



Financial and social sustainability in the European microfinance sector

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Abstract This paper investigates the balance between social and financial sustainability goals in the European microfinance sector using an original dataset obtained from a survey conducted in 2016–2017 on 159 microfinance institutions (MFIs) operating in 38 European countries. Overall, our results show that MFIs that are more likely to comply with their social sustainability objectives 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. A phenomenon that seems peculiar to the European context is that larger MFIs operating in countries with stringent financial regulation tend to show a comparative advantage and better withstand competition from the traditional banking sector. However, a separate issue that deserves attention is the specific regulation on interest rates, which seems to penalize the MFIs operating in countries imposing interest rate caps due to the impossibility to pass on the high unit costs of microlending to borrowers. 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.

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Plain English Summary European Microfinance Institutions that more tightly pursue social objectives are also more likely to be financially sustainable but are penalized by regulatory restrictions on interest rates.

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 empirical

evidence on the European microfinance sector. In this paper, we provide one of the first pieces of evidence of this relationship in the European context. Our findings have important implications for researchers, policymakers, and society as a whole. The research reveals that European Microfinance Institutions (MFIs) that more tightly pursue social objectives are also more likely to be financially sustainable. Furthermore, smaller MFIs appear to achieve a double bottom line more easily, especially targeting higher shares of women borrowers. The critical aspect of European MFIs appears to be their greater reliance on subsidies, as well as a regulation that is ill-suited to the microfinance sector, especially regarding interest rate caps. Thus, a more structured regulatory framework focused on social sustainability variables could improve microfinance effectiveness in the coming years.

Keywords Microfinance · European Union · Social sustainability · Outreach · Mission drift · Financial sustainability

JEL Classifications G21 · I32 · L26 · O16

1 Introduction

Since the advent of microfinance in the 2000s, the number of Microfinance Institutions (MFIs) has grown dramatically (Cull & Morduch, 2018; Hermes & Hudon, 2018; Lopez & Winkler, 2018; Vanroose & D'Espallier, 2013).¹ 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.

Scholars have used the institutional theory (Campbell, 2007; Lee & Lounsbury, 2015; Greenwood et al., 2011;

Gümüşay et al., 2020; Thornton et al., 2012)² to theorize the relationship between environmental conditions and economic goals central to organizations, recognizing that the way organizations behave in terms of balancing social and financial sustainability depends on the institutions within which they operate (e.g., Fligstein & Freeland, 1995; Hall & Soskice, 2001). Some studies affirm that there is an inherent tension between socially oriented (i.e., prioritizing social welfare maximization practices) and economic-centered objectives (i.e., prioritizing profit-maximization practices) (Pache & Santos, 2013; see also Battilana & Dorado, 2010 on the specific case of MFIs). However, few of them investigated the reasons why each organization acts in a socially responsible way (Campbell, 2004, 2007; Galaskiewicz, 1991; Maignan & Ralston, 2002; Rowley & Berman, 2000). Our study aims to provide evidence on the role of social objectives pursued by MFIs on their financial performance while trying to offer an interpretation of the MFIs' behavior within the framework of the institutional logics.

Integrating and reconciling social welfare objectives and financial performance might be a particularly daunting task for MFIs (Abate et al., 2014; Abdulai & Tewari, 2016; Cull et al., 2007; Gonzalez & Rosenberg, 2006; Hartarska et al., 2013; Hermes et al., 2011; Louis & Baesens, 2013; Olivares-Polanco, 2005; Pedrini & Ferri, 2016). Indeed, increasing access of the poorest to financial services while ensuring their operations' financial sustainability is challenging, mostly due to the inevitably high fixed and operating costs combined with the smaller-sized loans offered (Abrar, 2019) and the considerable financial burden associated with the provision of business development services. Because the financial and social goals largely influence both the operating and administrative expenses associated

² As stated by North (1990), institutions can be defined as “the humanly devised constraints that structure political, economic, and social interaction”. Institutional theory refers to “socially constructed, historical patterns of cultural symbols and material practices, including assumptions, values, and beliefs by which individuals and organizations provide meaning to their daily activity” (Thornton et al., 2012). According to Campbell (2007), some examples are public and private regulation, the presence of nongovernmental and other independent organizations that monitor corporate behavior, institutionalized norms regarding appropriate corporate behavior, associative behavior among corporations themselves, and organized dialogues among corporations and their stakeholders.

¹ <https://www.findevgateway.org/paper/2015/12/mapping-pathways-out-poverty-state-microcredit-summit-campaign-report-2015>.

with lending (Abrar, 2019), 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 (Gutierrez-Goiria et al., 2017; Hansen et al., 2021). 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 (D'Espallier et al., 2017). Consequently, while the high-interest rates of micro-loans have long been criticized, in the past few years the debate over the trade-off between MFIs' social and financial sustainability has further surged (Awaworyi Churchill, 2020).

Given the urgency of tackling global poverty, it is essential to examine the MFIs' performance (both in terms of social and financial sustainability). 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)³ due to severe crises such as the Covid-19 pandemic and the Ukraine war that have already claimed thousands of lives and caused significant worldwide economic harm. 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 MFIs for several reasons. In general, there are no widely accepted indicators or summarized measures to assess the social sustainability of an MFI (Hermes & Hudon, 2018; Schreiner, 2002). Consequently, while some studies have shown empirical evidence of a trade-off between social and financial sustainability (Abate et al., 2014; Abdulai & Tewari, 2016; Ault, 2016; Cull et al., 2007; Hermes et al., 2011; Mersland & Strøm, 2010; Pedrini & Ferri, 2016), others questioned its validity (Quayes, 2015), or even found complementarities between the two (Adhikary & Papachristou, 2014; Kar, 2013; Kaur, 2016; Louis et al., 2013; 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 a large number of empirical contributions showing that microfinance programs can contribute to the development of local economies, the literature is still inconclusive on whether it is possible to increase social sustainability while being financially viable. Furthermore, the trade-off (or complementary) between social and financial sustainability seems to depend on the institutional, cultural, and geographical environment in which these relations are analyzed (Hermes & Hudon, 2018).

In Europe, microfinance is still a relatively recent phenomenon (Sheremenko et al., 2017). As such, European MFIs have been scarcely investigated (Bourlès & Cozarenco, 2018). In particular, the European microfinance context is interesting for studying the relationship between social and financial sustainability. Nowadays, the most significant challenges for European MFIs are the competition with traditional intermediaries rather than competition within the microfinance sector and the regulatory framework characterizing both the EU as a whole as well as individual countries. In particular, in less developed 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. This allowed MFIs to grow in size. European MFIs, instead, are relatively smaller than those operating in less developed countries (Bourlès & Cozarenco, 2018). While this can represent an advantage, as they can still reach significant economies of scale while serving microenterprises⁴ and poor households, it can also put them in a disadvantageous position compared to traditional banks that offer small-scale loans on a standardized basis.⁵ Nonetheless, in many states, MFIs are subject to the same regulation as banks.

Furthermore, most of the competitive advantage of the traditional banking sector stems from the possibility of cross-subsidizing their activities. This induced some European MFIs to create partnerships with banks

⁴ According to Bourlès and Cozarenco (2018), microenterprises represent almost 93% of all businesses in EU.

⁵ 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.

³ <https://www.worldbank.org/en/topic/poverty>.

to benefit from more advantageous funding costs, while contextually offering their experience in assisting the poorest segments of the population by designing more tailored products for marginal customers.

Moreover, the European microfinance sector is also considerably younger (Sheremenko et al., 2017) and heavily dependent on private and public subsidies (Chmelíková et al., 2019) compared to the mainstream microfinance sector. All these features may considerably affect the trade-off between social and financial sustainability. In particular, 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.

To address this gap in the literature, we examined 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 and the Microfinance Centre. We adopted technical efficiency as the financial sustainability indicator, measured through Data Envelopment Analysis (DEA).

Our study contributes to improving the understanding of the relationship between social and financial sustainability in the European microfinance industry in several ways. Specifically, we observed a positive effect of the depth of social sustainability in terms of the diffusion of MFI services to female customers on the financial sustainability of European MFIs. We showed that this link is stronger for Eastern European MFIs, which are smaller and operate in a less regulated context. Conversely, we found that social sustainability, in the form of financing the poorest through small-scale loans likely reduces the financial sustainability of European MFIs. On the extensive margin (number of loans extended), we provided evidence of complementarity between the two bottom lines pursued by MFIs. In our empirical analysis, we also inspected the pros and cons that the regulation of MFIs represents for the achievement of financial sustainability. Finally, we addressed the nexus of endogeneity in determining the connection between social sustainability and financial performance.

The paper is organized as follows. In the next section, we present the literature on the financial and social sustainability debate in microfinance, with a focus on Europe. In section three, we describe the

database and illustrate the empirical framework. In section four, we report the baseline results, testing competing theories and hypotheses about the role of incentives, MFIs' size, geography, and regulation. In section five, we conduct robustness checks to address endogeneity issues. In section six, we discuss the main implications of our findings. Finally, section seven concludes.

2 Literature background

2.1 The debate on social and financial sustainability

The literature of the last decade relating to microfinance revealed a change in the research aims, previously focused mainly on the impact evaluation of the microfinance instrument, then increasingly concerned about the institutional analysis of the context (Hermes & Hudon, 2018; Mia et al., 2019).

Social sustainability, defined in the literature as the degree of market penetration of an MFI (CGAP 2016)⁶ has become one of the primary concerns (Wry & Zhao, 2018). 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, unquestionably play a central role. Average loan balance per borrowers and percentage of women borrowers are the commonly used proxies for the latter.

According to Bruton et al. (2010), the application of the institutional theory in understanding businesses' adoption of socially responsible behavior has grown significantly in the last few years (e.g. Biniari et al., 2015; Estrin, et al., 2018; Grinevich et al., 2019; Pascal et al., 2017; Xu et al., 2022), and the microfinance industry makes no exception. According to the institutional view, the relationship between economic sustainability and social sustainability is mediated by institutional factors. For instance, tax law allowing to deduct charitable contributions is an important way through which institutions can affect corporate behavior (Campbell, 2004). Also, managers who belong to professional associations dedicated to charitable

⁶ <https://www.cgap.org/>.

giving can instill in the staff an ethic of corporate philanthropy (Galaskiewicz, 1991). It even happens, however, that firms behave in a socially responsible way not so much because they necessarily subscribe to the normative principles that drive such behavior, but instead to receive legitimacy from community groups, customers, regulators, and other stakeholders (DiMaggio & Powell, 1983; Maignan & Ralston, 2002). This may be especially true for organizations that rely on subsidies and donations to conduct their activity, including several MFIs.

MFIs can be considered hybrid organizations that follow two logics (Battilana & Dorado, 2010; Im & Sun, 2015; Miller et al., 2012; Pascal et al., 2017). On the one hand, they pursue social welfare, whereas, on the other hand, they have commercial objectives concerned with profit, efficiency, and effectiveness (Smith et al., 2013). As compared to social welfare goals that rely on non-profit legal forms and philanthropic actors, commercial logic counts on earned revenues and for-profit legal forms (Battilana & Dorado, 2010). Being at the nexus of distinct logics can be useful, but maintaining commitments to both social welfare and economic objectives in the face of institutional pressure can sometimes be a challenge (Smith et al., 2013).

As such, the current debate on MFIs' social and financial sustainability achievements has led to discordant opinions and contradictory empirical results. Most of the empirical literature pointed 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 (Abate et al., 2014; Abdulai & Tewari, 2016; Cull et al., 2007; Gonzalez & Rosenberg, 2006; Hartarska et al., 2013; Hermes et al., 2011; Louis & Baesens, 2013; Olivares-Polanco, 2005; Pedrini & Ferri, 2016). Other studies claim that the observed trade-off between financial and social sustainability very much depends on the context. In particular, the various outcomes from country-specific and multicountry analyses indicate that country-contextual and institutional factors may play a significant role in determining whether the link between MFI's financial and social performance is positive, negative, or non-existent (Hermes & Hudon, 2018; Quayes, 2012).

In particular, according to the trade-off view, reaching the disadvantaged sections of the population could lead to increased administrative and operational costs, resulting

in a worsening of the institution's financial sustainability (Wry & Zhao, 2018). Specifically, high transaction costs are associated with obtaining information on the creditworthiness of poorer customers, monitoring high-frequency repayments, and providing them with business development services. Often these costs have a significant fixed component, so the incidence of unit costs per (small) loan is relatively high compared to larger financial transactions, thereby threatening MFIs' financial performance.

Hence, we formulate the following hypothesis:

H1: Financial sustainability is negatively associated with the depth of social sustainability.

In consideration of the high unit costs of loans disbursed to the poorest customers, the MFIs are particularly attentive to the creditworthiness of their customers. It is a widespread perceived stereotype, in particular, that female clients are less creditworthy than men (Ghosh et al., 2018). However, accredited empirical studies showed that not only is this claim rather groundless, but quite the opposite is true. Particularly, field studies performed in less developed countries provided evidence that loan repayment rates are higher for women than for men (see, for example, D'Espallier et al., 2017; Hansen et al., 2021; Kevane & Wydick, 2001; Sharma & Zeller, 1997), either thanks to females' innate trustworthiness (Shahriar et al., 2020),⁷ or because, especially in poor countries, women have very limited mobility compared to men (Armendáriz & Morduch, 2005; Morvant-Roux, 2011). Having less mobility and not having the financial capacity to relocate, women are often trapped in a place where pressure and humiliation are greater if they do not repay their loans. Higher trustworthiness and scarce mobility are among the possible reasons why it is expected that higher participation of women leads to higher repayment rates and, therefore, better financial performance of MFIs (Mia et al., 2022).

⁷ Trustworthiness refers to the innate personal characteristics of an individual reflecting her or his preference to reciprocate to the act of trusting in the absence of any economic incentives. Specifically, in a typical lending relationship with asymmetric information, the lender shows trust by accepting the risk that the borrower may strategically default, while the borrower shows trustworthiness by repaying the loan (Becchetti and Conzo, 2011; Saporito et al., 2004). Previous studies in the microfinance ambit found a positive association between trustworthiness and loan repayment rates (see, Shahriar et al., 2020; Karlan, 2005; Cassar et al., 2007; Cassar and Wydick, 2010).

Based on these considerations, we formulate the following hypothesis:

H2: Financial sustainability is positively associated with the depth of social sustainability.

In addition, to overcome the possible trade-off between financial and social sustainability, several MFIs tend to serve not the poorest but the individuals just above the poverty line (see, for instance, Navajas et al., 2000; Nawaz, 2010). 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 the very poor develop meaningful control over their investment activities (Aubert et al., 2009; Goetz & Gupta, 1996).

Nonetheless, an efficient MFI that reaches micro-entrepreneurs above the poverty line could contribute more to poverty reduction, at the macro level, than an MFI that reaches the unbankable but is financially unsustainable. Due to spill-over effects, clients of the most efficient MFIs could significantly help people who do not have access to credit by creating new job opportunities (Zeller & Johannsen, 2008). Moreover, cross-subsidization can take place between loans to microentrepreneurs above the poverty line and loans to the poorest, allowing MFIs to grow by jointly expanding credit to both these categories of borrowers while increasing financial sustainability.

Given these premises, we formulate the following hypothesis:

H3: Financial sustainability is positively associated with the breadth of social sustainability.

Summarizing the content of H1-H3, we theorize that the trade-off may not necessarily hold, while instead being contingent on the credit market conditions and the institutional environment where an MFI operates. By adhering to social norms, values, and rules, they can obtain legitimacy, which grants them prestige and access to resources (Meyer & Rowan, 1977). The “context matters” is therefore precisely what motivated the present study on the European microfinance market. It is indeed difficult to analyze the performance of MFIs operating in heterogeneously regulated 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 (Armendáriz & Szafarz, 2011). In other words, the reference context where financial institutions operate must be carefully considered, as it may play a key role in assessing the results of ours as well as other studies, such as those conducted in less developed countries.

2.2 The microfinance sector in Europe

High growth rates, major financial innovations, and heterogeneity in loan providers, methods, and services are all characteristics of the European microfinance market (Cozarencu & Szafarz, 2018). 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 characterized by smaller lending institutions.

There are also substantial differences between EU and non-EU countries, as well as between Western and Eastern and Northern and Southern European countries, in terms of institutional setting, labor costs, financial inclusion (Brown et al., 2016), and income level (Beckfield, 2006). In particular, Eastern European nations—specifically post-soviet countries—still have significant barriers for women to start their businesses. As a result, women entrepreneurs in these countries are more vulnerable than men since they have less access to market and business networks, and financial assistance (De Vita et al., 2014).

The main actors providing microloans in Europe are Non-Governmental Organizations (NGOs), Banks, Non-Bank Financial Institutions (NBFI), and Cooperatives/Cooperative Credit Banks. Depending on the context, European MFIs offer a wide range of products and services besides credit, such as financial support for education and advisory tools for entrepreneurs in the form of business development services.

European MFIs are also heavily dependent on private and public subsidies, especially in countries where high bank penetration can represent an impediment to the microfinance sector (Cull & Morduch, 2018). On the one hand, in 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. Since MFIs are penalized by

not being allowed to collect savings, they often strive to find alternative ways to refinance themselves, relying on funding opportunities available from the European Union, individual Governments, and the private sector (Hudon & Traca, 2011). Because microcredit is considered a full-fledged social policy instrument addressing both the labor market failure and the credit market failure (De Bandt & Nowak, 2006), the welfare system of some European countries provides generous state interventions on the microcredit market.

On the other hand, in countries where the microfinance industry is less disciplined and not pressured by competition from the banking sector MFIs are less subsidized. In Germany and Serbia, for example, 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 legally perform credit, such as those required in Greece, represent another reason that pushes MFIs to engage in partnerships with bank intermediaries.

Several MFIs in Europe diversify their funding sources also using innovative alternative partnerships with crowdfunding and peer-to-peer platforms. In particular, crowdfunding is a relatively new financial innovation that is often used by MFIs as a source of debt capital which allows them to move away from relying on donations and subsidies and access the mainstream capital market (Cull & Morduch, 2018).⁸ However, unlike MFIs, crowdlending platforms do not receive subsidies, and, with the exception of prosocial crowdlending, are completely dependent on investment-oriented financing from retail and institutional investors.

Either because they are highly subsidized or because of their alliances with bank intermediaries, European MFIs are closely scrutinized by the regulators, who monitor the fulfillment of both their financial performance and social mission of serving disadvantaged populations (Cozarenco & Szafarz, 2018). In general, MFIs operating in the European Union tend

to be more regulated than those operating outside the EU, although the EU leaves the task of designing specific regulations for individual member states. There are restrictions on interest rates, loan size, tax schemes, and legal entities, with different specifications depending on the home country's institutional setting and type of MFI (Cozarenco & Szafarz, 2020).⁹

Distinctive institutional settings and regulations in the credit market play a substantial role in shaping the relationship between social and financial sustainability. To comply with regulatory constraints, some MFIs may be forced to offer credit agreements that are sub-optimal from the point of view of their operational efficiency. In a broad sense, a more binding regulatory framework should entail costs that can harm MFIs' financial sustainability. Nevertheless, regulated MFIs could benefit from access to low-cost depositor funding and gain clients' trust, and consequently improve their financial sustainability (Iqbal et al., 2019; Mersland & Strøm, 2009; Strøm et al., 2014).

According to the above discussion, we test the following hypothesis:

H4: MFIs operating in more regulated contexts experience more difficulties in fulfilling the dual objective of social and financial sustainability.

To go further in depth with the regulatory setting, we focus on the possible consequences of imposing specific limits on interest rates, which is one of the most controversial regulatory aspects in the microfinance literature. From the economic side, although low interest rate ceilings fall under client protection, they hamper the financial sustainability of MFIs because they cannot shift high unitary costs to the poorest clientele (Abrar, 2019; Ledgerwood, 1998).

Accordingly, we formulate the following hypothesis:

H5: MFIs established in countries imposing interest rate caps experience more difficulties in pursuing social and financial sustainability.

⁸ Note that crowdlending for consumer loans in Europe was estimated at \$2.9 billion + \$250 million in the UK during 2020. Crowdlending of business loans was estimated at \$1.8 billion + \$3.2 billion in the UK alone during 2020. Crowdlending of property loans was estimated at \$0.5 billion + \$1.3 billion in the UK alone during 2020 (Ziegler et al., 2021).

⁹ 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 rules vary with the MFI's legal status, the type of loans (business versus personal), and their duration and size (Cozarenco and Szafarz, 2018).

Additionally, while business-type micro-credits constitute the majority of loans, European MFIs also accord a significant portion of personal micro-credits compared to MFIs operating in less developed countries. Personal loans are aimed at helping clients (especially women) deal with purely individual needs, such as emergencies, housing-related expenses, and child education. On the one hand, if women are more creditworthy than men (D'Espallier et al., 2017; Hansen et al., 2021; Kevane & Wydick, 2001; Sharma & Zeller, 1997), this could improve the relationship between financial sustainability and the depth of social sustainability measured by the share of female borrowers. On the other hand, since business loans are of higher amounts compared to personal loans, they may entail better financial performance, eventually worsening the link between financial sustainability and the depth of social sustainability measured by loan size. In addition, privileging business loans should, in principle, ease MFIs to break even by exploiting pledgeable incomes to increase loans' NPV.¹⁰ If this leads to an increase in the volume of credit, a larger share of business loans should improve financial and the breadth of social sustainability on an extensive margin.

According to this view, we hypothesize the following:

H6: MFIs granting a larger share of business loans (w.r.t. personal loans) can improve the relationship between financial sustainability and social sustainability.

We also test the hypothesis that larger MFIs may benefit from higher-scale economies, possibly adopting a standardized approach to lending. The standardization of loans, driven by the so-called “commercialization of microfinance” (see, for instance, D'Espallier et al., 2017) involves significant fixed costs, especially related to the use of ICT. This model requires the disbursement of a considerable volume of credit to break even. Therefore, through loan

standardization larger intermediaries can improve efficiency on the extensive margin. However, if this comes along with an increase in the average loan balance, MFIs may be more likely to drift from vulnerable and less financially competent customers, who are instead needier of tailored forms of financial assistance (Chahine & Tannir, 2010).

Hence, we formulate the following hypothesis:

H7: Larger MFIs exhibit a positive relationship between social and financial sustainability-

In the next sections, we aim at deepening the analysis regarding the fulfillment of the dual objectives in the European microfinance industry, with particular concerns about the institutional setting and country regulation.

3 Empirical framework: data, variables, and methodology

3.1 The survey

This research was conducted using a unique dataset based on a survey administered by the authors with the support of the European Microfinance Network and the Microfinance Centre (see Diriker et al., 2018) that was submitted to European MFIs based in 38 European countries.¹¹

The initial survey was sent to the universe of 616 MFIs that were either members of the European Microfinance Network and Microfinance Centre or non-members.¹² 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 translated into Bulgarian, French, German, Hungarian, Italian, Polish, Romanian, and Spanish. It was submitted on March 21st, 2018, and five reminders followed to

¹⁰ Recently the use of various forms of non-physical collateral, such as co-signment requirements (regardless of the type of loan, see Dalla Pellegrina and Scollo, 2016; Guinnane, 2011), has reduced the discrepancies between business and personal loans in terms of risk coverage, which nonetheless remain large.

¹¹ Two Turkish MFIs were also contacted. Actual response rates reduce the sample used for the empirical analysis to 20 countries.

¹² The number of European MFIs is relatively low, estimated to range between 500 and 700 institutions, <https://www.european-microfinance.org/publication/overview-microcredit-sector-european-union-2012-2013>.

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

Own elaboration on data from European Microcredit Survey 2016–2017

non-responsive MFIs, including emails and calls. The survey 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.

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.¹³ The main descriptive statistics from the original survey on

European MFIs are reported in Table 1.¹⁴ Notice, in particular, that the institutions contacted were MFIs providing only microloans. Apart from a few cases, they were not branches of larger institutions that also offered microfinance products, but rather pure MFIs of relatively small size (as can be seen by the low average number of employees, on average 99 per institution, Table 1) which reasonably operated within the national borders.

Most European NGOs surveyed started their activities before 2005.¹⁵ Government agencies and private banks have approached this sector more recently.

¹³ The response rate per country was highly variable. A quantification of the country-bias is available in Appendix A, Table 11. 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, we investigate the social-financial sustainability relationship on separate samples of Western and Eastern European countries (see Sect. 5).

¹⁴ 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 20.

¹⁵ Notice that the European microfinance sector is relatively young compared to less developed countries. 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).

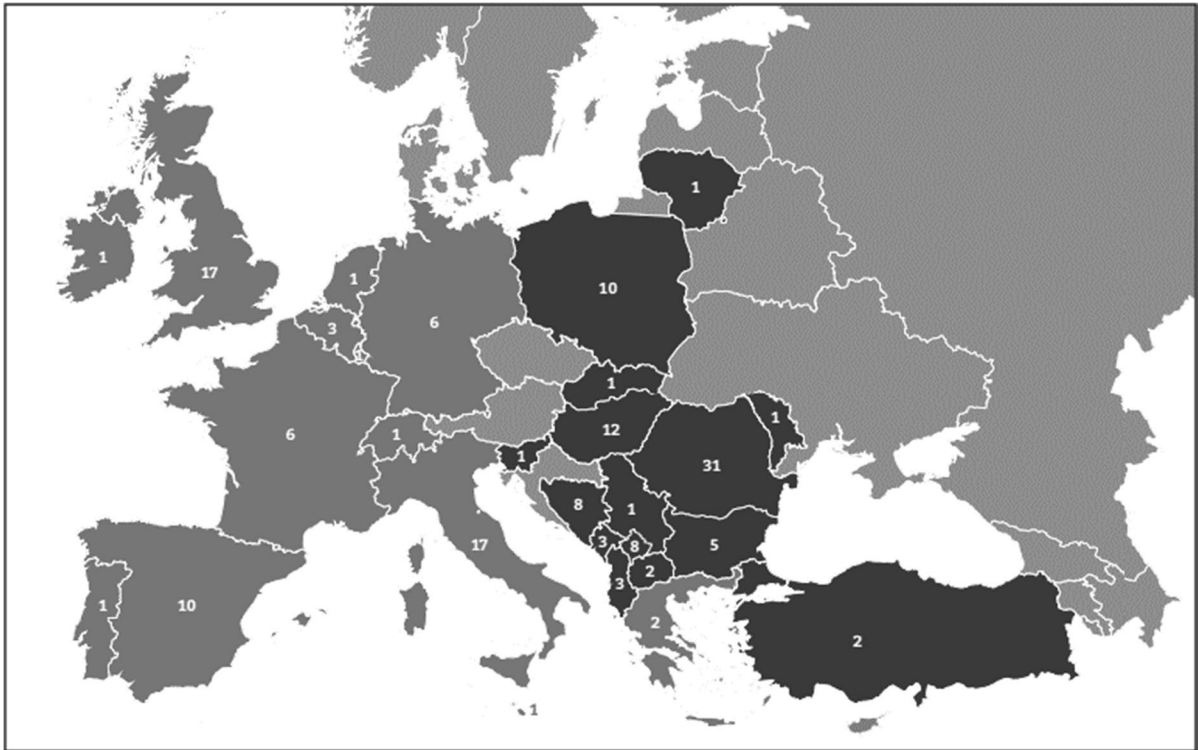


Fig. 1 MFIs by country and region (respondent institutions)

Overall, 40% of the MFIs were non-governmental organizations (NGOs), 29% were non-bank financial institutions, 19% were cooperative banks or financial cooperatives, and only 12% were private and state banks and various government bodies.¹⁶

Considering the main fields of activity of the various MFIs, we can see that microcredit represented an ancillary activity for banks and government agencies. On the contrary, almost all cooperatives/cooperative banks and a significant portion of NBFIs and NGOs were specialized in the microcredit sector, which represented the focus of their activity.¹⁷

¹⁶ 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%).

¹⁷ 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.

Figure 1 shows where the respondent institutions were geographically located, whereas in Fig. 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*

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; Van Damme et al., 2016; Wijesiri et al., 2017). Thus, in our study, we measured the financial performance of European MFIs using the frontier efficiency methodology. With a rigorous methodology drawn from the microeconomic theory, frontier efficiency approaches

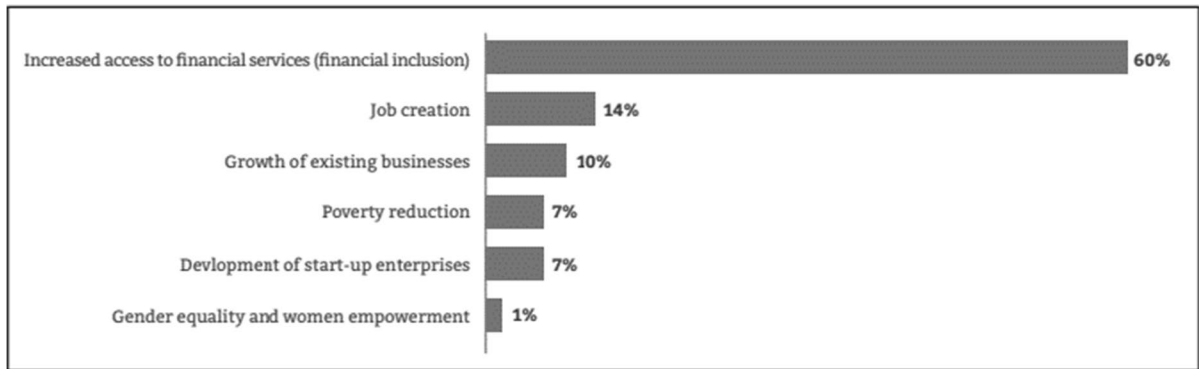


Fig. 2 Share of MFIs by mission

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 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 do not impose an explicit, ad hoc weighting system while evaluating performance. Instead, widely used performance indicators cannot 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 used 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 adopted BCC because MFIs struggle to maximize outputs given limited available inputs. Moreover, we used the BCC model with VRS assumption as differences in operational size may affect efficiency (Wanke et al., 2022; Widiarto & Emrouznejad, 2015).

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 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. Both approaches apply the traditional microeconomic theory of the firm to banking and differ only in the specification of the 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.

The appropriateness of each approach varies according to the circumstances (Das & Ghosh, 2006). In our study, we followed Yaron’s (1994) framework and Gutierrez-Nieto et al. (2007), and we did not strictly categorize MFIs under any of the above approaches due to the diverse nature of their operations. Consistent with earlier studies (Bassem, 2008, 2014; Gutierrez-Nieto et al., 2007 and 2009; Piot-Lepetit & Nzongang, 2014;

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

Widiarto & Emrouznejad, 2015; Wijesiri et al., 2017), and given data availability, we selected three inputs (total assets, operating expenses, and the total number of employees) and one output (financial revenues). We used financial revenues as an output variable because MFIs that could not generate enough revenues are unable to operate sustainably (Bassem, 2014; Gutierrez-Nieto et al., 2007). 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 were 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 is that it has no statistical properties and consequently the efficiency measure is sensitive to variations in the sample configuration (Simar & 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) proposed 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 & 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.¹⁸ Country-wise efficiency scores are reported in Fig. 3.

¹⁸ Refer Simar and Wilson (1998 and 2000) for the detailed information about bootstrap algorithm we used in our analysis.

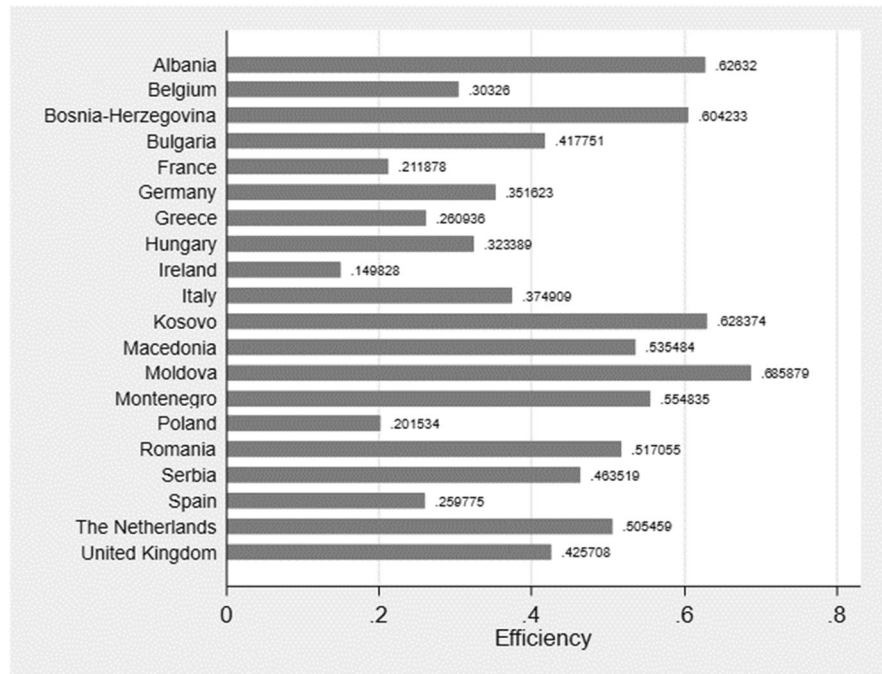
3.2.2 Explanatory variables: social sustainability measures

Our main explanatory variables in the regression analysis that follows are MFIs' social sustainability measures. We measured 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). A socially oriented MFI should serve as many clients as possible (Pascal et al., 2017). 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 used the number of active borrowers as a proxy for the breadth of social sustainability.¹⁹

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*).

¹⁹ 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.

Fig. 3 Country wise Mean efficiency scores

On the one hand, the percentage of women borrowers is widely used as a depth of social sustainability because loans to women have higher marginal impacts than those granted to men (Pitt & Khandker, 1998). According to CGAP (2017),²⁰ nearly one of every three women in the world is excluded from the formal financial system. It reveals that women are 7% 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 both credit and labor markets 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 (De Vita et al., 2014; Sperber et al., 2022). 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 credit (EU, 2021).²¹ Because of this, we included the proportion of female borrowers as a proxy for the depth of social sustainability.

On the other hand, small-scale loans indicate the client's poverty level (Cull et al., 2009; Pascal et al., 2017). The smaller the average loan balance (i.e., the lower *Depth_Alb*) (normally in relation to some measure reflecting the standard of living), the greater the depth of social sustainability. Although deep social sustainability increases social benefits, it also usually 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 (i.e. *Depth_Alb* has a negative relationship with financial sustainability)²² (Quayes, 2015). The average loan balance per borrower is measured in monetary units. However, the same amount of money may mean different things

²⁰ <https://www.cgap.org/blog/5-challenges-womens-financial-inclusion>.

²¹ https://ec.europa.eu/info/sites/default/files/aid_development_cooperation_fundamental_rights/2022_report_on_gender_equality_in_the_eu_en.pdf.

²² In other words, *Depth_Alb* is an inverse measure of social sustainability, the larger the loan balance, the lower the social outreach.

in different countries depending on the average per capita income (Chmelíková et al., 2019; Gutiérrez-Nieto et al., 2009; Quayes, 2015). Since our sample includes MFIs in different countries in Europe, we divided 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 were 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 were grouped into 7 categories: size; age, regulatory status; leverage; legal types, subsidies, and interest rates. Moreover, economic indicators, such as GDP and GDP growth, were 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.²³

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, earlier studies (e.g., Ledgerwood, 1998) showed that financial sustainability improves as MFIs become more mature. On the contrary, other studies revealed that age could be negatively associated with MFIs' sustainability (e.g., Hermes et al., 2011), as newer MFIs may leapfrog older institutions in terms of the financial sustainability of their activities. Hence, the expected net effect of MFIs' age on efficiency is undetermined.

MFIs size (Size): Size can influence financial sustainability as it reflects a firm's ability to compete

with peers in the market thanks to scale economies. We used the logarithm of the total assets as a proxy of MFIs' size. Therefore, the expected sign of MFIs' size on efficiency is positive.

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 & Strøm, 2009). Hence, the expected net effect of regulation on MFIs' efficiency is undetermined. In our analysis, we used 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 used the variable *Regulated* in a broad sense. We then deepened the analysis using more specific regulatory measures, such as interest rate caps, and tested specific hypotheses regarding their effect on the social-financial sustainability relationship.

Leverage: We controlled 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 & Daly, 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 on efficiency is undetermined.

MFIs' legal type: MFIs in our sample exist in four main types: Cooperatives (COOP), Non-Governmental Organizations (NGOs) Non-Bank Financial Intermediaries (NBFIs), and Banks (residual category). Each of them has different agency and governance problems (Tchakoute-Tchuigoua, 2010; Zeller & Johannsen, 2008); hence, the relative weight of each of the dual objectives may be different according to the legal type (Servin et al., 2012). In particular, some studies assessed that MFIs' financial sustainability could be affected by the preferences of their stakeholders and funding agencies (see Khachatryan et al., 2017 on Eastern Europe and Central Asia). We accounted for these effects on MFIs' outcome by including their legal type dummies as covariates (Yimga, 2018).

²³ 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.

Subsidies: In our sample, 39 MFIs are subsidized.²⁴ In general, subsidies may help MFIs reduce operating expenditures and thus achieve higher financial sustainability, while also improving their social performance by enabling MFIs to extend smaller loans (Forcella & Hudon, 2016). However, subsidies may also constitute a disincentive to efficient behavior (Cozarenco et al., 2022); hence their expected effect on MFIs' financial sustainability is, in principle, ambiguous. We used the amount of grants and subsidies received by each MFI at the end of the year as a covariate.

Interest rates: Since the pursuit of social objectives leads to an increase in operational and administrative expenses associated with the provision of loans (Abrar, 2019), MFIs may pass these costs on to the most disadvantaged economic groups to be financially sustainable (Ledgerwood, 1998). We, therefore, expect MFIs that can charge higher interest rates²⁵ to perform better from a financial point of view.

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

3.3 Methodology

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

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

where θ_{it} is the financial sustainability of the i^{th} MFI, measured by efficiency in year t , while Outreach_{it} are our measures of social sustainability (explanatory variables), and X_{it} are covariates which were detailed in the previous subsection. We included year dummy variables (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, while Tobit regression would be a more suitable technique to be used in such situations. We used the Simar and Wilson (2007) truncated bootstrap methodology to support the base Tobit output. The bootstrap estimates were produced using 2000 bootstrap replications (Simar & Wilson, 2007).

4 Results

4.1 Descriptive statistics

Table 3, presents the summary statistics for all the variables used in the regression. As one can see from Table 3, the efficiency scores of MFIs in Europe have an average value of 0.465.²⁶ 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 NBFIs, 32% are credit cooperatives, and less than 2% are banks. Debt-to-Equity (*Leverage*) is 3 on average. Table 4 reports the dependent variable and the key explanatory variables for subsamples of MFIs.

4.2 Correlations among the variables

The correlation matrix of the dependent and independent variables is presented in Table 5. Coefficients show that social sustainability indicators (*Depth_Women*) sometimes exhibit a significant correlation 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. Explanatory variables are occasionally correlated with efficiency.

²⁴ 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).

²⁵ We use the average interest rate on personal and business loans. Further in the analysis we will consider personal and business loans separately.

²⁶ 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).

Table 3 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)	66				
% 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 €

Table 4 Descriptive statistics for regression analysis: subsamples

		Small (N=93)			Large (N=66)			
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=33)			East (N=126)			
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	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=133)			
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 5 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	0.086	1										
Depth_Women	0.256**	0.135	1									
Depth_AlB	0.018	-0.054	-0.306***	1								
Age	0.239**	-0.073	0.042	-0.104	1							
Size	0.177*	0.548***	0.113	-0.036	-0.032	1						
Regulated	0.484***	-0.125	0.037	-0.115	0.120	0.032	1					
COOP	0.209**	-0.137	0.084	-0.278***	0.465***	-0.291***	0.366***	1				
NGO	-0.160*	-0.057	-0.006	0.233**	-0.081	0.074	-0.450***	-0.571***	1			
NBFI	-0.028	-0.031	-0.100	0.054	-0.365***	0.102	0.164*	-0.400***	-0.480***	1		
Bank	-0.049	0.765***	0.051	-0.056	-0.141	0.401***	-0.152	-0.097	-0.116	-0.082	1	
Leverage	-0.093	0.005	-0.162*	-0.169*	-0.072	0.192*	0.093	-0.146	-0.083	0.238**	0.044	1
Int. rate	0.446***	0.428***	0.365***	-0.041	-0.132*	0.153*	0.387***	-0.222***	0.140*	0.086	-0.0168	-0.027

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

Average values of the variables 2016–2017

4.3 Regression results

In Table 6, we present the results of the Tobit and Truncated bootstrap regressions. Overall, results are comparable across techniques.²⁷

The breadth of social sustainability (*Breadth*) is positive and significant ($p < 0.01$), meaning that European MFIs that seek to expand financial inclusion on the extensive margin exhibit greater efficiency, confirming H3. Also, the percentage of women borrowers (*Depth_Women*) has a positive and significant relationship with efficiency scores ($p < 0.01$), indicating that gender plays a noteworthy role in determining financial sustainability in Europe. This evidence is supportive of H2.

On the one hand, these are both signals of possible complementarities between the two bottom-line purposes of MFIs (social 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, supporting the existence of a possible trade-off between social and financial goals, as expressed by H1.

Turning to the control variables, the baseline regressions document several significant relations. The coefficient of MFIs' *Age* has a positive and significant effect on financial sustainability ($p < 0.1$ in column (a) and $p < 0.05$ in column (b)).

MFIs' *Size* measured by the log of total assets does not have any significant relationship with efficiency.

The dummy *Regulated* exhibits positive and significant parameters ($p < 0.01$). This result does not support H4. We also found that higher *Interest rates* (columns (g)–(h)) tend to foster MFIs' financial sustainability ($p < 0.1$). Furthermore, the legal types of institutions exert a weak significant influence ($p < 0.1$) on efficiency. Specifically, NGOs and cooperative institutions appear less efficient compared to banks (residual category).

Regarding *Subsidies*, estimates provide evidence of a negative relationship between the amount of this external source of funding and the financial sustainability of the MFIs ($p < 0.01$).

Finally, the coefficient concerning the relationship between *Leverage* and financial sustainability is negative, but not statistically significant.

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

Our main analysis assumed that MFIs strive to maximize outputs given limited available inputs. However, MFIs may be 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 & Emrouznejad, 2015). Thus, to provide a broad comparison, we repeated our main regressions with efficiency scores obtained assuming input-oriented VRS. Results are reported in Table 7. Outputs are comparable to those of the main analysis in Table 6.

4.5 Testing alternative hypotheses in the European context: MFIs' dimension, geographical characteristics, loan type, and interest rate caps

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 subgroups of MFIs in Table 4. Specifically, we split the database into different categories of MFIs according to size, geographical area, regulation, and type of loan.

4.5.1 MFIs' dimension

Simple mean comparisons in Table 4 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 of smaller MFIs), 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 8, Panel A). The coefficients concerning the relationships between the breadth of social sustainability and financial sustainability of both large and small MFIs are positive and statistically significant, but those for

²⁷ Columns (c)–(f) alternatively include *Breadth* and *Depth_Women*. Only columns (g)–(h) include interest rate due to its high correlation with social sustainability measures.

Table 6 Financial sustainability and social sustainability: Tobit and Truncated regressions—Efficiency-oriented VRS

Dependent variable	Efficiency	Tobit	Truncated	Tobit	Truncated	Tobit	Truncated	Tobit	Truncated
		(a)	(b)	(c)	(d)	(e)	(f)	(g)	(h)
Outreach variables									
Breadth		0.0553*** (5.065)	0.0574*** (4.826)			0.0642*** (6.038)	0.0676*** (5.788)	0.0487*** (4.257)	0.0508*** (4.112)
Depth_Women		0.0020*** (2.650)	0.0021*** (2.671)	0.0032*** (4.087)	0.0034*** (4.102)			0.00149* (1.866)	0.00164* (1.931)
Depth_AlB		0.169*** (4.398)	0.180*** (4.402)	0.0894** (2.362)	0.103** (2.529)	0.150*** (3.892)	0.161*** (3.902)	0.161*** (4.211)	0.172*** (4.225)
MFI specific controls									
Age		0.00196* (1.965)	0.00208** (1.980)	0.00202* (1.869)	0.00221* (1.927)	0.00192* (1.879)	0.00202* (1.878)	0.00209** (2.108)	0.00218** (2.102)
Size		-0.0180 (-1.418)	-0.0183 (-1.330)	0.0262*** (2.629)	0.0304*** (2.691)	-0.0232* (-1.807)	-0.0242* (-1.745)	-0.0123 (-0.944)	-0.0126 (-0.898)
Regulated		0.139*** (3.582)	0.150*** (3.513)	0.190*** (4.685)	0.217*** (4.748)	0.134*** (3.365)	0.142*** (3.270)	0.102** (2.340)	0.113** (2.370)
Subsidies		-0.007*** (-2.861)	-0.008*** (-2.888)	-0.007*** (-2.867)	-0.009*** (-3.016)	-0.006** (-2.428)	-0.007** (-2.446)	-0.00606** (-2.508)	-0.00666** (-2.530)
COOP		0.0721 (0.572)	0.0717 (0.543)	-0.0274 (-0.203)	-0.0318 (-0.223)	0.0789 (0.612)	0.0824 (0.609)	0.107 (0.846)	0.106 (0.803)
NGO		0.0750 (0.653)	0.0736 (0.612)	-0.0161 (-0.131)	-0.0148 (-0.114)	0.0773 (0.658)	0.0792 (0.643)	0.0695 (0.612)	0.0686 (0.578)
NBFI		0.0773 (0.659)	0.0745 (0.604)	-0.0411 (-0.331)	-0.0521 (-0.396)	0.0820 (0.683)	0.0837 (0.663)	0.0853 (0.734)	0.0835 (0.685)
Leverage		0.00030 (0.107)	0.00034 (0.111)	-0.00022 (-0.0718)	0.00046 (0.0140)	-0.00144 (-0.520)	-0.00163 (-0.525)	0.000319 (0.116)	0.000399 (0.132)
Interest rate ⁽¹⁾								0.00309* (1.776)	0.00302* (1.656)
Country specific controls									
GDP		-0.00838 (-0.437)	-0.00893 (-0.439)	-0.0398** (-2.027)	-0.0419** (-1.994)	-0.00555 (-0.283)	-0.00519 (-0.249)	-0.00957 (-0.504)	-0.00993 (-0.493)
GDPG		-0.00529 (-0.507)	-0.00617 (-0.541)	0.000666 (0.0594)	0.000718 (0.0573)	-0.00762 (-0.717)	-0.00838 (-0.725)	-0.00534 (-0.518)	-0.00593 (-0.529)
year		0.0161 (0.605)	0.0175 (0.614)	0.00561 (0.196)	0.00627 (0.202)	0.0183 (0.672)	0.0193 (0.663)	0.0160 (0.607)	0.0170 (0.606)
Constant		0.131 (0.434)	0.109 (0.337)	0.170 (0.520)	0.0889 (0.247)	0.190 (0.614)	0.163 (0.492)	0.0938 (0.312)	0.0712 (0.223)
R-squared (from linear regression) ⁽²⁾		0.5257	0.5257	0.4461	0.4461	0.5039	0.5039	0.5353	0.5353
Adj R-squared (from linear regression) ⁽²⁾		0.4776	0.4776	0.3943	0.3943	0.4575	0.4575	0.4844	0.4844
No. MFIs		159	159	159	159	159	159	159	159

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

⁽¹⁾ Average business loans and personal loans

⁽²⁾ 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 sustainability and social sustainability: Tobit and Truncated regressions—Input-oriented VRS

Dependent variable	Tobit	Truncated	Tobit	Truncated	Tobit	Truncated	Tobit	Truncated
Efficiency	(a)	(b)	(c)	(d)	(e)	(f)		
Outreach variables								
Breadth	0.0548*** (4.687)	0.0574*** (4.519)			0.0621*** (5.508)	0.0658*** (5.332)	0.0479*** (3.911)	0.0500*** (3.781)
Depth_Women	0.0017** (2.042)	0.0018** (2.007)	0.0028*** (3.419)	0.0031*** (3.399)			0.00112 (1.310)	0.00119 (1.276)
Depth_AlB	0.229*** (5.565)	0.243*** (5.321)	0.150*** (3.740)	0.166*** (3.635)	0.213*** (5.210)	0.228*** (4.985)	0.220*** (5.384)	0.232*** (5.153)
MFI specific controls								
Age	0.0016 (1.494)	0.0017 (1.496)	0.0017 (1.444)	0.0018 (1.460)	0.0016 (1.441)	0.0017 (1.444)	0.00173 (1.629)	0.00186 (1.630)
Size	-0.058*** (-4.230)	-0.061*** (-4.112)	-0.014 (-1.297)	-0.016 (-1.367)	-0.062*** (-4.537)	-0.066*** (-4.401)	-0.0516*** (-3.704)	-0.0546*** (-3.603)
Regulated	0.149*** (3.581)	0.159*** (3.485)	0.200*** (4.639)	0.215*** (4.488)	0.145*** (3.427)	0.153*** (3.324)	0.111** (2.363)	0.116** (2.291)
Subsidies	-0.0061** (-2.361)	-0.0065** (-2.336)	-0.0066** (-2.413)	-0.0073** (-2.400)	-0.0053** (-2.043)	-0.0057** (-2.033)	-0.00523** (-2.019)	-0.00570** (-2.031)
COOP	-0.230* (-1.701)	-0.243* (-1.671)	-0.328** (-2.302)	-0.354** (-2.249)	-0.224 (-1.638)	-0.237 (-1.605)	-0.194 (-1.431)	-0.202 (-1.386)
NGO	-0.224* (-1.820)	-0.236* (-1.780)	-0.314** (-2.419)	-0.339** (-2.370)	-0.222* (-1.781)	-0.233* (-1.728)	-0.230* (-1.884)	-0.239* (-1.821)
NBFI	-0.203 (-1.611)	-0.215 (-1.576)	-0.320** (-2.429)	-0.347** (-2.376)	-0.199 (-1.560)	-0.210 (-1.515)	-0.194 (-1.559)	-0.203 (-1.507)
Leverage	-0.00244 (-0.821)	-0.00271 (-0.829)	-0.00295 (-0.928)	-0.00301 (-0.865)	-0.00387 (-1.322)	-0.00432 (-1.327)	-0.00242 (-0.821)	-0.00266 (-0.826)
Interest rate ⁽¹⁾							0.00321* (1.724)	0.00356* (1.720)
Country specific controls								
GDP	-0.00528 (-0.257)	-0.00571 (-0.254)	-0.0364* (-1.750)	-0.0400* (-1.746)	-0.00295 (-0.142)	-0.00241 (-0.106)	-0.00652 (-0.320)	-0.00606 (-0.270)
GDPG	-0.0179 (-1.603)	-0.0206* (-1.652)	-0.0120 (-1.011)	-0.0148 (-1.091)	-0.0198* (-1.758)	-0.0225* (-1.788)	-0.0180 (-1.623)	-0.0205* (-1.669)
year	0.0336 (1.182)	0.0387 (1.244)	0.0233 (0.767)	0.0280 (0.833)	0.0354 (1.229)	0.0407 (1.285)	0.0335 (1.190)	0.0384 (1.245)
Constant	1.168*** (3.601)	1.218*** (3.472)	1.206*** (3.479)	1.287*** (3.373)	1.216*** (3.709)	1.265*** (3.559)	1.129*** (3.505)	1.161*** (3.336)
R-squared (from linear regression) ⁽²⁾	0.4528	0.4528	0.3742	0.3742	0.4379	0.4379	0.5639	0.4632
Adj R-squared (from linear regression) ⁽²⁾	0.3973	0.3973	0.3157	0.3157	0.3853	0.3853	0.4831	0.4044
No. MFIs	159	159	159	159	159	159	159	159

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

⁽¹⁾ Average business loans and personal loans

⁽²⁾ Linear regression was performed on the same specification and using the same set of explanatory variables as in Tobit and Truncated regressions

Table 8 Financial sustainability and social sustainability relationship by MFI size, geographical region, loan type, and interest rates

Dependent variable Efficiency	A		B		C			D	
	Dimension assets < = 10,000,000		Geography ⁽¹⁾		Loan Type			Interest rate caps	
	Large	Small	West	East	Non-UE	Business	Personal	Cap	No Cap
Breadth	0.0910*** (4.390)	0.0568*** (4.556)	0.0716** (2.451)	0.0844*** (4.264)	0.00703 (0.136)	0.0868*** (5.094)	0.0595*** (4.279)	0.149*** (3.692)	0.0447*** (2.709)
Depth_Women	-0.00151 (-1.279)	0.0034*** (3.508)	0.00113 (0.391)	0.00180** (2.154)	0.00120 (1.519)	0.0017* (1.937)	0.0028*** (3.526)	-0.00491** (-2.276)	0.00240*** (3.025)
Depth_Alb	0.289*** (3.750)	0.110*** (2.846)	0.204 (0.539)	0.188*** (4.353)	0.486** (2.438)	0.718*** (6.255)	0.157*** (3.608)	0.219 (1.390)	0.176*** (3.553)
Covariates	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Constant	1.745** (2.224)	0.184 (0.533)	-1.675 (-0.727)	0.410 (1.080)	-0.453 (-1.114)	0.438 (1.220)	0.352 (-1.112)	1.756 (0.764)	-0.150 (-0.445)
R-squared	0.604	0.595	0.362	0.483	0.503	0.585	0.556	0.821	0.497
No. MFIs	66	93	33	126	44	99	107	26	133

*, **, 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

big MFIs are larger in magnitude, thus confirming H7. However, the higher magnitude of the coefficient associated with *Depth_Alb* in larger MFIs suggests that these institutions more heavily exploit the loan size to achieve higher efficiency, while drifting from social sustainability objectives (this contradicts H7).

In addition, the significant positive coefficient associated with *Depth_Women* in smaller MFIs indicates that they tend to achieve higher efficiency by targeting more vulnerable customers (also contradicting H7).

4.6 Loan type

Summary statistics (Table 4) 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%).²⁸

²⁸ Notice that the two samples of business and personal loans tend to overlap for MFIs that offer both types of loans.

Table 8 (Panel C) reports the regression results for the divided sample according to the type of loan offered.²⁹ Overall, the regression outcome suggests that MFIs that offer personal loans are more likely to achieve financial sustainability by serving a higher percentage of female clientele (*Depth_Women*), contradicting H6. Also, MFIs that offer business loans are more likely to achieve financial sustainability by providing larger loan amounts (*Depth_Alb*), thus drifting more from their social purposes. This evidence also contradicts H6.

4.7 Geographical area

Summary statistics (Table 4) show that the MFIs in the Non-EU countries 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

²⁹ The regression outcome represents a corollary of the implications derived in terms of asset size in the previous subsection, 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 (Tables 3 and 4, Panel A).

and Western counterparts). Like 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).

We performed regressions on the sub-samples of Western (EU) and Eastern MFIs, including Non-EU countries.³⁰ The regression results for the divided sample according to geographical macro-areas (Table 8, Panel B) suggest that deeper involvement of Eastern MFIs in social sustainability in terms of shares of women borrowers (*Depth_Women*) helps them to achieve a greater level of financial sustainability on the intensive margin. However, Eastern MFIs also show a significant positive parameter associated with *Depth_Alb*, possibly indicating that less strict regulation allows them to extend loans of larger amounts while drifting from social goals.³¹ In terms of breadth of outreach, both Eastern and Western MFIs likely succeed in leveraging financial sustainability by serving a larger number of borrowers, while Non-EU countries do not. Overall, the empirical evidence only partially supports H4.

4.8 Regulation on interest rate caps

The wide range of credit products and associated interest rate ceilings did 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 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),³² nations imposing interest rate ceilings as of March 2010 were: Greece, Ireland, Belgium, France, Germany, Italy, Netherlands, Poland, and Spain.³³ In our analysis we used 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 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 4).

Table 8 (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.³⁴ A noticeable effect is observed in terms of obstacles that interest rate caps represent for the service of poorer female customers and their negative consequences on 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, confirming H5.

5 Robustness analysis

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

An important issue in studying the relationship between efficiency levels and financial indicators is the

³⁰ Notice that non-EU MFIs are a subset of the sample of Eastern MFIs.

³¹ According to the European Microfinance Network, 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 (Cozarencu & Szafarz, 2020). In addition, as already mentioned, the European Commission recommends a EUR 25,000 ceiling (European Commission, 2013).

³² <https://op.europa.eu/en/publication-detail/-/publication/46a336d0-18a0-4b46-8262-74f0e0f47eb3>.

³³ 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.

³⁴ The results broadly 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.

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 allowed 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 could not 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 Eq. (1). We chose to limit this problem by exploiting the presence of allegedly exogenous variables in both Generalized Method of Moments (GMM) and Instrumental Variable (IV) regressions.

In particular, there are two hypotheses on which we relied to motivate the choice of IVs. The first is the fact that some covariates (namely, COOP NGO NBFI, and *Leverage*) were not significant in the Tobit and Truncated baseline regressions of Table 6. This legitimized us to assume that these variables could be considered exogenous with respect to the (unexplained component of) efficiency, thus allowing us to consider them as possible instruments for social sustainability.³⁵

In addition, we used the lagged value of the efficiency estimate as an additional instrument for social sustainability.³⁶ On the one hand, it is reasonable to assume that the lagged value is correlated with the endogenous variables at time t under the assumption that relatively efficient MFIs can devote more resources to social goals at time $t+1$. On the other hand, 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 autocorrelation is not strong, the instrument can be considered exogenous.

We checked these hypotheses by performing the appropriate diagnostic tests.

The results obtained through GMM and Two-Stage Least Squares (2SLS), along with associated tests are reported in Table 9. GMM in column (a) was conducted considering all 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 6. *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, we proceed to the IV estimation using the 2SLS estimator, again considering all the covariates and the lagged efficiency score as instruments in the first estimation stage Column (b). 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 chose to instrument one endogenous variable at a time. Furthermore, we opted for considering as exogenous only the variables that were not significant in the baseline regressions of Table 6 (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.

Both the volume of clients served (*Breadth*) and the percentage of female customers (*Depth_Women*) are still significant in promoting MFIs' efficiency (Columns (b)-(c) and (d), respectively) and the associated effects are larger than in the baseline regressions, possibly reflecting a negative

³⁵ Hansen J statics tests will be computed to verify the exclusion hypothesis.

³⁶ Note that due to the one-year lag of the efficiency score only a cross-sectional estimate for the year 2017 is allowed.

Table 9 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*** (3.604)	0.0577*** (2.622)	0.150*** (3.996)		
Depth_Women	0.00561* (1.793)	0.00949* (1.655)		0.0159*** (2.850)	
Depth_AlB	0.116 (1.092)	0.116 (0.836)			0.137 (1.082)
Covariates	Yes	No	Yes	Yes	Yes
Constant		-0.237* (-1.744)	0.946** (2.210)	-0.214 (-0.605)	-0.190 (-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 <i>P</i> -val		0.3764	0.0506	0.1768	0.0017
Hansen J statistic (over-identification test of all instruments)		10.285	5.935	6.238	17.295
Chi-sq <i>P</i> -val		0.2456	0.5474	0.5123	0.0156
t-statistics in parentheses *** <i>p</i> < 0.01, ** <i>p</i> < 0.05, * <i>p</i> < 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	Included instruments: age size regulated
		Excluded instruments: age size regulated COOP NGO NBFI leverage gdp gdp Efficiency_1	Excluded instruments: COOP NGO NBFI leverage gdp gdp Efficiency_1	Excluded instruments: COOP NGO NBFI leverage gdp gdp Efficiency_1	Excluded instruments: COOP NGO NBFI leverage gdp gdp Efficiency_1

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

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 (Column (e)), 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.³⁷

³⁷ 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 (Andreou and Anyfantaki, 2021; Bhattacharya et al., 2020; Chauhan and Kumar, 2019; Grohmann et al., 2018). 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., 2020). The regression output is reported in Appendix B (Table 19). Results do not show any substantial difference compared to those obtained in the main analysis.

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

5.2 Impact of social sustainability on alternative financial sustainability measures

In support of the output obtained in the previous subsection, we analyzed the impact of the social sustainability variables on financial sustainability measures alternative to efficiency scores.

Specifically, we considered 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 analyzed 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 & Strøm, 2009). It is measured by the fraction of the loan portfolio 30 days overdue (PAR30). Finally, we analyzed the effects of social sustainability measures on the costs of MFIs (Operational Expenses and Financial Expenses).

In Table 10, we report a summary of the analysis of the impact of the social sustainability variables on the various financial sustainability and risk indicators.³⁸ 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).

6 Discussion

6.1 Summary of the main results

Consistent with our hypotheses, this research showed that European MFIs that prioritize serving wealthier clients are more financially sustainable. In particular, larger MFIs use loan size to increase efficiency, while drifting away from social sustainability goals. We also found that providing loans to women is favorably linked with MFIs' financial sustainability and that this association is higher for MFIs in Eastern Europe. However, our sub-sample study revealed that lending to women does not contribute to the financial sustainability of large MFIs. Instead, we found that 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 smaller MFIs are represented by NGOs and the cooperative sector, which tend to care more for disadvantaged

³⁸ The complete regression output is reported in Appendix B (Tables 12-18).

Table 10 Impact of Social sustainability on alternative measures of financial sustainability—OLS, GMM and IV (Two-Stage Least Squares) regressions

	(a)	(b)	(c)	(d)	(e)	(f)
	OLS	GMM	IVREG	IVREG	IVREG	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 gdp Efficiency_1	COOP NGO NBFI risk leverage gdp gdp Efficiency_1	COOP NGO NBFI risk leverage gdp gdp Efficiency_1	COOP NGO NBFI risk leverage gdp gdp 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

customers by also providing non-business services, such as health and education programs, especially to women.

Furthermore, in terms of extensive margin, we found that European MFIs that actively pursue broad financial inclusion (breadth of social sustainability) do so more effectively. Larger MFIs are more noticeable for doing this. We also carried out a sub-sample analysis of Eastern and non-EU countries and found that MFIs' financial sustainability in Eastern regions is sensitive to both the breadth and depth of social sustainability, whereas in Western Europe MFIs are sensitive only to the breadth of social sustainability. However, MFIs in Western Europe are sensitive only to the breadth of social sustainability, leading to the conclusion that the existing legally mandated regulatory framework, especially in terms of interest rate caps, makes it more difficult for MFIs operating in Western nations to achieve the dual goal of social and financial sustainability.

6.2 Implications for theory

Our study contributes to the literature on microfinance in several ways. First, while most microfinance research focuses on trade-offs and complementarities between social and financial objectives in developing countries, our study adds to the growing literature on the dual objectives of microfinance in the European context. Second, our analysis provides evidence of significant relationships between various measures of social sustainability on financial performance advancing their understanding according to the specific geographical and institutional context in which each MFI operates (Cozarenco & Szafarz, 2020; Hermes & Hudon, 2018; Quayes, 2012).

We found a positive effect of the depth of social sustainability in the form of loan provision to female borrowers on financial sustainability, not unlike what emerges from similar analyses on MFIs outside the European context (Aubert et al., 2009; Goetz & Gupta, 1996, among others). This may be due either

to the inherent disparities between men and women, which may explain why women are more likely to repay their debts thanks to their innate trustworthiness (Shahriar et al., 2020; Becchetti & Conzo, 2011; Cassar et al., 2007; Cassar et al., 2007; Karlan, 2005; Saporito et al., 2004), or because of their inability to relocate to escape the social stigma related to missing loan repayments (Armendáriz & Morduch, 2005; Morvant-Roux, 2011). In particular, from our analysis, the observed effect emerges to be 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 hamper financial sustainability, confirming the evidence of other studies conducted in the non-European contexts (Hermes et al., 2011; Mia et al., 2019; Navajas et al., 2000; Wry & Zhao, 2018, among others). Such form of social and financial sustainability trade-off is typically attributable to the relatively high transaction costs associated with small loans, and largely reflects the contradictory nature of the dual-logics organizations, (Abate et al., 2014; Abdulai & Tewari, 2016; Bhattarai et al., 2019; Cull et al., 2007; Gonzalez & Rosenberg, 2006; Hartarska et al., 2013; Hermes et al., 2011; Louis & Baensens, 2013; Olivares-Polanco, 2005; Pedrini & Ferri, 2016). To attain sustainability, different MFIs condition their social goals according to their marketability, pricing strategies, and marketing prowess (Lee & Chandra, 2020). The tension between these different priorities may account for the conflict between social and financial performance and is in line with the view that to get resources, MFIs may give in to institutional demands arising from commercial logics while ignoring those linked to social welfare logics (Battilana & Dorado, 2010).

In terms of breadth of social sustainability, our results suggest that European MFIs that pursue financial inclusion on an extensive margin are more efficient. This could be motivated by the fact that some MFIs (e.g. micro-banks, as opposed to NGOs, cooperative banks, village banks, and solidarity groups) likely reach those microentrepreneurs who are just above the poverty line but still without

access to traditional commercial bank lending. Previous literature suggests that poverty outreach differs by type of microfinance institute (Zeller, 2006). Features other than serving the very poor could be at least as important to explain the poverty outreach of MFIs as they could indirectly contribute to poverty reduction at the macro level (Zeller & Johannsen, 2008), for instance by offering more job opportunities to the very poor.

Our analysis also documents several substantial differences compared with the microfinance environment outside Europe. Older MFIs are more efficient, confirming the previous analysis by Ledgerwood (1998), while larger MFIs are not necessarily more efficient.³⁹ We also found a positive relationship between the existence of specific country regulation for MFIs and their financial sustainability, confirming earlier studies (eg., D'Espallier et al., 2017; Iqbal et al., 2019; Strøm et al., 2014). However, MFIs that are not forbidden by country regulation to partially shift costs onto customers through higher interest rates turn out to be more efficient. Furthermore, NGOs and cooperative institutions appear less efficient compared to banks. This is in line with the previous literature suggesting that poverty outreach differs by type of microfinance institute (Zeller, 2006; Zeller & Johannsen, 2008). Finally, it emerges that in the European context, subsidies constitute a form of disincentive to MFIs' efficient behavior (Cozarenco et al., 2022), whereas leverage does not exert any perceptible bearing on financial sustainability.

6.3 Practical implications

This study has interesting practical implications. The above results showed that the microfinance sector in Europe is operatively ready to serve

³⁹ Notice that higher total assets (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 reporting higher breadth of social sustainability.

increasing volumes of poor customers and more female borrowers. Specifically, robustness analysis conducted using individual measures of financial sustainability, such as ROA, ROE, OSS, etc., indicated that an increase in both the number of loans (extensive margin of social sustainability) and the share of women served (intensive margin of social sustainability) have positive effects on the efficiency of European MFIs through the reduction of MFIs' risk and costs, inducing positive net benefits on profitability. However, we found an inverse relationship between financial and social sustainability in terms of serving the poorest through small-scale loan provision. As a result, practitioners are encouraged to place priority on social welfare logics and implement sustainable business strategies (for example, providing more tailored products) to increase their outreach to the poor who cannot afford large loans.

Furthermore, the present study suggests that European MFIs should not apply the institutional logics to legitimate their activity and obtain consensus from stakeholders and the society, including potential fund providers (DiMaggio & Powell, 1983; Zhang, 2021), but rather adopt it with the objective to maximizing financial performance, for example increasing loans granted to women. Indeed, our empirical analysis shows that in the European context, excessive reliance on subsidies represents a disincentive to MFIs' efficient behavior. Lending to women, instead, may help reduce the risk of the loan portfolio thanks to females' greater creditworthiness. As a corollary, it can be further advanced that the higher profit margins obtained through lending to women could cross-subsidize smaller-sized loans, which from our study seem to penalize the profitability of European MFIs due to high transaction costs.

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, especially in terms of interest rate cap imposition (see details in

Bourlès & Cozarenco, 2018; Cozarenco & Szafarz, 2018). Even though interest rate caps are meant to offer the best level of microfinance services at the lowest cost (Armendáriz & Morduch, 2005), in the European context, they seem to limit the possibility of MFIs providing credit to marginal customers. In our study, we also found that a higher degree of subsidization is negatively related to financial performance, possibly because subsidies represent a form of disincentive to increase efficiency. This finding is consistent with Mimouni et al. (2022), who found that subsidies increase cost inefficiencies, also indicating that excessive reliance on—or poorly planned—subsidies can restrict MFIs' scale and weaken their incentives to be efficient institutions (Hudon & Traca, 2011; Morduch, 2006). Our evidence is instead in contrast with the theoretical predictions of Becchetti and Pisani (2010) who assess that subsidized lending can significantly increase borrowers' effort. In our context, subsidized MFIs feel probably under less pressure to use stringent screening and monitoring standards in their microcredit lending models, resulting in riskier borrower pools and long-lasting negative effects on financial performance (Mimouni et al., 2022). Thus, in line with Morduch (2006), we argue that transparent, rule-bound, and time-limited subsidies should only be used as a starting point to help an MFI reach the point where it can access private funding sources like deposits or investments. Moreover, recent repeated crises may both increase the number of poor and exacerbate European banks' reluctance to grant credit, due to increased risk. In this situation, it may be advisable to encourage smaller and potentially less regulated MFIs to increase their social sustainability on both extensive and intensive margins since they tend to accomplish social sustainability in a financially sustainable way.

Looking ahead to the future of the European micro-credit sector, it is also possible to anticipate an increase in both supply and demand, which will be ensured by the evolution of existing MFIs and the entry of new ones. The development of the

microfinance industry, however, could be hampered by an outdated regulatory framework. As such, our research has additional practical implications for regulators. 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. This is specifically applicable to Western European countries where interest rate restrictions are more common. Our findings showed a noticeable effect in terms of obstacles that interest rate caps represent for the service of poorer female customers and their negative consequences on the achievement of efficiency objectives through the service of this fringe of potential debtors. To overcome these barriers, appropriate policies must be implemented.

6.4 Limitations and future research

Notwithstanding many contributions, this work has some limitations that suggest interesting areas for further investigation. Our study investigated whether achieving social sustainability leads to financial sustainability in Europe. Empirical findings warrant more rigorous evidence, which can be further investigated by including some intervening variables that could influence the strength and direction of this relationship.

Future research could also use sound alternative proxies for depth and breadth of outreach. Furthermore, it would be useful to specifically identify the socially conscious strategic directions taken by European MFIs, allowing for the exploration of more nuanced distinctions and developmental trends between social and financial performance. For instance, from our analysis, it seems to emerge that for many European MFIs the depth of outreach to the very poor in terms of small-sized loans is not a priority. Nonetheless, the advantage of having those MFIs in the industry is that they may indirectly contribute to poverty reduction by serving the neglected middle market. Data limitation did not allow us to measure how far the clients

of these institutions are above the poverty line. However, other studies conducted outside Europe (such as Zeller & Johannsen, 2008) indicate that micro-banks mainly pursuing breath of outreach purposes do not reach disproportionately out to the poorest population. Trying to observe this aspect in the European context would be useful in outlining a better regulation of the microfinance sector, tailored to different types and objectives of the various MFIs.

Further research should also focus on the promotion of savings by the MFIs, which could represent a form of loanable assets alternative to more expensive fund provisions. For our analysis, we used original data from a small survey conducted by the authors. So we limited the study to countries included in this dataset. Thus, another potential extension might be to repeat this work with a larger dataset to have a comprehensive grasp of how MFIs function in the European region and their influence on society.

7 Concluding remarks

In conclusion, this research aimed to investigate the relationship between the social and financial sustainability of European MFIs. We provided evidence that MFIs that are more likely to meet their social sustainability objectives—particularly on the extended and intense margins, where they serve a greater proportion of women—are also financially successful. The funding of the poorest through the provision of small-scale loans is the only area in which social sustainability does not appear to have a positive impact on financial sustainability.

This study also offered important policy and theoretical implications concerning the European microfinance sector, which should interest scholars and researchers. It also provided implications for microfinance practitioners and managers, as well as for public policy and sustainable finance in European society as a whole.

Appendix A

Sample representativeness

Table 11 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 12 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* (1.869)	0.485 (0.941)	-0.564 (-0.581)	0.793* (1.736)		
Depth_Women	-0.00239 (-0.123)	0.0592 (0.787)	0.120 (1.010)		0.0452 (0.866)	
Depth_AlB	1.541 (1.306)	9.245*** (3.316)	10.14** (2.478)			8.145** (2.131)
Covariates	Yes	Yes	No	Yes	Yes	Yes
Constant	16.20 (1.477)		1.913 (0.353)	19.32** (2.041)	13.38 (1.172)	10.52 (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 NBF risk leverage gdp gdpg Efficiency_1	COOP NGO NBF risk leverage gdp gdpg Efficiency_1	COOP NGO NBF risk leverage gdp gdpg Efficiency_1	COOP NGO NBF risk leverage gdp gdpg Effi- ciency_1

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

Table 13 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 (1.344)	2.455** (2.208)	1.593 (1.216)	4.532*** (3.660)		
Depth_Women	-0.0269 (-0.425)	0.191 (1.016)	0.0346 (0.152)		0.204 (1.247)	
Depth_AlB	2.780 (1.110)	17.33** (1.961)	9.736 (0.925)			9.180 (0.823)
Covariates	Yes	Yes	No	Yes	Yes	Yes
Constant	27.75 (1.368)		-4.758 (-0.554)	37.63** (1.991)	3.972 (0.239)	1.479 (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	age size regulated
Excluded instruments			age size regulated COOP NGO NBFI risk leverage gdp gdp Efficiency_1	COOP NGO NBFI risk leverage gdp gdp Efficiency_1	COOP NGO NBFI risk leverage gdp gdp Efficiency_1	COOP NGO NBFI risk leverage gdp gdp Efficiency_1

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

Table 14 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** (2.492)	5.927 (0.717)	3.753 (0.578)	18.35** (2.307)		
Depth_Women	0.627** (2.264)	1.511 (1.437)	2.227** (1.977)		2.481*** (2.590)	
Depth_AlB	25.87** (2.291)	-44.95 (-1.332)	-8.061 (-0.196)			-28.95 (-0.650)
Covariates	Yes	Yes	No	Yes	Yes	Yes
Constant	113.4 (1.311)		-51.71 (-1.369)	40.03 (0.478)	-104.2 (-1.131)	-81.36 (-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	age size regulated
Excluded instruments			age size regulated COOP NGO NBF1 risk leverage gdp gdpg Efficiency_1	COOP NGO NBF1 risk leverage gdp gdpg Efficiency_1	COOP NGO NBF1 risk leverage gdp gdpg Efficiency_1	COOP NGO NBF1 risk leverage gdp gdpg Effi- ciency_1

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

Table 15 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*** (-4.468)	-0.878 (-0.882)	1.610 (1.049)	-7.520** (-2.521)		
Depth_Women	0.100 (0.913)	-0.0874 (-0.192)	-0.231 (-0.343)		-0.136 (-0.303)	
Depth_AlB	-12.98** (-2.517)	8.837 (0.808)	-1.255 (-0.0591)			-7.952 (-0.428)
Covariates	Yes	Yes	No	Yes	Yes	Yes
Constant	-55.36 (-1.346)		16.63 (1.037)	-76.62** (-2.092)	-21.74 (-0.950)	-19.39 (-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 NBF risk leverage gdp gdp Efficiency_1	COOP NGO NBF risk leverage gdp gdp Efficiency_1	COOP NGO NBF risk leverage gdp gdp Efficiency_1	COOP NGO NBF risk leverage gdp gdp Efficiency_1

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

Table 16 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** (-2.148)	-3.245*** (-6.547)	-1.188** (-2.003)	-2.265 (-1.618)		
Depth_Women	-0.0276 (-0.942)	0.0296 (0.247)	-0.138 (-0.908)		-0.165 (-1.035)	
Depth_AlB	-7.770*** (-4.409)	-19.56*** (-3.988)	-19.11*** (-3.385)			-17.98*** (-2.590)
Covariates	Yes	Yes	No	Yes	Yes	Yes
Constant	-18.93 (-1.226)		24.56*** (5.738)	8.153 (0.656)	25.28*** (2.675)	31.29*** (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 gdp Efficiency_1	COOP NGO NBFI risk leverage gdp gdp Efficiency_1	COOP NGO NBFI risk leverage gdp gdp Efficiency_1	COOP NGO NBFI risk leverage gdp gdp Efficiency_1

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

Table 17 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*** (-7.746)	-8.216*** (-3.324)	-3.152 (-1.357)	-15.24*** (-5.846)		
Depth_Women	0.0463 (0.621)	-0.159 (-0.381)	-0.398 (-0.726)		-0.829 (-1.565)	
Depth_AlB	-23.53*** (-4.501)	6.695 (0.511)	6.625 (0.349)			-0.120 (-0.00619)
Covariates	Yes	Yes	No	Yes	Yes	Yes
Constant	13.37 (0.436)		52.25*** (2.994)	-80.22*** (-2.582)	33.65 (0.841)	29.71 (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 <i>P</i> -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 <i>P</i> -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 age gdp gdp Efficiency_1	COOP NGO NBFI risk leverage gdp gdp Efficiency_1	COOP NGO NBFI risk leverage gdp gdp Efficiency_1	COOP NGO NBFI risk leverage gdp gdp Efficiency_1

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

Table 18 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** (-2.211)	0.578 (1.076)	-0.910** (-2.120)	-0.248 (-0.293)		
Depth_Women	0.0184 (0.712)	-0.0432 (-0.403)	-0.105 (-0.706)		-0.00110 (-0.0113)	
Depth_AlB	1.192 (1.059)	-7.229* (-1.839)	-5.269 (-1.238)			-5.919 (-1.416)
Covariates	Yes	Yes	No	Yes	Yes	Yes
Constant	-23.05*** (-2.660)		1.488 (0.425)	-10.67 (-1.209)	-8.879 (-1.639)	-6.644 (-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 NBF risk leverage gdp gdpg Efficiency_1	COOP NGO NBF risk leverage gdp gdpg Efficiency_1	COOP NGO NBF risk leverage gdp gdpg Efficiency_1	COOP NGO NBF 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 19 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* (1.854)	-0.157 (-0.656)	-0.176 (-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 NBF1 leverage gdp gdp Efficiency_1	Excluded instruments: COOP NGO NBF1 leverage gdp gdp Efficiency_1	Excluded instruments: COOP NGO NBF1 leverage gdp gdp 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 20 Tests of mean comparison between the survey sample and the WB-MIX Market Financial database

Variable (a)	Our sample (European Microcredit Survey)			MIX Market Financial database ^(b)			t-stat
	Obs	Mean	Std.Dev	Obs	Mean	Std. Dev	
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	11,039	-0.0287
Financial Expenses	159	3545	14,400	604	4585	12,527	-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>

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