	(a)	(b)	(c)	(d)	(e)	(f)
ROE	OLS	GMM	IVREG	IVREG	IVREG	IVREG
Breadth	0.894	2.455**	1.593	4.532***		
	(1.344)	(2.208)	(1.216)	(3.660)		
Depth_Women	-0.0269	0.191	0.0346		0.204	
	(-0.425)	(1.016)	(0.152)		(1.247)	
Depth_Alb	2.780	17.33**	9.736			9.180
	(1.110)	(1.961)	(0.925)			(0.823)
Covariates	Yes	Yes	No	Yes	Yes	Yes
Constant	27.75		-4.758	37.63**	3.972	1.479
	(1.368)		(-0.554)	(1.991)	(0.239)	(0.0813)
No. MFIs	153	77	77	77	77	77
R-squared		0.0586				
Weak identification test (Kleibergen-Paap rk Wald F statistic)			0.435	0.359	0.392	0.422
Chi-sq P-val			1.318	3.892	4.673	4.246
Under identification test (Kleibergen-Paap rk LM statistic)			0.425	0.0558	0.130	0.00120
Hansen J statistic (overidentification test of all instruments)			8.090	13.75	11.20	23.88
Chi-sq P-val			0.432	0.761	0.166	0.0965
Instrumented			Breadth Depth_Women Depth_Alb	Breadth	Depth_Women	Depth_Alb
Included instruments				age size regulated	age size regulated	age size regulated
Excluded instruments			age size regulated COOP NGO NBFI risk leverage gdp gdpg Efficiency_1	COOP NGO NBFI risk leverage gdp gdpg Efficiency_1	COOP NGO NBFI risk leverage gdp gdpg Efficiency_1	COOP NGO NBFI risk leverage gdp gdpg Efficiency_1

*, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively; t stat from robust std. errors in parenthesis.

Table B3 – Impact of social sustainability on alternative measures of financial sustainability: Operational Self-sufficiency (OSS) – GMM and IV (Two-Stage Least Squares) regressions

DEPENDENT VARIABLE	(a)	(b)	(c)	(d)	(e)	(f)
OSS	OLS	GMM	IVREG	IVREG	IVREG	IVREG
Breadth	9.976**	5.927	3.753	18.35**		
	(2.492)	(0.717)	(0.578)	(2.307)		
Depth_Women	0.627**	1.511	2.227**		2.481***	
	(2.264)	(1.437)	(1.977)		(2.590)	
Depth_Alb	25.87**	-44.95	-8.061			-28.95
	(2.291)	(-1.332)	(-0.196)			(-0.650)
Covariates	Yes	Yes	No	Yes	Yes	Yes
Constant	113.4		-51.71	40.03	-104.2	-81.36
	(1.311)		(-1.369)	(0.478)	(-1.131)	(-0.890)
No. MFIs	153	77	77	77	77	77
R-squared		0.106				
Weak identification test (Kleibergen-Paap rk Wald F statistic)			0.213	0.376	0.209	0.320
Chi-sq P-val			0.425	0.0558	0.130	0.00120
Under identification test (Kleibergen-Paap rk LM statistic)			1.318	3.892	4.673	4.246
Hansen J statistic (overidentification test of all instruments)			0.231	0.0769	0.377	0.104
Chi-sq P-val			8.090	13.75	11.20	23.88
Instrumented			Breadth Depth_Women Depth_Alb	Breadth	Depth_Women	Depth_Alb
Included instruments				age size regulated	age size regulated	age size regulated
Excluded instruments			age size regulated COOP NGO NBFI risk leverage gdp gdpg Efficiency_1	COOP NGO NBFI risk leverage gdp gdpg Efficiency_1	COOP NGO NBFI risk leverage gdp gdpg Efficiency_1	COOP NGO NBFI risk leverage gdp gdpg Efficiency_1

*, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively; t stat from robust std. errors in parenthesis.

Table B4 – Impact of social sustainability on alternative measures of financial sustainability: Portfolio Yield – GMM and IV (Two-Stage Least Squares) regressions

DEPENDENT VARIABLE	(a)	(b)	(c)	(d)	(e)	(f)
Portfolio Yield	OLS	GMM	IVREG	IVREG	IVREG	IVREG
Breadth	-9.351***	-0.878	1.610	-7.520**		
	(-4.468)	(-0.882)	(1.049)	(-2.521)		
Depth_Women	0.100	-0.0874	-0.231		-0.136	
	(0.913)	(-0.192)	(-0.343)		(-0.303)	
Depth_Alb	-12.98**	8.837	-1.255			-7.952
	(-2.517)	(0.808)	(-0.0591)			(-0.428)
Covariates	Yes	Yes	No	Yes	Yes	Yes
Constant	-55.36		16.63	-76.62**	-21.74	-19.39
	(-1.346)		(1.037)	(-2.092)	(-0.950)	(-0.940)
No. MFIs	153	77	77	77	77	77
R-squared		0.0903				
Weak identification test (Kleibergen-Paap rk Wald F statistic)			0.492	0.734	0.617	0.599
Chi-sq P-val			0.425	0.0558	0.130	0.00120
Under identification test (Kleibergen-Paap rk LM statistic)			1.318	3.892	4.673	4.246
Hansen J statistic (overidentification test of all instruments)			0.130	0.371	0.282	0.434
Chi-sq P-val			8.090	13.75	11.20	23.88
Instrumented			Breadth Depth_Women Depth_Alb	Breadth	Depth_Women	Depth_Alb
Included instruments				age size regulated	age size regulated	age size regulated
Excluded instruments			age size regulated COOP NGO NBFI risk leverage gdp gdpg Efficiency_1	COOP NGO NBFI risk leverage gdp gdpg Efficiency_1	COOP NGO NBFI risk leverage gdp gdpg Efficiency_1	COOP NGO NBFI risk leverage gdp gdpg Efficiency_1

*, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively; t stat from robust std. errors in parenthesis.

Table B5 – Impact of social sustainability on alternative measures of financial sustainability: Portfolio at Risk (PAR30) – GMM and IV (Two-Stage Least Squares) regressions Portfolio at Risk (PAR30)

DEPENDENT VARIABLE	(a)	(b)	(c)	(d)	(e)	(f)
PAR30	OLS	GMM	IVREG	IVREG	IVREG	IVREG
Breadth	-1.943**	-3.245***	-1.188**	-2.265		
	(-2.148)	(-6.547)	(-2.003)	(-1.618)		
Depth_Women	-0.0276	0.0296	-0.138		-0.165	
	(-0.942)	(0.247)	(-0.908)		(-1.035)	
Depth_Alb	-7.770***	-19.56***	-19.11***			-17.98***
	(-4.409)	(-3.988)	(-3.385)			(-2.590)
Covariates	Yes	Yes	No	Yes	Yes	Yes
Constant	-18.93		24.56***	8.153	25.28***	31.29***
	(-1.226)		(5.738)	(0.656)	(2.675)	(3.018)
No. MFIs	153	77	77	77	77	77
R-squared		0.0483				
Weak identification test (Kleibergen-Paap rk Wald F statistic)			0.569	0.532	0.511	0.458
Chi-sq P-val			0.425	0.0558	0.130	0.00120
Under identification test (Kleibergen-Paap rk LM statistic)			1.318	3.892	4.673	4.246
Hansen J statistic (overidentification test of all instruments)			0.926	0.0112	0.0256	0.337
Chi-sq P-val			8.090	13.75	11.20	23.88
Instrumented			Breadth Depth_Women Depth_Alb	Breadth	Depth_Women	Depth_Alb
Included instruments				age size regulated	age size regulated	age size regulated
Excluded instruments			age size regulated COOP NGO NBFI risk leverage gdp gdpg Efficiency_1	COOP NGO NBFI risk leverage gdp gdpg Efficiency_1	COOP NGO NBFI risk leverage gdp gdpg Efficiency_1	COOP NGO NBFI risk leverage gdp gdpg Efficiency_1

*, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively; t stat from robust std. errors in parenthesis.

Table B6 – Impact of social sustainability on alternative measures of financial sustainability: Operating Expense Ratio – GMM and IV (Two-Stage Least Squares) regressions

DEPENDENT VARIABLE	(a)	(b)	(c)	(d)	(e)	(f)
Operating Expense Ratio	OLS	GMM	IVREG	IVREG	IVREG	IVREG
Breadth	-11.66***	-8.216***	-3.152	-15.24***		
	(-7.746)	(-3.324)	(-1.357)	(-5.846)		
Depth_Women	0.0463	-0.159	-0.398		-0.829	
	(0.621)	(-0.381)	(-0.726)		(-1.565)	
Depth_Alb	-23.53***	6.695	6.625			-0.120
	(-4.501)	(0.511)	(0.349)			(-0.00619)
Covariates	Yes	Yes	No	Yes	Yes	Yes
Constant	13.37		52.25***	-80.22***	33.65	29.71
	(0.436)		(2.994)	(-2.582)	(0.841)	(0.854)
No. MFIs	153	77	77	77	77	77
R-squared		0.215				
Weak identification test (Kleibergen-Paap rk Wald F statistic)			0.460	0.617	0.370	0.497
Chi-sq P-val			0.425	0.0558	0.130	0.00120
Under identification test (Kleibergen-Paap rk LM statistic)			1.318	3.892	4.673	4.246
Hansen J statistic (overidentification test of all instruments)			0.0846	0.236	0.0575	0.0637
Chi-sq P-val			8.090	13.75	11.20	23.88
Instrumented			Breadth Depth_Women Depth_Alb	Breadth	Depth_Women	Depth_Alb
Included instruments				age size regulated	age size regulated	age size regulated
Excluded instruments			age size regulated COOP NGO NBFI risk leverage gdp gdpg Efficiency_1	COOP NGO NBFI risk leverage gdp gdpg Efficiency_1	COOP NGO NBFI risk leverage gdp gdpg Efficiency_1	COOP NGO NBFI risk leverage gdp gdpg Efficiency_1

*, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively; t stat from robust std. errors in parenthesis.

Table B7 – Impact of social sustainability on alternative measures of financial sustainability: Financial Expense Ratio – GMM and IV (Two-Stage Least Squares) regressions

DEPENDENT VARIABLE	(a)	(b)	(c)	(d)	(e)	(f)
Financial Expense Ratio	OLS	GMM	IVREG	IVREG	IVREG	IVREG
Breadth	-0.989**	0.578	-0.910**	-0.248		
	(-2.211)	(1.076)	(-2.120)	(-0.293)		
Depth_Women	0.0184	-0.0432	-0.105		-0.00110	
	(0.712)	(-0.403)	(-0.706)		(-0.0113)	
Depth_Alb	1.192	-7.229*	-5.269			-5.919
	(1.059)	(-1.839)	(-1.238)			(-1.416)
Covariates	Yes	Yes	No	Yes	Yes	Yes
Constant	-23.05***		1.488	-10.67	-8.879	-6.644
	(-2.660)		(0.425)	(-1.209)	(-1.639)	(-1.165)
No. MFIs	153	77	77	77	77	77
R-squared		0.0583				
Weak identification test (Kleibergen-Paap rk Wald F statistic)			0.268	0.536	0.519	0.372
Chi-sq P-val			0.425	0.0558	0.130	0.00120
Under identification test (Kleibergen-Paap rk LM statistic)			1.318	3.892	4.673	4.246
Hansen J statistic (overidentification test of all instruments)			0.645	0.0748	0.0757	0.573
Chi-sq P-val			8.090	13.75	11.20	23.88
Instrumented			Breadth Depth_Women Depth_Alb	Breadth	Depth_Women	Depth_Alb
Included instruments				age size regulated	age size regulated	age size regulated
Excluded instruments			age size regulated COOP NGO NBFI risk leverage gdp gdpg Efficiency_1	COOP NGO NBFI risk leverage gdp gdpg Efficiency_1	COOP NGO NBFI risk leverage gdp gdpg Efficiency_1	COOP NGO NBFI risk leverage gdp gdpg Efficiency_1

*, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively; t stat from robust std. errors in parenthesis.

Table B8 – Financial sustainability and social sustainability: IV regressions with heteroskedasticity-based instruments

DEPENDENT VARIABLE	(a)	(b)	(c)
Efficiency	2SLS	2SLS	2SLS
Breadth	0.0717***		
	(4.390)		
Depth_Women		0.00395**	
		(2.442)	
Depth_Alb			0.101
			(1.275)
Covariates	Yes	Yes	Yes
Constant	0.379*	-0.157	-0.176
	(1.854)	(-0.656)	(-0.762)
No. MFIs	77	77	77
R-squared	0.344	0.306	0.310
Kleibergen-Paap rk Wald F statistic	18.74	8.044	25.04
Kleibergen-Paap rk LM statistic	18.31	18.93	24.69
Chi-sq P-val	0.0921	0.0352	0.0141
Hansen J statistic (overidentification test of all instruments)			
eqn. excluding suspect orthog. conditions	0.467	1.931	2.681
Chi-sq P-val	0.7918	0.3809	0.2617
	Instrumented: Breadth	Instrumented: Depth_Women	Instrumented: Depth_Alb
	Included instruments: age size regulated	Included instruments: age size regulated	Included instruments: age size regulated
	Excluded instruments: COOP NGO NBFI leverage gdp gdpg Efficiency_1	Excluded instruments: COOP NGO NBFI leverage gdp gdpg Efficiency_1	Excluded instruments: COOP NGO NBFI leverage gdp gdpg Efficiency_1

*, **, and *** indicate statistical significance at 10%, 5%, and 1% levels, respectively; t stat from robust std. errors in parenthesis.
Estimates are performed using both generated and excluded instruments.

Table B9 – Tests of mean comparison between the survey sample and the WB-MIX Market Financial database

	Our sample (European Microcredit Survey)			MIX Market Financial database[(b)]			
Variable [(a)]	Obs	Mean	Std.Dev.	Obs	Mean	Std. Dev.	t-stat
ROA	159	3.17	4.46	604	2.76	7.06	0.7015
ROE	159	10.68	11.87	604	10.32	16.07	0.2651
OSS	159	32.75	51.42	604	10.5	6.70	10.31***
PortfolioYield	159	22.45	21.56	604	22.15	6.04	0.2490
MPAR30	159	7.16	7.30	604	7.54	20.08	-0.2324
Operating Expenses	159	2085	5035	604	6285	11039	-0.0287
Financial Expenses	159	3545	14400	604	4585	12527	-0.8955

[(a)] Tests are conducted on the financial indicators used as dependent variables in Tables A2-A8 in this Appendix.

Sources:

European Microcredit Survey 2016-2017

[(a)] https://datacatalog.worldbank.org/search/dataset/0038647

[(a)] https://databank.worldbank.org/source/mix-market