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Abstract

Microfinance regulation plays a crucial role in ensuring financial stability and client protection, yet their influence on Microfinance Institutions (MFIs) remains a topic of contention. Using Artificial Intelligence (AI) in the screening stage, this Systematic Literature Review (SLR) incorporates both quantitative and qualitative articles, offering a comprehensive analysis of the effects of regulatory measures on the performance of MFIs. Overall, we find that while microfinance regulation initially may hinder the financial and social performance of MFIs, in the long run its stabilizing effects reverse the adverse effects through the self-correcting loop, which eventually support MFIs to systematic growth. Our study calls for an optimal level of regulation that increases the compatibility of the financial, social, and stability goals of microfinance.

Keywords: Microfinance, Regulation, Financial, Social, Performance, Stability, ASReview

1. Introduction

Microfinance encourages transformation and supports economic development in financially underserved areas around the globe (Cull et al., 2009; Duvendack & Mader, 2020; Morduch, 1999). However, the microfinance sector faces several risks and challenges, such as over-indebtedness of clients, high interest rates, operational challenges, as well as sustainability, high costs, and stability of MFIs (e.g., Mendelson & Rozas, 2024; Milana & Ashta, 2020; Sainz-Fernandez et al., 2015; Schicks, 2014; Taylor, 2011). To ensure that MFIs can thrive in the face of these challenges, in the past, governments and regulatory bodies have often enacted regulatory measures (Hermes & Hudon, 2019; Mendelson & Rozas, 2024; Milana & Ashta, 2020; Zainal et al., 2021). What solutions such regulatory measures offer is an important question to address. Using a Systematics Literature Review (SLR) methodology, this study investigates how microfinance regulations influence the performance of MFIs by showing how regulatory practices optimize or hinder the effectiveness of the microfinance sector.

Conducting an SLR on the effects of microfinance regulation is important, because of several reasons. First, the current literature reports conflicting findings on the effects of microfinance regulation. Some studies suggest that stringent regulations enhance stability and performance (e.g., Agarwal & Hauswald, 2010; Olsen, 2010; Ajide & Ojeyinka, 2024), while others argue that excessive regulation stifles outreach (e.g., Cull et al., 2009; Jungo et al., 2022; Zainal et al., 2021). This contradiction highlights the need for collating and analyzing the extant evidence to offer a clearer picture of how regulation affects MFI performance, under what conditions regulation may be effective, and which specific regulatory measures may be beneficial or detrimental.

Second, the complexity in the microfinance sector has increased due to diversification, expansion, and digitalization of services. MFIs have diversified their services to include savings, insurance, remittance transfer, and other products. At the same time, the sector is rapidly expanding, with an expected annual growth rate of 13.69% from 2023 to 2031 (Microfinance Trends 2023: Driving financial inclusion and social impact, 2023), partly due to the sharp increase of digitization in the sector, as more MFIs adopt digital products and channels. This rapid expansion has come with a surge in new services and new players entering the microfinance market, posing unique challenges for regulation (e.g., Ashta & Patel, 2013; Pal et al., 2023) that may require vigorous regulatory consideration. Managing such developments in microfinance demands robust regulatory frameworks to ensure safe and effective service delivery, while maintaining the dual goals of microfinance, i.e. their financial and social sustainability.

Third, microfinance crises, such as the Grameen, the Andhra Pradesh, and the Covid-19 Pandemic, emphasize the vulnerability of the microfinance sector (Brickell et al., 2020; Mendelson & Rozas, 2024; Sainz-Fernandez et al., 2015). For example, the Andhra Pradesh crisis in 2010 underscores weaknesses in microfinance regulatory measures, which prompted debates on microfinance regulation (Mendelson & Rozas, 2024; Taylor, 2011). A comprehensive study on the effects of microfinance regulation can help understand a resilient microfinance system that can withstand such crises.

Finally, recently, there has been a proliferation of studies that analyze the implications of various aspects of microfinance regulation. These studies primarily focus on the effects of microfinance regulation on specific aspects of MFI financial and social performance, their relationship, and financial stability outcomes of various regulatory measures. For instance, several studies (e.g., Ahamed et al., 2021; Anarfo & Abor, 2020; Cull et al., 2009; Hartarska,

2009; Jungo et al., 2022; Ofoeda et al., 2024) empirically analyze the effects of regulation on MFIs' profitability and outreach, while others (e.g., Cozarenco & Szafarz, 2020; Kodongo, 2018; Samreth et al., 2023) analyze the effects of specific regulatory measures such as regulatory interest rate ceilings. These studies often have a narrow focus.

Despite the significant growth in microfinance research, there remains a lack of comprehensive understanding regarding the implications of microfinance regulation. Using ASReview, an AI tool in the screening stage of this SLR, we collect and combine the findings of articles on the effects of microfinance regulation to provide a profound data base for policymakers that may help them with designing more effective and balanced regulatory frameworks.

The specific research questions of this study are as follows:

- What are the key findings in the existing literature on the effects of microfinance regulation on the performance of MFIs?
- What methodologies have been employed in studying the effects of microfinance regulation, and what are their strengths and weaknesses?
- What gaps exist in the current research, and what directions should future studies take?

In addition, we review relevant qualitative studies to analyze the challenges in implementing microfinance regulation and the recommendations for best practices. Qualitative studies often analyze challenges and detailed best practices based on real-world experiences and case studies, which are crucial for a thorough understanding of the topic.

The following sections present the theoretical overview, which provides a thorough foundation for understanding microfinance regulation, a description of our methodology for selecting and analyzing relevant studies, and a discussion of the key findings that uncover significant themes

and implications. Finally, we provide a discussion, concise summary, practical recommendations, and future research directions.

2. Theoretical overview of microfinance regulation

2.1. Rationale for microfinance regulation

Regulatory measures are government policies and actions, focusing on achieving societal goals and protecting and advancing public interests (Stigler, 1971). Microfinance regulations are rules, laws, and norms that control, restrict, and shape the activities of MFIs (Christen et al., 2003; Ledgerwood et al., 2013).

The justifications for regulating financial institutions discussed in the literature are mainly grounded in externalities, information asymmetry, and market power theories, which collectively explain the importance of microfinance regulation (Begenau & Landvoigt, 2022; Botha & Makina, 2011; De Ceuster & Masschelein, 2003; Hanson et al., 2011). The primary rationale for financial regulation is the possibility of negative externalities arising from financial markets, which can have consequences for society. When engaging in riskier endeavors, financial institutions usually consider their own cost and disregard the possible wider cost on society. Societal cost can accrue if the actions of financial institutions result in negative outcomes such as liquidity risk, systemic risk, and contagion effects (Alexander, 2006; Botha & Makina, 2011; Slovin et al., 1999). Liquidity risk arises when a financial institution has inadequate funds to meet its short-term liabilities. Systemic risk happens when the failure of one financial institution causes a wider breakdown across the financial system. Contagion effects arise because of the spreading of financial instability from one market or institution to other markets and institutions

(Aldasoro et al., 2017; Botha & Makina, 2011; Davis & Korenok, 2023). Together, these risks can generate social costs usually higher than those of financial institutions.

Nonetheless, some researchers contend that the microfinance sector is less susceptible to such risks compared to traditional banking, because of the difference in their scope, funding arrangements, and associated risks. MFIs often serve local communities and have weaker links to other financial institutions, reducing the probability that contagion and/or systemic risk of a large crisis of the traditional financial system will adversely affect them (Armendáriz & Morduch, 2010; Cull et al., 2009; Uddin et al., 2022). Similarly, whereas traditional banks are instrumental in national and international payment systems and their collapse can considerably interrupt financial activities (Freixas et al., 2000), MFIs have a much more limited role in these systems and are therefore unlikely to have a significant impact on the financial system as a whole (Ledgerwood, 1999). Likewise, traditional banks primarily depend on volatile short-term funding (Berger et al., 2010). In contrast, the funding sources of MFIs mostly include stable, long-term donor funds, equity, and debt, reducing the need for regulatory intervention to maintain liquidity and solvency (Hartarska & Nadolnyak, 2007). In addition, microfinance does not pose a significant risk of money laundering and financing terrorism (Tran & Koker, 2019). These arguments collectively suggest that there is a lesser need for regulating MFIs.

In microfinance, negative externalities mainly arise due to its rapid, unsustainable growth, which is based on aggressive lending strategies, and leading to widespread client over-indebtedness and abusive loan recovery practices (Mendelson & Rozas, 2024; Taylor, 2011). If an MFI aggressively expands its loan portfolio without adequately assessing borrowers' repayment capacities, it may experience a surge in default rates. While the immediate impact would be financial losses for the MFI, the broader social cost could include increased financial distress, reduced credit accessibility for marginalized communities and an overall loss of trust in the

microfinance sector. These negative externalities show how the costs of risky lending practices conduct by MFIs go beyond their private costs (Botha & Makina, 2011; Mendelson & Rozas, 2024).

Thus, microfinance regulation is essential for mitigating potential externalities following from MFI policies. It shapes the strategies and decision-making processes of MFIs, forcing them to take into account the wider consequences of their risky endeavors.

Furthermore, microfinance regulations help reduce information gaps between MFIs and their clients. Microfinance clients often lack sufficient knowledge to assess the soundness of MFIs and their products and services, leading to poor decisions (Anku-Tsede, 2014). Regulations prevent MFIs from using their information advantage to harm their clients (Christen et al., 2003). For example, regulation may enforce information disclosure about the lending terms, interest rates, and other charges on MFIs, ensuring that borrowers understand the terms and actual cost. This openness deprives MFIs of their informational advantage and assists borrowers in making informed decisions, thereby reducing the probability of over-indebtedness and financial distress. Regulation also protects consumers from monopolistic practices such as exorbitant interest rates, especially in markets where competition is absent or ineffective (Samreth et al., 2023). By doing so, regulations prevent MFIs from misusing their market power at the expense of consumers and help to ensure that MFIs operate responsibly and transparently.

These theoretical perspectives generally provide two rationales for microfinance regulation: reducing the threat of financial instability in microfinance that primarily arises from the unsustainable growth of MFIs and overseeing microfinance activities to ensure consumer protection.

2.2. The effects of microfinance regulation on MFIs

The principal-agent model can explain the effects of regulation on MFIs (Alexander, 2006). A regulatory body representing the public interest acts as a principal to set measures for MFIs (agents) that influence them to act in the interests of the general public. Regulatory measures such as capital regulation and interest rate ceilings can affect the actions and strategies of MFIs to accomplish specific outcomes, such as consumer protection and financial stability. Nevertheless, MFIs may possess more information than regulators. For example, an MFI may have more knowledge about the creditworthiness of its clients than regulators (Alexander, 2006; Arun, 2005), which leads to insufficient monitoring of MFI by regulators (Alexander, 2006). This information gap may lead to activities prioritizing MFI profits, such as aggressive lending while ignoring the adverse consequences. To tackle this issue, regulators may use punitive measures or incentives to encourage compliance.

However, if the goals of the two are aligned, MFIs will adapt their operations based on regulatory measures to ensure that their activities fit the interests of the general public. In case of a misalignment of interests, for instance, when regulation imposes compliance cost, MFIs focusing on profitability will adjust their costs in response to higher regulatory compliance costs to maintain profitability. The costs of MFIs are primarily determined by internal and external factors. The former mainly include overhead costs, credit risks, the costs of financing, and deposits, while external costs are inflation, tax, and others. MFIs can more easily adjust the overhead costs since they have direct control over them. Overhead costs are a decreasing function of loan size. Thus, MFIs adjust their transaction or business model often by increasing the size of loans to stay profitable (Samreth et al., 2023). More specifically, they resort to upscaling (e.g., Cull et al., 2009), shifting their focus from small lending of weaker and costlier sections to larger

borrowers who are more likely to generate profit due to lower cost per dollar lent. This way, they continue to function profitably.

Thus, while regulation creates a structured environment for MFIs to act at the public interest, it can negatively influence their performance and behavior.

Furthermore, microfinance regulations are often criticized for restricting innovation (Bernstein, 2013; Macchiavello, 2012). This is because regulations may create a tension between innovation and compliance with regulatory measures. Regulatory pressures can lead MFIs to adopt structures and practices similar to other financial institutions, leading to coercive institutional isomorphism. This phenomenon, rooted in organizational theory, suggests that organizations in the same industry become increasingly alike over time (Powell & DiMaggio, 1991; Scott, 2013). Isomorphic MFIs may face challenges in maintaining their community-based approach to customize their microfinance products to the needs of their clients. This homogenization can stifle innovation by forcing MFIs to adhere to standardized practices such as stringent credit risk assessment procedures, documentation, and reporting similar to other financial institutions. As a result, microfinance regulation reduces the ability of MFIs to innovate and adapt, which is necessary to fulfill their social mission.

Lastly, like other sectors, the constantly changing landscape of microfinance can complicate its regulation by creating a mismatch between the evolving microfinance activities and its regulation. Path dependence theory (David, 1994) can elucidate the potential discrepancy between the evolution of microfinance and its regulation by suggesting that historical decisions and institutional legacies significantly constrain current and future regulatory frameworks. This theory can explain that the established practices in microfinance regulation self-reinforce each other, making it difficult to change. This means that both regulators and MFIs become

accustomed to operating within the existing frameworks, making it difficult to introduce changes. As a result, innovation in microfinance such as the introduction of digital products may outpace regulatory adaptation. Therefore, regulators often face challenges to adjust microfinance regulation or adapt innovation, resulting in a regulatory lag, negatively affecting the potential of the microfinance sector (Arner et al., 2015).

Overall, the above discussion makes clear that there may be pros and cons with respect to regulating microfinance. Our SLR aims at providing a clearer view of discussions regarding the cases for or against microfinance regulations.

3. Methodology

This study utilizes the systematic literature review (SLR) methodology, a rigorous approach that advocates for the consolidation of the most relevant and high-quality evidence regarding a specific research area or field (Petticrew & Roberts, 2008; Shaikh & Karjaluoto, 2015; Xiao & Watson, 2019). SLR allows for identifying themes, gaps, and trends in existing literature while tracking the volume of the literature in the research field. SLR also helps in detecting discrepancies and contradictions in the field and assesses the overall evidence level regarding the research questions under investigation (e.g., Brereton et al., 2007; Xiao & Watson, 2019).

We use the so-called PRISMA protocol, which provides a road map for our SLR. This protocol is widely utilized for conducting review studies (Belle & Zhao, 2023; Moher et al., 2009). We chose this approach because it clearly defines inclusion and exclusion criteria to decide on whether research output (i.e. articles) should be included in the dataset or not (Moher et al., 2009; Shaffril et al., 2018). The PRISMA protocol involves four stages: identification, screening,

eligibility evaluation, and inclusion (Moher et al., 2009). We use AI-powered self-learning software to speed up screening and enhance accuracy. Each stage can be explained as follows:

3.1. Identification

We retrieve articles on microfinance regulation from SCOPUS, a well-known database for social science research (e.g., Liu et al., 2021). SCOPUS contains an extensive mass of relevant articles on microfinance (Gutiérrez-Nieto & Serrano-Cinca, 2019). The initial selection process includes four criteria:

1. A combination of search terms must appear in the title, abstract, or keywords;
2. We include only academic journal articles to ensure scientific rigor;
3. We include only peer-reviewed journals and
4. We only include publications in English

The search was carried out on January 18, 2024. Figure 1 depicts the PRISMA diagram, which outlines the review process.

Given the absence of a standardized vocabulary for "microfinance regulation" and the scattered nature of the topic, we expanded our search to include other terms that refer to microfinance regulation. We utilized Merriam-Webster's Thesaurus, experts' opinions, and existing literature to identify alternative terms for "microfinance" and "regulation." Search iterations were conducted utilizing a mix of search terms and Boolean operators. At first, we found 1,212 articles; after removing duplicates, we were left with 1,191 articles.

Insert Figure 1 here

3.2. Screening

The number of academic publications has been increasing rapidly and it is becoming more difficult to manually screen and assess each study in a large list of retrieved articles from scientific databases. Screening manually also may introduce inconsistencies and biases, as humans are subject to mistakes during monotonous tasks (Quan & Hui, 2023; Van De Schoot et al., 2021). Recently, an increasing number of researchers use AI in the screening stage of an SLR to efficiently conduct more thorough and reliable systematic reviews. However, AI tools should be used with caution for systematic reviews as they may not be perfect and may be difficult to use. Thus, following Quan et al. (2024) and Chan et al. (2024), we use a dual approach that combines traditional SLR methods and AI during the screening phase. This semi-automated methodology ensures a robust and efficient selection of relevant articles, optimizing the comprehensiveness and accuracy of the review process.

To screen 1,191 articles, we leveraged the ASReview tool, an open-source AI-based pipeline, developed by the ASReview Innovation Lab at Utrecht University. This software utilizes active learning techniques to assist researchers in decision-making about what to include and exclude in their review studies. While reviewing documents, ASReview does not replace the judgment of researchers. Instead, it integrates the expertise of the researcher and decision-making with machine learning (Chan et al., 2024; Quan et al., 2024). This tool significantly enhances the efficiency and accuracy of screening articles, as evidenced by its successful use by several researchers in various disciplines in the past (e.g., Kempeneer et al., 2023; Marsili et al., 2023; Scherer & Campos, 2022).

Figure A1 in Appendix 1 illustrates the ASReview AI-guided screening process for the 1,191 retrieved articles. The figure also shows which part of the work is done by the researcher and which part is done by the software.

Starting with the screening process, we first clarify the relevance of the articles. We define relevance as articles analyzing the effects of microfinance regulation. We then upload the list of 1,191 retrieved articles to the ASReview tool. Next, based on the relevance criteria explained earlier, we manually select an initial subset of 10 highly relevant (e.g., Hartarska & Nadolnyak, 2007; Karimu et al., 2021) and ten least relevant articles to train the algorithm and initiate the 'active learning process'. The least relevant articles include microfinance regulation-related words in the abstracts, keywords, or titles, but do not analyze microfinance regulation (e.g., Adam & Lestari, 2017; Parmanand, 2021). Although in principle only one record is sufficient, using more records increases the efficiency of the 'active learning process' (Van De Schoot et al., 2021). The ASReview tool then utilizes this training as 'prior knowledge' to sort the entire dataset based on relevance, ranking the articles from most to least relevant.

In the second step, the 'active learning cycle' step (see Figure A1 in appendix 1), the ASReview tool displays one new article (title, abstract, and keywords) at a time for the researcher to screen and label it as "relevant" or "irrelevant". The researcher reads and labels the record as relevant or irrelevant, utilizing the abovementioned relevance criteria. Subsequently, ASReview uses this binary labeling by the researcher for training the new model, after which another new record will be shown to the researcher. Thus, ASReview learns from the researcher's decision to predict the relevance of a paper and then rearranges the order in which papers are shown for review, putting the most likely relevant ones first. This semi-automated method reflects 'the interaction between the researcher and AI', in which the AI model learns from the researcher's

input and uses that knowledge to suggest the next possibly relevant article (Chan et al., 2024; Quan et al., 2024; Van De Schoot et al., 2021).

The cycle continues until the software repeatedly presents "irrelevant" new records. In our screening setup, the 355th article was the last relevant article according to the researcher, and no relevant articles were identified between the 355th and 405th records presented by the software. Thus, we stopped the screening process at the 405th article, because we assumed that no relevant articles were left in the remaining part of the original 1,191 articles in our dataset. The decision to stop searching is based on Quan et al. (2024).[1]

The yellow line in the upper panel of Figure 2 shows the cumulative total of relevant articles. It shows that after reviewing 405 records presented by the ASReveiw tool, only 112 were considered relevant by the researcher (including the 10 articles, manually categorized by the researcher as relevant in the initial stage).

The yellow space in the lower panel of Figure 2 represents the 112 relevant records out of the 405 records presented by the software. In contrast, the white space denotes the number of records labeled as irrelevant by the researcher (Van de Schoot, 2020). The yellow space indicates a decrease in relevant records and an increase in irrelevant records as we proceed with the screening until the 355th point, at which point no record remains relevant. It shows that the researcher labeled 52 of the first 82 articles presented by the software as relevant, while only five were labeled as relevant between 324 and 405 articles, the last 82 articles presented by the software. This decreasing trend shows that the model has worked well in the active learning

[1] The blue line in Figure 2 shows that the researcher would have found 35 relevant articles (or 31.25% of 112) had he searched them manually after reviewing 405 (or 34%) articles out of 1191. In other words, if the researcher had searched manually for relevant articles, he would have found 102 articles at the 1191st point. We have already found 112 articles at 355th point. Thus, we stopped searching for further relevant articles.

cycle. It means that the software accurately ordered the records to the greatest extent, listing them from the highest to the lowest likelihood of relevance.

This method helped us to screen a large database quickly and more transparently compared to manual screening.

After conducting a full-text review of the identified 112 articles, we excluded 14 theoretical studies (e.g., Lawack, 2021) and five reviews (e.g., Wójcik, 2021); we could not retrieve two records. Additionally, after reviewing citations of our initially selected articles, we found six additional quantitative studies that met our inclusion criteria, but were not in the initial list of articles retrieved from SCOPUS. Figure 1 reveals the article selection process. Our final dataset consists of 97 articles, including 44 quantitative and 53 qualitative articles. The papers in our dataset provide original research findings that have the potential to influence ongoing debates on microfinance regulation. We use the 44 quantitative articles to analyze the effects of microfinance regulation on MFIs. These articles employ appropriate statistical methods to assess the effects of microfinance regulation. The qualitative articles are used to analyze and discuss the challenges in the implementation of regulation and to develop recommendations. Qualitative articles are case studies, in-dept interviews, and the analysis of legal documents.

Insert Figure 2 here

3.3. Data analysis

The focus of this SLR is on the 44 quantitative studies that empirically investigate how various regulatory measures influence the performance of MFIs. We first provide a descriptive analysis of these articles. Next, we analyze the methodologies employed in these studies.

Analyzing methodologies is crucial, as it helps in understanding the strength of the findings and the limitations due to potential biases. Specifically, we assess the utilized data, the regulatory and outcome variables and the methods employed to measure them. Finally, we discuss the empirical methods applied in the studies in our dataset.

To analyze the effects of microfinance regulation on the performance of MFIs, we use thematic analysis to obtain an overview of the key concepts and themes in the studies in our dataset. To extract data from these studies, we developed a data extraction form (see Appendix 2) that includes questions regarding the research objectives, methodologies, findings, and other important aspects. The data was subsequently analyzed utilizing AtlasTi 23 software to derive significant themes, insights and patterns, resulting in profound findings.

4. Results

4.1. Trend and an overview of quantitative studies

Figure 3 illustrates the annual count of quantitative studies on microfinance regulation. Until 2005, qualitative articles argued for and against microfinance regulation, but no study attempted to analyze the effects of microfinance regulation quantitatively, perhaps due to lack of data. Hartarska (2005) is the first quantitative study included in this review, which analyzes the effects of microfinance regulation on the social and financial performances of MFIs, utilizing data from 34 MFIs. Hartarska (2005) is also the most impactful article, with 805 citations.

The trend indicates a higher number of quantitative studies in recent years, perhaps due to the increasing academic interest in the topic and data availability. These articles come from 35

academic journals. World Development journal has the highest number of publications, with three articles.

Insert Figure 3 here

4.2. Review of methodologies in microfinance regulation studies

Data

Thirty-nine studies in our data set (88.6%) use secondary data from databases providing worldwide and country-specific data on microfinance and other economic indicators, e.g., MIX Market, World Development Indicator (WDI), and International Monetary Fund-Financial Access Surveys, and statistical organizations of individual countries. The majority of these studies (65.9%) use multi-year, cross-country data from these databases. A particularly interesting dataset for research in microfinance is the MIX Market, which since 2004 has collected data on the operations of more than 2,000 MFIs in 110 countries, representing 80% of the microfinance sector in the world (MIX market website).

Most studies (e.g., Ayayi & Peprah, 2018; Hartarska, 2009; Olsen, 2010) acknowledge that the MIX market data are self-reported, and that there may therefore be a chance that only larger and/or financially stable MFIs with sufficient capacity and resources will report, while smaller MFIs may not (leading to the so-called survivor bias). The MFIs may also want to report because they want to attract donors or investors. By submitting their data to the MIX market data base, MFIs gain international visibility, which may help securing financial support and enhancing their

reputation within the development community. This may provide incentives to overestimate their performance, however.[2]

Econometric methods

Microfinance regulation may be influenced by the same factors that also affect MFI performance. Similarly, regulated and non-regulated MFIs may differ significantly in terms of their characteristics, and thus, the differences observed in the performance measures may not only be attributed to regulation (Hartarska, 2005). These examples point out that research into the impact of regulation for microfinance may need to address endogeneity issues. Careful econometric methods are therefore needed to correctly evaluate the effects of regulation on MFIs and to help establishing valid policy recommendations.

An ideal methodology for impact evaluation in empirical research is the use of Randomized Control Trials (RCT) (e.g., Duvendack et al., 2011). However, RCTs may not be feasible when analyzing the impact of microfinance regulation. The impact of financial regulation may take years to materialize fully. Conducting an RCT over such long periods is impractical due to high costs, difficulties in maintaining consistent experimental conditions, and the potential for significant changes in the external environment (e.g., economic downturns and political changes) that could confound the results. Similarly, legal and ethical constraints may prevent governments from selectively applying regulations to only a subset of institutions within a jurisdiction. They enforce laws and regulations uniformly, especially if the regulation is designed to protect consumers, ensure financial stability, or promote social welfare.

[2] At the same time, the MIX market database stresses that they maintain a process of quality audits reducing the chances of outliers and/or exaggerations in reporting (see: www.mixmarket.org)

The studies in our dataset use other advanced methods to account for endogeneity. These techniques include various forms of multiple regressions, such as fixed and random effects models. A few studies use generalized methods of moments (GMM) models. These models control for time-invariant variables and are appropriate for panel data where multiple observations over time are available (Baltagi, 2008). Three studies use instrumental variables to address endogeneity to obtain unbiased estimates by isolating exogenous variation in the treatment variables. Furthermore, a few studies utilize probit regressions to analyze regulation as a determinant of MFI performance. One study by Hartarska et al. (2024) employed an innovative methodology using double robust semi-parametric machine learning, with neural networks, to flexibly model the effects of microfinance regulation on MFIs, minimizing the risk of model misspecification and enhancing the accuracy of average treatment effect estimates.

These econometric methods, while helpful in addressing endogeneity, are limited by their reliance on strong assumptions, such as the validity of instruments in GMM, or the randomness of IVs, and may still be prone to biases or oversimplifications that can lead to misinterpretation of regulatory impacts on MFIs. To address these issues, most studies conduct robustness checks (e.g., Cull et al., 2011; Dorfleitner et al., 2013; Ofoeda et al., 2024) and apply additional tests for overidentification, endogeneity, and sensitivity analyses, or use multiple methodologies to produce consistent and reliable results that offer greater confidence in the results (e.g., Boehe & Cruz, 2013).

Measuring regulatory and outcome variables

Twenty-nine studies, particularly earlier studies (e.g., Bassem, 2009; Cull et al., 2008, 2011; Hartarska, 2005, 2009) use binary variables to account for regulation as a treatment or explanatory variable in their analyses. They code regulatory measures (e.g., regulatory framework, interest rate caps, etc.) as "1" and its absence as "0". However, this approach may not capture the full complexity of a regulatory measure. For instance, Cull et al. (2011) use binary variables for microfinance regulation, an aggregate measure of several regulatory measures such as capital regulation and supervision, and may vary from context to context.

Studies that analyze the effects of capital regulation often use the capital adequacy ratio (e.g., Anarfo & Abor, 2020; Kodongo, 2018; Zainal et al., 2020), also known as the capital to risk-weighted assets ratio, to measure capital regulation. This ratio is often used to examine the capacity of financial institutions to withstand a loss and to protect depositors. A higher ratio indicates a higher capital regulation stringency.

Similarly, five articles employ indices that more comprehensively incorporate the crucial elements of regulatory measures in their statistical models. For instance, Besong et al. (2022) incorporate supervision, capital adequacy regulation, bank licensing, audits and reporting, consumer protection, and deposit insurance in a regulatory index they use as a treatment variable.

The remaining studies use proxy variables for regulatory measures. For example, Zhang et al. (2023) use the state financial supervision expenses as a proxy of regulatory supervision.

The above methods of capturing regulatory effects have their own pros and cons. Data availability usually determines the choice of regulatory measures in the empirical analysis.

To analyze the regulatory effects on the financial performance of MFIs, most studies utilize Return on Equity (ROE) and Return on Assets (ROA). ROE is the ratio of net operating income and equity value, and ROA is calculated by dividing net operating income by net assets. These indicators are simple to calculate, but often fail to capture the unique financial dynamics of MFIs (Hermes & Hudon, 2018). Several studies also use sustainability indicators as outcome variables, such as operational and financial self-sufficiency (OSS and FSS) indicators that assess the ability of MFIs to cover operating costs with their revenues, indicating MFIs' sustainability. Furthermore, a few studies employ bank performance and efficiency indices using principal component (PCA) and data envelopment (DEA) analyses. The latter are more objective and comprehensive indicators of microfinance performance. Moreover, a few studies that examine the effects of regulatory measures on financial stability use MFI bankruptcy and portfolio at risk as indicators of financial stability.

Several articles measure social performance in terms of outreach, which may be split into the depth and breadth of outreach. Eleven studies use the number of borrowers to measure the breadth of outreach, while the average loan size per capita and the percentage of female borrowers are used to measure the depth of outreach. These measures are critical for understanding how well MFIs fulfill their social mission, particularly in targeting marginalized groups. A growing body of the literature uses financial inclusion indices generated by using PCA analysis. This approach helps in combining several aspects of financial inclusion into a single composite index, a more comprehensive way to account for financial inclusion than a single-aspect indicator. Overall, there is an increasing emphasis on using more sophisticated indicators that better capture the performance of MFIs.

4.3. The effects of microfinance regulation

The 44 studies in our dataset cover 79 individual analyses of the relationship between microfinance regulation and MFI performance. Figure 4 illustrates an overall trend in the direction of effects found in the analyses, revealing that many studies until 2015 reported unclear results. This is probably due to data limitations and perhaps because earlier microfinance regulations had more shortcomings than those introduced in recent years. The findings in recent studies show a balance between positive and negative results.

A closer look at these findings reveals that in recent studies, most individual analyses pertain to the social performance outcomes of MFIs compared to the financial performance and stability outcomes of MFIs (refer to Figure A2 in Appendix 3).

Insert Figure 4 here

4.4. Types of microfinance regulations

Financial regulation is often categorized into prudential and non-prudential regulation. Prudential regulation typically involves measures to ensure the financial stability and soundness of financial institutions, focusing on aspects like capital adequacy and risk management (Davies & Green, 2013; Demirguc-Kunt et al., 2008). In contrast, non-prudential do not directly pertain to financial soundness, and are more concerned with consumer protection and the market conduct of MFIs (Arun, 2005). Yet, the distinction between these two categories is often blurred. For instance, supervisory control can be both prudential if it is concerned with the soundness of the

microfinance system and non-prudential if it is concerned more with consumer protection. As a consequence, studies in many cases do not make a clear distinction between the two categories.

Instead, studies analyze the effects of general microfinance regulatory frameworks that include both prudential and non-prudential measures, capital regulation, supervisory control, specific regulatory measures, and supportive regulation. Therefore, we adhere to the specific categories of regulation used by studies in our dataset when discussing their results on the relationship between microfinance regulation and MFI performance.

Table 1 lists the main five types of microfinance regulations that have been analyzed in the literature. These five types refer to microfinance regulatory frameworks, capital regulation, supervisory control, specific regulatory measures, and supportive regulation.

Regulatory Frameworks

Microfinance regulatory frameworks generally aim to bring stability and order in the microfinance sector while also protecting consumers. These frameworks include the rules and standards set by authorities to direct and monitor the operations of MFIs. They include several measures such as licensing, capital adequacy requirements, supervision, consumer protection, measures to prevent money laundering, operating standards, compliance checks, and market conduct regulation (Halouani & Boujelbène, 2015). Table 1 reveals the positive, negative, and unclear effects of microfinance regulatory frameworks on the various social and financial performance aspects of MFIs.

Several studies (i.e., Gohar & Batool, 2015; Halouani & Boujelbène, 2015; Hartarska & Nadolnyak, 2007; Karimu et al., 2021; Ofoeda et al., 2024; Olsen, 2010) report favorable outcomes on social and financial performance because these frameworks lead to the systematic growth of MFIs. Two studies (Karimu et al., 2021; Ofoeda et al., 2024) also found positive effects on the risk management of MFI. Findings from these studies indicate that regulated MFIs are more credible and trustworthy. Regulatory frameworks have integrated these MFIs into a broader financial system, ensuring they function under recognized standards and guidelines. This trustworthiness reassures clients and investors, reducing concerns about fraud or mismanagement. Regulatory frameworks also ensure that MFIs are financially sound and stable by enforcing required capital reserves and other risk management measures such as supervision. Thus, regulated MFIs are more reliable in the public eye. These frameworks also enable MFIs to offer saving products. All these factors together increase trust, allowing MFIs to attract more clients, expand their product range, and grow their operations. This leads to the systematic growth of MFIs, which in turn enhances their financial and social performance.

The empirical evidence, such as in the study by Olsen (2010), using data from 299 MFIs in 18 Latin American countries, and Gohar & Batool (2015), based on a sample of 25 MFIs in Pakistan, shows there is a positive effect of regulatory frameworks on the number of borrowers and MFI branches due to increased trust and saving in regulated MFIs. According to Hartarska & Nadolnyak (2007) and Gohar & Batool (2015), regulatory frameworks enable MFIs to indirectly increase the number of clients and improve their outreach by attracting savings, a crucial source of funding that enhances their lending capacity. This underscores the potential of bringing MFIs under microfinance regulatory frameworks to foster financial inclusion.

However, there may also be more direct pathways that improve the social performance of MFIs. For instance, Halouani and Boujelbene (2015) find positive and significant effects on the number of borrowers and female borrowers of commercially oriented MFIs in Kenya, due to the imposed obligation to focus more on marginalized borrowers by the regulatory framework. This regulation stimulated commercially oriented MFIs to expand their outreach and increase their lending to the poor.

Two studies observe positive effects on the financial performance of MFIs. Halouani and Boujelbène (2015) reveal that the microfinance regulatory framework in Kenya significantly improved both the ROA and OSS of MFIs, because of improved efficiency. These regulations increase the efficiency of MFIs by mandating standardized operational practices, such as financial and risk management systems, as well as loan appraisal procedures, which ensure the quality of operations and reduce inefficiencies. Regulations also enhance accountability by requiring MFIs to meet specific performance and reporting standards, encouraging them to manage resources more effectively. These measures collectively enhance the financial performance of MFIs (Halouani & Boujelbène, 2015).

However, regulatory frameworks may vary substantially depending on the context, leading to different pathways of effects. For instance, Gohar and Batool (2015) observe that regulatory frameworks increased the risk-taking behavior of MFIs in Pakistan, significantly increasing their profitability. They show that regulated MFIs were covered by government support (i.e., subsidies in case of loss), encouraging them to lend to riskier clients. Thus, they achieved higher returns on assets, operational self-sufficiency, and portfolio yield. The study did not analyze the effects of the regulations on the financial stability of MFIs.

Karimu et al. (2021) and Ofoeda et al. (2024) find favorable effects on risk management and financial stability. Using portfolio at risk as an outcome variable, Karimu et al. (2021) reveal that microfinance regulation significantly reduced credit risk for MFIs in Sub-Saharan Africa, but only in low-competition settings. They find that non-regulated MFIs were more susceptible to risky behavior in such markets, driven by profit motives and the absence of regulation. Regulation reduced these tendencies, ensuring more stable and responsible lending practices. However, they also find that in high-competition markets, regulation has unfavorable effects on credit risk, which may be because effective regulation is difficult to achieve in such markets, and ineffective regulation leads to higher risk-taking behavior by MFIs. This signifies a more stringent regulation for a low-competition market.

In contrast to the above findings, Ayayi and Peprah (2018), Aoun et al. (2019), and Bakker et al. (2014) reveal the adverse effects of regulatory frameworks on the financial performance of MFIs, primarily because of the compliance costs associated with these regulations. Regulated MFIs are often required to maintain capital reserves, adhere to risk mitigation measures, and to financial reporting standards. Compliance with these measures requires substantial financial and administrative resources, which can negatively affect the financial performance of MFIs. For instance, utilizing data from 96 MFIs in developing countries, Bakker et al. (2014) find that financial regulation significantly reduced the return on assets and operational and financial self-sustainability of MFIs. Using MIX Market data spanning 2002-2012 from Ghana, Ayayi and Peprah (2018) find that regulated MFIs had significantly higher costs per borrower and per loan than non-regulated MFIs. The higher cost has consequences for the sustainability of MFIs as it affects their ability to generate sufficient revenues to cover expenses without relying on subsidies.

These costs are particularly burdensome for smaller MFIs (Ayayi & Peprah, 2018) and NGO MFIs (Anku-Tsede, 2014). Smaller MFIs often lack the financial and human resources to meet regulatory standards. Similarly, the organizational structure of NGOs may not match the above-mentioned regulatory requirements as they are more focused on the social mission rather than on financial stability. Thus, regulatory frameworks may reduce the ability of these MFIs to continue serving the marginalized communities.

Higher costs and poor financial performance due to adhering to regulatory frameworks make MFIs focus more on maintaining their financial performance, often at the cost of reducing social performance. To stay financially sound, MFIs reduce lending to costlier and riskier borrowers. This upscaling is observed in articles such as Ayayi and Peprah (2018), Ofoeda et al. (2024), Nourani et al. (2021), and Hartarska et al. (2024). For instance, Ayayi and Peprah (2018) find that regulation increased operational costs in Ghana, resulting in higher interest rates for clients and less outreach, particularly for female borrowers. Similarly, Hartarska et al. (2024), using cross-country MIX Market data, observe no effects on the financial performance of regulated MFIs but adverse effects on social performance. No improvement in financial performance, but a simultaneous decrease in social performance, may suggest that MFIs compensate for the increase in cost linked to regulation by reducing their outreach and going upmarket. Likewise, using data from 90 MFIs, Nourani et al. (2021) observe higher operational efficiency but lower social efficiency in regulated MFIs.

Several studies (e.g., Bakker et al., 2014; Hartarska, 2005, 2009; Pati, 2012; Pati, 2015) find unclear effects on both social and financial performance. These studies suggest that factors other than regulation are responsible for the performance of MFIs.

The key takeaway from the above analysis is that regulatory frameworks may enhance trust and credibility of MFIs, which may lead to systematic growth and eventually improve the social and financial performance of MFIs. This is also supported by the findings of several qualitative studies in our dataset. For instance, Siwale and Okoye (2017) find that regulatory frameworks professionalized the microfinance sector in Nigeria and Zambia, boosting its credibility and outreach. According to Valiante (2023), the regulatory frameworks for peer-to-peer lending increase its acceptance and respectability, enabling financial inclusion and investment prospects. Similarly, according to Marr (2012), through enhanced legitimacy and acceptance, regulatory frameworks help in developing networks and partnerships, which make MFIs more attractive partners for commercial lenders in Peru, where regulated MFIs are preferred over NGOs, even those with social missions.

However, there is also evidence that these regulations impose compliance costs, particularly for smaller and NGO MFIs, which can compromise their social mission. Furthermore, while the primary purpose of microfinance regulation is to ensure financial stability, only two studies analyzed their effects on credit risk.

A thorough understanding of different contexts and types of MFIs is needed to know how these regulations affect financial stability. More research into the role of the institutional context and of the types of MFIs in explaining the relationship between microfinance regulation and microfinance performance is needed. Moreover, the studies in our dataset often do not explain the specificity of the regulatory frameworks they have analyzed. These frameworks may incorporate different components based on contexts, which leads to somehow ambiguous results. This limitation should be considered while interpreting the results.

Capital regulation

Capital regulation refers to the standards that ensure the stability and soundness of financial institutions. It mainly includes capital adequacy requirements, which is the minimum capital level that MFIs should maintain to cover their risk and the consequences of unpredicted failure. Several studies in our datatset show that this regulatory measure is a financial burden that harms the financial and social performance of MFIs by shrinking their lending capacity, increasing cost of capital, and triggering MFIs to become loss averse. Yet, some studies find that it indirectly and, at least in the long run, may enhance the financial and social performance of MFIs due to its stabilizing effects (Table 1).

Zainal et al. (2021) using data from Indonesia, Malaysia, the Philippines, Singapore, and Thailand, Jungo et al. (2022) using data from countries of the South African Development Community (SADC) and several South Asian countries, and Anarfo and Abor (2020) using data from Sub-Sahara African (SSA) countries, provide evidence for a negative effect of capital regulation on the social and financial performance of MFIs. Zainal et al. (2021) find a negative effect on both the social and financial performance of MFIs due to the reduction in the lending ability, reducing the revenue of MFIs. Kodongo (2018), using data from a household survey conducted in Kenya, finds that liquidity regulation and capital adequacy requirements lead to a reduction of small-scale agricultural credit. This study finds that doubling the maintained capital to risk-weighted assets ratio reduced credit availability to small-scale agricultural entities and cooperatives by 0.7%. MFIs reduced credit to higher-risk clients, such as small-scale agricultural entities and cooperatives, to avoid losses and meet capital adequacy standards.

Likewise, Anarfo and Abor (2020) reveal harmful effects of capital regulation on financial inclusion in SSA. According to this study, stringent capital adequacy requirements increased the

opportunity cost of capital and reduced return on equity. MFIs reacted by increasing interest rates on lending, reducing interest rates on savings, and increasing transaction processing charges, resulting in credit rationing for marginalized clients. However, they also show that increased financial stability due to capital regulation reverses the harmful effects on financial inclusion by 5.9% because of higher confidence in MFIs.

A few recent studies reveal the favorable effects of capital regulations on financial stability, eventually leading to better financial performance. For instance, Sha'ban et al. (2023) show a critical role of capital regulations in managing risks linked to the deposits and lending products of MFIs in low income nations. MFIs that maintained higher capital reserves were better equipped to manage potential losses. Similarly, Jungo et al. (2022) reveal that higher capital regulations overcome the destabilizing consequences of intense market competition in Latin American and Caribbean (LAC) countries. They find that MFIs with higher capital buffers are less likely to show risky behavior to outcompete rivals, contributing to overall financial stability. Maintaining higher capital reserve reduces the available capital for MFIs to go for high-risk/high-return ventures, which makes it more difficult and less attractive to engage in risky behaviors that can jeopardize the stability of MFIs. Jungo et al. (2022) find no significant effects on financial stability in SSA countries, probably because of the weaker enforcement measures as compared to LAC countries.

The stabilizing effects of capital regulations may help attract low-cost deposits from the public, which results in inexpensive financing for high-return endeavors, improving the financial performance of MFIs. Ofoeda et al. (2016) reveal that higher capital reserves increased the profitability of MFIs in Ghana. This was due to the higher confidence of depositors that helped attract larger, cheaper savings (with interest rates below 5%) and investing in high-return lending

(i.e., loans with interest rates ranging from 25% to 35%). The study indicates that MFIs with higher capital buffers financially outperformed those dependent on borrowed funds. These well-capitalized MFIs were perceived to have lower insolvency risk, encouraging clients to deposit more money with them, strengthening their financial base, reducing their borrowing costs, and improving overall financial performance.

However, the level of rigidity in capital regulation also plays a critical role in determining its impact on MFIs. While higher capital regulations generally increase costs for MFIs that are eventually passed on to customers, studies by Ayayi and Peprah (2018) and Ofoeda et al. (2016) indicate that moderate capital regulations, such as a lower reserve requirement (i.e., a 10% minimum capital requirement), can enhance MFIs' financial performance. These moderate regulations helped in enhancing lending capacity, return on assets and lower transaction costs.

The above analysis shows that capital regulation may limit the financial and social performance of MFIs. At the same time, however, there appears to be a self-correcting loop as the stabilizing effects of capital regulation eventually enhance financial and social performance.

Ultimately, it seems important that, in order to maintain the performance of MFIs, regulators should emphasize a lower capital adequacy ratio or other regulatory measures such as supervision to ensure stability.

Insert Table 1 here

Supervisory control

Supervisory control, which include regulatory supervision, on-site inspections, monitoring, auditing by government authorities, and reporting, is crucial in maintaining transparency and

accountability within MFIs as well as compliance with legal and regulatory standards and adhering to best practice recommendations. Table 1 shows that several studies have analyzed the effects of supervisory control on the social and financial performance and financial stability of MFIs.

Five studies (i.e., Besong et al., 2022; Dorfleitner et al., 2013; Halouani & Boujelbène, 2015; Zainal et al., 2021; Zhang et al., 2023) reveal favorable effects of supervisory control on the social and financial performance of MFIs. They argue that supervisory control helps MFIs to effectively achieve their social goals, because these measures often promote transparency, accountability, and ethical practices. This crucial role of supervisory control is confirmed by Halouani & Boujelbène (2015), Zainal et al. (2021), Zhang et al. (2023), and Besong et al. (2022). These studies find that regulatory supervision, audit, monitoring admission into the financial sector, and reporting positively affect the social performance of MFIs in East Asian, including China, and African countries. Similarly, analyzing data from 712 MFIs across 72 countries, Dorfleitner et al. (2013) reveal that supervisory control significantly reduces interest rates for loans. These measures often set standards and control mechanisms, sometimes prioritizing the reduction in lending costs for borrowers to enhance financial inclusion. Furthermore, these studies explain that higher supervisory control enhances the operational efficiency of MFIs through reinforcing accountability and better management practices, resulting in cost reductions for MFIs, enabling them to reduce lending rates.

Similarly, studies by Cull et al. (2011), Zhang et al. (2023), Zainal et al. (2020, 2021) and Bassem (2009) provide evidence that supervisory control enhances the financial performance and risk management of MFIs, primarily due to the accounting and reporting standards often mandated by supervisory control, which improves their financial and operational efficiency. For instance, Cull et al. (2011) find that higher reporting and supervision standards have a direct

positive effect on the financial self-sufficiency and return on asset of profit-oriented MFIs. Similarly, analyzing data from multiple countries, Zainal et al. (2020) and Cull et al. (2011) show that applying rigorous supervisory measures reduce excessive risk-taking, which in turn, leads to financial stability and better performance. This highlights the practical benefits of supervisory control in enhancing the financial performance and risk management of MFIs.

The above analysis indicates the importance of supervisory control on the profitability and operational efficiency of MFIS, as well as on their social mission. However, it is important to note that, like other forms of regulation, excessive supervisory control can, at least potentially, also impose costs on MFIs, which may negatively impact their performance. The studies in our dataset do not provide any empirical evidence to support this, however.

Some studies do not find a clear relationship between supervisory control and the performance of MFIs (i.e., Cull et al., 2008; Estapé-Dubreuil & Torreguitart-Mirada, 2015; Hartarska, 2009). For instance, Cull et al. (2008) find no significant effects of supervision on the financial self-sufficiency of MFIs. Similarly, Hartarska (2009) does not find any significant effects of regulatory oversight and financial statement transparency on the profitability of MFIs. Likewise, Estapé-Dubreuil and Torreguitart-Mirada (2015) report ambiguous results on the social performance of MFIs.

The reason why results for the impact of supervisory control seem inconclusive may be that, similar to other regulatory measures, supervisory control can also be a financial burden for MFIs. The potential increase in costs may cancel out any financial benefits. Furthermore, the goals of financial supervision sometimes conflict with MFI missions. Many MFIs prioritize outreach over profit, whereas regulators may concentrate on financial indicators and stability. Thus, its efficacy

might be compromised by this mismatching aspect, challenging to ascertain the influence of supervisory control.

Specific measures

Regulators often impose specific measures, such as setting interest rate and loan amount limits, enforcing know your customer (KYC) requirements, and restricting specific banking activities to protect clients and ensure financial stability. The studies in our dataset show the potential of unintended consequences that may occur due to the restrictive nature of these regulatory measures, which may create challenges to MFIs. In response, MFIs often opt for upscaling, reducing their social performance.

MFIs might use their monopolistic market power to exploit borrowers by charging higher interest rates, particularly in markets for which interest rates are inelastic. Regulators may impose interest rate ceilings in these markets to prevent the welfare loss of borrowers. However, interest rate ceilings can also be driven by other factors such as boosting affordable loans or political reasons. They are often imposed before elections in some countries (Bylander et al., 2019; Samreth et al., 2023). Interest rate ceilings may reduce the revenue of MFIs, leading them to change their strategies to maintain profitability.

When a regulatory interest rate ceiling is imposed, MFIs cannot charge higher interest rates. In response, MFIs may have to adjust their overhead and loan processing costs. To decrease cost per loan or per borrower, they may increase the size of loans to maintain profitability (Samreth et al., 2023). This means that MFIs decrease financial service accessibility to marginalized borrowers.

There is robust evidence from various contexts in the studies that we review showing the harmful effects of interest rates ceilings on the social mission of MFIs and shifting the focus of MFIs away from the poorest clients. Examples of these studies are Roa et al. (2022), using data

from Bolivia, Cozarenco and Szafarz (2018) using data from France, Mia and Lee (2017) based on data in Bangladesh, and Samreth et al. (2023) looking at data from Cambodia. For instance, Samreth et al. (2023) find that although the 18% interest ceiling in 2017 in Cambodia decrease the interest rates, it increase the informal credit and the average loan size by households. They also report an increase in the loan assessment and procedure fees, although, overall, the average loan costs were decreased for borrowers. Similarly, Roa et al. (2022) analyze the consequences of an interest rate ceiling of 11.5% in Bolivia in 2014 for the productive sector. They find that this interest rate regulation restricted SMEs from accessing MFI microcredit. The loan to these businesses dropped by 26.1%. Likewise, Cozarenco and Szafarz (2018) find that regulatory credit rate ceilings 'crowd out the most vulnerable borrowers', using data from France.

Only one study, Kambole and Alhassan (2018), analyze the effects of interest rate ceilings on the financial performance of MFIs, showing evidence for an adverse effect of these ceiling on the sustainability of MFIs in Zambia.

Regulators sometimes also restrict MFIs from engaging in certain banking activities. Such regulation intends to maintain financial stability by preventing MFIs from engaging in high-risk investments. Restriction on banking activities usually involves barring MFIs from side ventures, such as securities trading, insurance, and real estate ventures. Regulators set limits for such activities that expose them to risky investments. Ahamed et al. (2021) and Zainal et al. (2021) find that restrictions on these activities harm the financial performance of MFIs, because they limit opportunities for diversification and income streams. Ahamed et al. (2021) discover that in countries with higher restrictions on banking activities, the positive effects of financial inclusion on bank efficiency are reduced. In contrast, in environments with fewer restrictions, banks are better able to use the additional funds from financial inclusion, increasing their efficiency. Zainal

et al. (2021) show that these limitations reduce social efficiency due to reduced income that could otherwise be used to fund loans for the poor.

In a similar vein, Kodongo (2018), using data from Kenya show that Know Your Client (KYC) regulations restricted the access to financial services for low-income and rural households, because the requirement for formal identification excludes individuals without proper identification affecting the unbanked poor. KYC regulations require MFIs to carry out rigorous identity verification of clients to prevent illegal activities such as fraud and money laundering. In contrast, Besong et al. (2022) reveal favorable effects of licensing and deposit insurance on the social performance of MFIs due to enhanced trust and credibility.

The specific regulatory measures discussed above, while generally well-intentioned, may also restrict MFIs in their business operations. In response, MFIs often adopt strategies to maintain their financial performance at the cost of reduced outreach. Thus, when setting these regulations, policymakers may consider the compatibility of these regulatory measures with the social and financial performance of MFIs. What has been understudied so far is whether regulatory measures affect the financial stability of MFIs. For instance, no study in our dataset analyzes whether loan amount limits or restrictions on banking activities affect the riskiness of the MFIs' overall activities. Studying this relationship may be important for future work.

Supportive microfinance regulation

Four studies analyze the effects of so-called supportive microfinance regulations. These regulations support the growth of MFIs and financial inclusion, often by creating a supportive environment with reduced regulatory restrictions and promoting market-driven solutions. This type of regulation generally includes flexible and proportionate regulations that are designed to the specific needs of MFIs. An example of such a regulation is a regulatory framework that

prevents MFIs from overly burdensome measures such as capital reserves and helps them in accessing multiple funding sources including deposits.

Girard (2020) examines the effects of a supportive microfinance regulation that emphasizes reduced state intervention and promotes competition and financial inclusion. The study reveals an increase in the overall number of bank accounts, but insignificant effects for marginalized people such as women and the rural poor. Similarly, Kennedy et al. (2020) and Lashitew et al. (2019) find favorable effects of such supportive regulations for digital services, such as mobile payments and mobile money services, on financial inclusion in Kenya and China. According to these studies, regulation with reduced state intervention may foster innovation, leading to a higher outreach. For example, the Chinese government supported the widespread adoption of mobile payment services by loosening its regulations. Likewise, the Kenyan government helped mobile money services in their early stages of development, successfully integrating them into the financial system. Similarly, Besong et al. (2022) observe that making it easier for MFIs to obtain a banking license and providing access to deposit insurance increase their social performance. Providing such regulatory comfort helps MFIs to increase their outreach and their client base.

4.5.Challenges to Microfinance Regulation

Establishing microfinance regulation often faces challenges, which can have consequences for its effective implementation. In this subsection, we review the 53 qualitative studies in our dataset to analyze what factors may hinder the effective implementation of microfinance regulation. The review of these qualitative studies produced a list of themes that relate to challenges facing effective implementation of microfinance regulation, including resource and

capacity limitations, ambiguities, enforcement issues, and challenges arising from technological innovation.

A key obstacle to effectively implementing microfinance regulations is the lack of sufficient resources and capacities in developing countries. Regulators must have knowledge, skills, experience, and financial resources to set, update, and monitor compliance with microfinance regulations (e.g., Anku-Tsede, 2014; Hudak, 2012; Siwale & Okoye, 2017). Case studies of Ghana (Anku-Tsede, 2014) and Sri Lanka and Nepal (Hudak, 2012) reveal that the lack of qualified human resources restrict the effective regulation of MFIs. Similarly, several studies observe significant costs associated with regulatory activities such as capacity building, monitoring compliance, as well as expenses on the necessary technological set-up of regulatory frameworks (Arun, 2005; Quao, 2019). The significant costs become a major concern in case of the lack of government support. Studies discussing the challenges of implementing regulation indicate that even if the microfinance regulatory framework exists, its effective implementation requires robust government institutional competency and sufficient resources. At the same time, some studies suggest that incorporating financial regulatory technologies for digital products can curb the costs associated with microfinance regulations. These approaches efficiently streamline compliance and monitoring, and help regulators manage large data more efficiently (e.g., Ally, 2024; Badr El Din, 2022; Gallardo et al., 2005; Pal et al., 2023; Rafiuddin et al., 2023).

Another challenge is the ambiguity of regulatory measures. Several studies in our dataset indicate that the lack of clarity mainly arises from the various legal structures of MFIs, overlapping regulatory bodies, and the incorporation of technological innovations in microfinance services. MFIs comprise of a broad set of different organizational models and legal structures, including NGOs, non-banking financial companies, commercial banks, self-help groups, and joint stock companies. According to the literature, this diversity of models can result

in inconsistencies and confusion when it comes to understanding which type of regulations apply to which type of microfinance models and structures (e.g., Anku-Tsede, 2014; Bara, 2013; Chitimira & Torerai, 2021; Girijan & Ramachandran, 2022; Hudak, 2012; McCarthy, 2023; Safavian et al., 2000; Zeqiraj et al., 2017). Differences in the legal structures of MFIs due to variations in their operational models require customized regulatory measures. The application of a one-size-fits-all for MFIs with varying legal structures may lead to inconsistencies and unclarity. This may mean that the regulatory measures will not fit the operational realities (Anku-Tsede, 2014), leading to inefficiencies in the implementation of regulatory measures (Hudak, 2012).

Ambiguity regarding microfinance regulation also may have unfavorable effects on the expansion and operational efficiency of MFIs, as observed in Russia (Safavian et al., 2000), Zimbabwe (Chitimira & Torerai, 2021), and India (Girijan & Ramachandran, 2022). In addition, it may deter innovation, because of the fears of non-compliance arising from the ambiguity in the legal frameworks (McCarthy, 2023). For example, regulatory ambiguity was restricting the conversion of MFIs from NGOs to joint stock companies in Kosovo (Zeqiraj et al., 2017).

In some countries, a crucial obstacle is the existence of many different authorities that are engaged in regulating MFIs (Bara, 2013; Gallardo et al., 2005; Girijan & Ramachandran, 2022). For instance, in India, different states often have different microfinance regulations, meaning that MFIs may need to navigate different regulatory measures based on the state they operate, with adverse consequences for the operation and performance of MFIs (Girijan & Ramachandran, 2022). Moreover, frequently modifying microfinance regulation creates an environment of hesitation, particularly when the implementation guidelines are unclear, impeding long-term strategic planning and innovation (Omarova, 2020; Trujillo et al., 2014).

Lastly, the rapidly expanding digital financial services increase the complexity of the implementation of microfinance regulation. A recurring theme in the studies in our database is the deficiency of current microfinance regulations in dealing with the specifications of digital financial services and their limited ability to quickly adapt to innovative digital financial services. Several recent articles discuss this issue (e.g., Ally, 2024; Ayayi & Peprah, 2018; Nayak & Silva, 2019; Valiante, 2023). For instance, according to Ally (2024), the extant regulations do not adequately address consumer protection concerns regarding mobile banking in Tanzania. Likewise, in South Africa and in Zimbabwe (Chitimira & Torerai, 2021), the current microfinance regulations do not keep up with technological advancements, resulting in legal gaps and uncertainties.

4.6. Recommendations

Several qualitative and quantitative articles recommend measures to improve the effectiveness of microfinance regulation. Table 2 summarizes the key themes arising from the review of the recommendations, including balanced, forward-looking, and consumer-centric regulations, regulation that improves the financial stability of MFIs, and harmonization of regulation.

Most studies recommend a balanced approach to microfinance regulation that ensures the dual goals of MFIs, and stresses having regulations that are both forward-looking and client-centric. Forward-looking regulation anticipates potential challenges and opportunities for MFIs, ensuring they remain relevant and adaptive over time. For example, digital financial services, such as mobile banking, have created both opportunities and risks. A forward-looking regulatory approach would address these developments proactively, ensuring that regulatory measures remain flexible enough to allow for creativity, while at the same time protecting against new

threats, such as data privacy concerns or cybersecurity attacks. Client-centric regulation mainly ensures that microfinance regulation considers clear and transparent requirements on disclosure, fair lending practices, consumer redress, and mechanisms against over-indebtedness. According to the studies that we have reviewed, such measures foster confidence in the microfinance system.

In addition, four studies recommend incorporating risk mitigation measures for MFIs in the microfinance regulatory frameworks. These measures include capital regulations and higher supervision that ensure financial stability in the microfinance sector. By effectively managing risk, MFIs maintain financial stability, while providing microfinance services to marginalized communities. Furthermore, several articles underscore the need for a harmonized regulatory framework to better coordinate efforts and unify standards across regions. This unified microfinance regulation ensures safe and more predictable cross-border microfinance activities. Moreover, 11 studies recommend enhanced supervisory control (Table 2).

Insert Table 2 here

5. Discussion and concluding remarks

In this SLR, we have reviewed 44 quantitative studies that analyze the effects of microfinance regulation on microfinance performance. Most studies analyze the effects of microfinance regulation on both the financial and social performance of MFIs. Our analysis of the existing empirical evidence suggests that microfinance regulation may have both positive and negative effects, but overall, we conclude that regulation does not harm microfinance performance. Given that microfinance regulation may be important for the financial stability of MFIs and that it may contribute to the protection of their customers, i.e. that it may have positive effects that go

beyond the individual MFIs, the question is not whether or not to regulate microfinance, but rather how regulation should look like and how it can be implemented most effectively.

Three crucial findings emerge from our analysis of the reviewed studies. First, microfinance regulatory frameworks generally lead to the growth of MFIs due to increased trust and credibility, strengthening the confidence of their clients and stakeholders.

Second, the reviewed studies indicate that there may be a tension between what many regulatory measures aim to achieve and the central aim of many MFIs, which is contributing to the financial inclusion of low-income households. Regulatory measures such as capital regulation and interest rate, as well as restrictions on specific banking activities, are often costly for MFIs, which distracts them from their social goal. These regulatory measures more directly limit the financial capacity of MFIs, often contradicting the realities of sustaining both the social and financial missions of MFIs. This bifurcation indicates that the set of regulatory measures imposed on MFIs should aim at taking into account the costs the measures may have for the financial sustainability of these institutions. More specifically, the set of regulatory measures should on the one hand contribute to the financial stability and sustainability of MFIs, while on the other they should not push these institutions into changing their business model and move away from achieving their social goal, that is contributing to the financial inclusion of the poor.

Third, the analysis reveals that there may be a self-correcting loop in the relationship between microfinance regulation, the performance of MFIs, and financial stability. Microfinance regulation may hurt the performance of MFIs, at least in the short run. At the same time, however, in the long run regulation may contribute to the financial stability of MFIs, with favorable consequences for the performance of MFIs, because this raises trust among customers and stakeholders. This indicates that when developing the set of regulatory measures for

microfinance, it is important to take into account the time dimension of the impact of these measures on the financial and social goals of MFIs.

Our review also reveals that the implementation of microfinance regulation may face several challenges. Effectively implementing microfinance regulation calls for financial and human resources. Regulatory bodies, particularly in developing countries, lack these resources. This may affect the implementation of regulatory measures and compromise effectively enforcing compliance standards. Furthermore, the variation in legal forms of MFIs and the existence of overlapping regulatory bodies may lead to inconsistencies and ambiguity with respect to which regulations hold for which types of MFIs. Moreover, the emergence of fintech in microfinance has created new regulatory issues, as current frameworks fail to adapt to and manage the complexities of digital financial services.

Our review of the recommendations made in the literature that we have evaluated suggests a balanced, client-centric, future-driven approach to microfinance regulations. Based on our review, we recommend tailored regulations that recognize the mission, operational model, and level of risk exposure of different MFIs. These regulations are more effective in ensuring that the dual goals of microfinance are maintained. By using context-based differentiated regulatory measures, regulators can ensure that regulatory measures are proportionate and responsive to the specific requirements and capacities of each type of MFI.

Our analysis of the available research on the relationship between microfinance regulation and microfinance performance also provides suggestions for future research. Most studies that we have reviewed focus on the effects of regulation on the profitability and outreach of MFIs. Less is known about the consequences of microfinance regulations for the stakeholders of MFIs. For example, what are the consequences of excessive regulation for the clients of the MFIs? Does this

lead to increased borrowing from informal lending alternatives with higher costs? What is the impact of this shift towards informal borrowing alternatives on their poverty levels? Thus, more studies on the social welfare consequences of the regulation of microfinance would be welcomed.

Another important avenue for future research would be the analysis of regulations of technology-driven innovative products and business models in microfinance, such as mobile banking, online lending platforms, biometric smartcards, and other fintech products. What kind of regulatory responses to such innovations are associated with better financial inclusion outcomes?

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Supplementary Materials: Figures, Tables, and Appendices

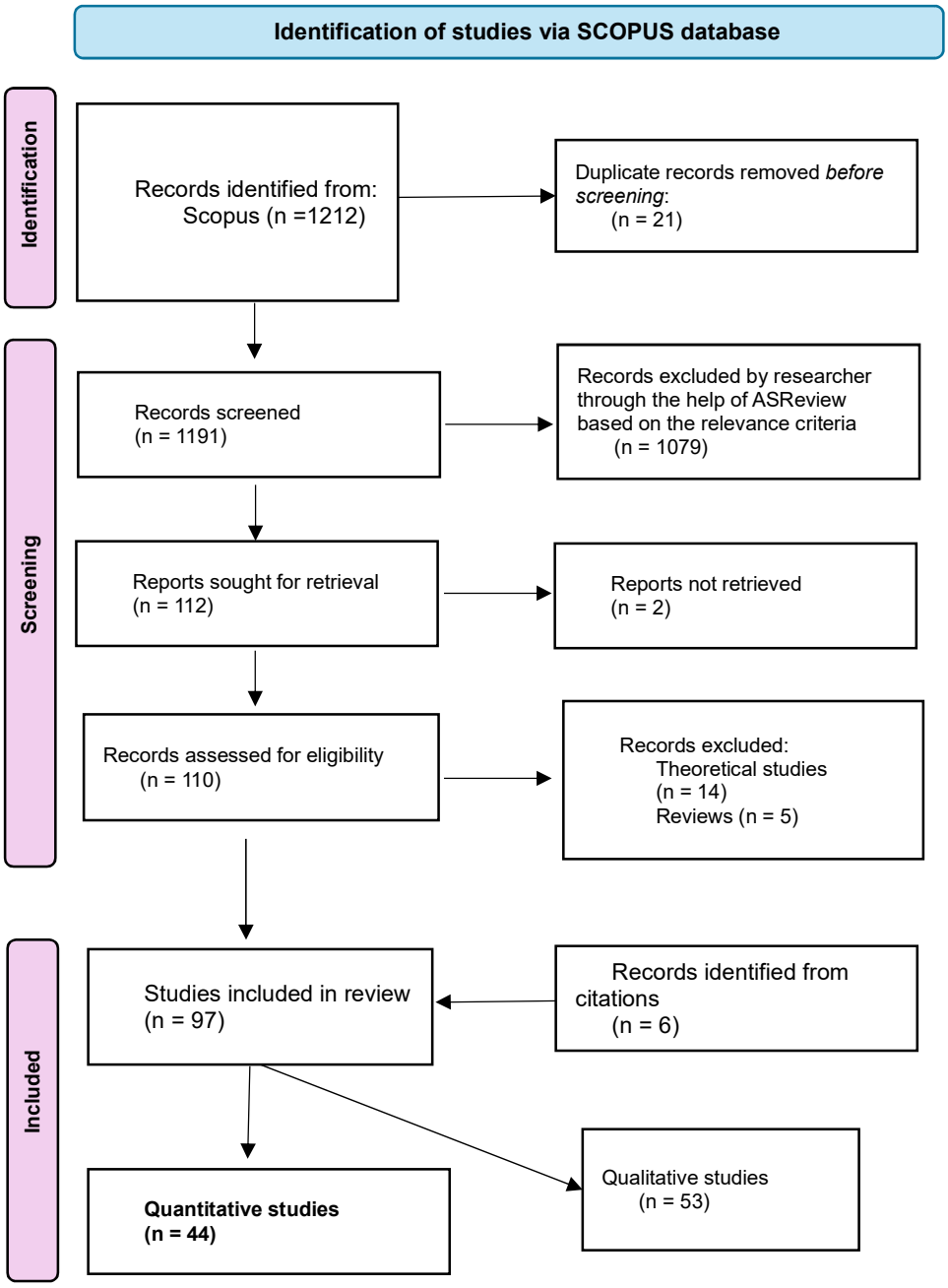

Figure 1. PRISMA diagram

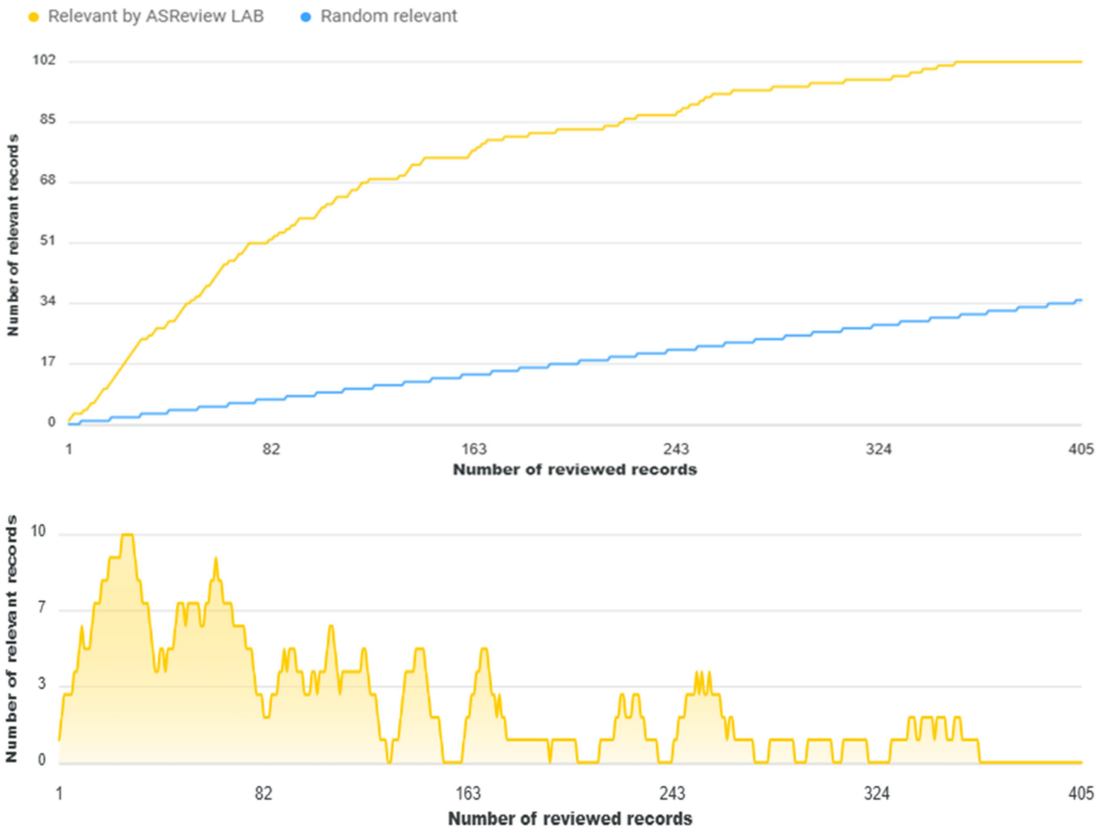

Figure 2: articles screening through ASReview

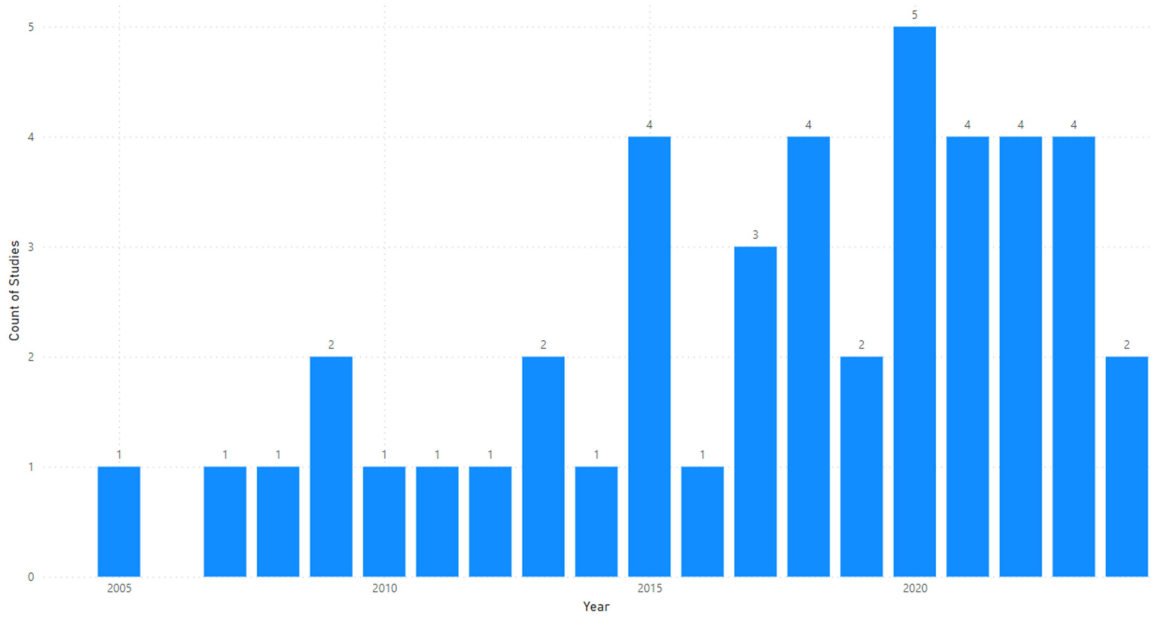

Figure 3. annual scientific production of the reviewed quantitative studies

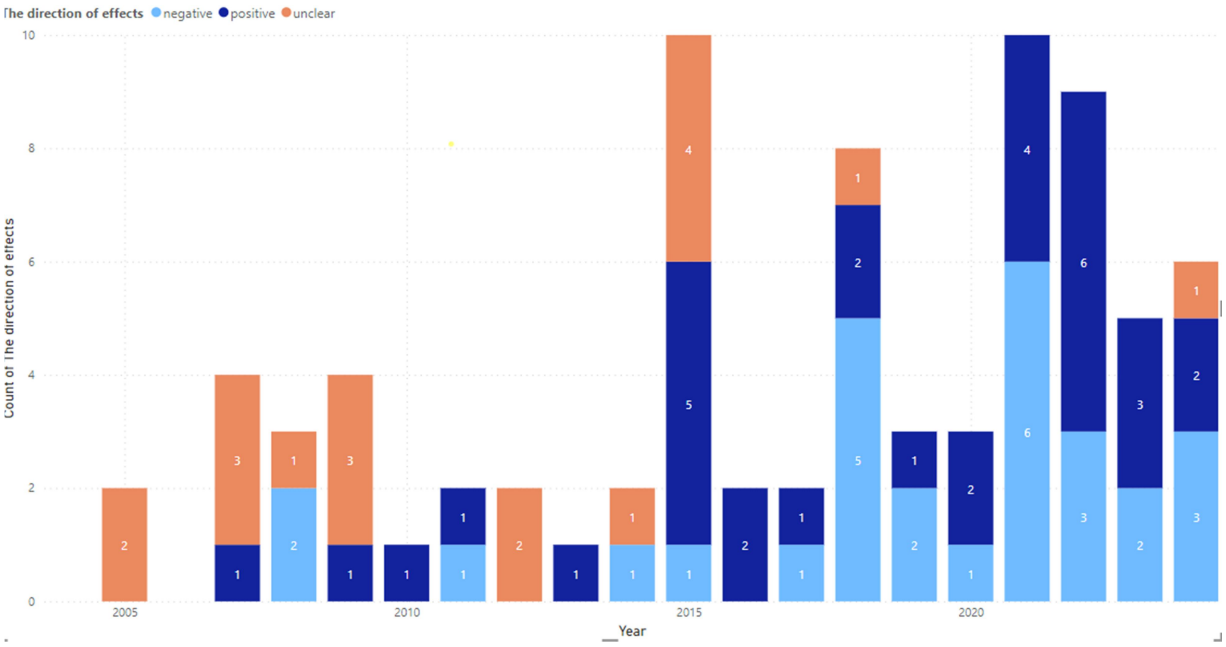

Figure 4: Annual distribution of positive, negative, and unclear findings of 79 individual analyses

Table 1. the effects of different types of microfinance regulation

Type of regulation: main theme	Detail of regulatory measures	Effects on:	Social/financial performance/stability	The direction of effects	Studies
Regulatory frameworks	Governments' overall regulation for MFIs		Social efficiency and outreach	Positive	Gohar and Batool (2015), Halouani and Boujelbène (2015), Olsen (2010), Hartarska and Nadolnyak (2007), Ofoeda et al. (2022)
		Social performance	Social efficiency and outreach	Negative	Hartarska et al. (2024), Zainal et al. (2021), Ayayi and Peprah (2018), Nourani et al. (2021)
			Outreach	Unclear	Bakker et al. (2014), Pati (2015), Pati (2012), Hartarska and Nadolnyak (2007), Hartarska (2005)
		Financial stability	Credit risk	Positive	Karimu et al. (2021), Ofoeda et al. (2024)
		Financial performance	Profitability and financial sustainability	Positive	Halouani and Boujelbène (2015), Gohar & Batool (2015)
		Financial performance	MFI growth and financial sustainability	Negative	Aoun et al. (2019), Bakker et al. (2014)
			Profit, financial sustainability, financial efficiency of MFIs	Unclear	Hartarska et al. (2024), Pati (2015), Pati (2015), Hartarska and Nadolnyak (2007), Hartarska (2005)
Capital regulation	Capital adequacy requirement for MFIs	Financial stability	Bankruptcy	Positive	Jungo et al. (2022)
			Managing risks	Positive	Sha'ban et al. (2023)
		Financial performance	Association between financial inclusion and bank performance	Positive	Sha'ban et al. (2023), Ahamed et al. (2021)
			Profitability	Positive	Ofoeda et al. (2016)
		Financial performance	Financial efficiency and competitiveness	Negative	Zainal et al. (2021), Jungo et al. (2022)
		Social performance	Social efficiency and financial inclusion	Negative	Zainal et al. (2021), Jungo et al. (2022), Anarfo and Abor (2020), Kodongo (2018)
Supervisory control	Regulatory supervision, external audit and reporting	Social performance	Financial inclusion, social efficiency of MFIs, outreach to poor clients	Positive	Halouani and Boujelbène (2015), Zainal et al. (2021), Zhang et al. (2023) Besong et al. (2022)
			Interest rates on loans	Positive	Dorfleitner et al. (2013)
	Regulatory supervision	Financial performance	Financial efficiency, banking functions	Positive	Cull et al. (2011), Zhang et al. (2023), Zainal et al. (2020, 2021), Bassem (2009)

		Financial performance	Profitability and financial sustainability	Unclear	Estapé-Dubreuil and Torreguitart-Mirad (2015); Hartarska (2009); and Cull et al. (2008)
		Social performance	Outreach	Unclear	Estapé-Dubreuil and Torreguitart-Mirada (2015)
Specific measures for MFIs risk management, and consumer protection	Regulatory Interest rate ceiling	Financial performance	Financial sustainability	Negative	Kambole and Alhassan (2018)
	Regulatory interest rate Ceilings	Social performance	Outreach	Negative	Roa et al. (2022), Cozarenco and Szafarz (2018), Mia and Lee (2017), and Samreth et al. (2023)
	Regulatory loan ceiling	Social performance	Financial inclusion	Negative	Cozarenco and Szafarz (2020)
	Anti-money laundering regulation	Social performance	Financial inclusion	Positive	Ofoeda (2022)
	Restrictions on banking activities	Financial performance	Association between financial inclusion and bank performance	Negative	Ahamed et al. (2021)
	Restrictions on banking activities	Social performance	Social efficiency	Negative	Zainal et al. (2021)
	Know your customer	Social performance	Financial inclusion	Negative	Kodongo (2018)
	Licensing and deposit insurance	Social performance	Financial inclusion	Positive	Besong et al. (2022)
Supportive regulation	Flexible and proportionate regulations	Social performance	Financial inclusion	Positive	Girard (2020), Kennedy et al. (2020), Lashitew et al. (2019), Besong et al. (2022)

Table 2. Recommendations in the reviewed qualitative and quantitative studies

S. No.	Recommended Policy	Total Studies	Key Points	References
1	Balanced regulation	17	Regulation to achieve dual goals	Ayayi and Peprah (2018), Sha'ban et al. (2023), Ofoeda et al. (2016), Anarfo and Abor (2020), Cull et al. (2011), Mia and Lee (2017), Lashitew et al. (2019), Ahamed et al. (2021), Singh and Louche (2020), Zainal et al. (2020, 2021) Pati (2012, 2015), Yimer (2022), Cabello (2008), Ngwu (2015), Kodongo (2018)
2	Forward-looking microfinance regulation	10	Clear regulatory frameworks for technological services and update existing ones to address emerging challenges.	Singh and Louche (2020) Ally (2023), McCarthy (2023), Valiante (2023), Chitimira and Torerai (2021), Badr El Din (2022), Tritto et al. (2020), Nayak and da Silva (2019), Vysokov (2020), Siwale and Okoye (2017)
		12	Develop adaptive regulatory frameworks for new technologies and adopt RegTech and SupTech.	Rupeika-Apoga and Wendt (2022), Chitimira and Torerai (2021), Ally (2024), Badr El Din (2022), Pal et al. (2023), Rafiuddin (2023), Zhang et al. (2023), Lashitew et al. (2019), McCarthy (2023), McCallum and Aziakpono (2023), Rupeika-Apoga and Wendt (2022), Kharisma (2021)
		5	Policies that encourage technological innovation and provide incentives for research and development in RegTech and SupTech.	McCarthy (2015), Kharisma (2021), Zhang et al. (2023), Lashitew et al. (2019), Rafiuddin (2023)
3	Client-centric microfinance regulation	13	Establish robust consumer protection regulations and implement dispute resolution mechanisms.	Markom et al. (2015), Quao (2019), McCarthy (2023), Chitimira and Torerai (2021), Rafiuddin (2023), Valiante (2023), Besong et al. (2022), Girard (2020), Warikandwa (2021), Kanobe et al. (2017), Shovkoplias et al. (2022), Brownbridge (2002) Bedaiwy and Peter (2022)
4	Financial stability of MFIs	4	Reduce credit risk exposure of MFIs	Karimu et al. (2021), Sha'ban et al. (2023), Jungo et al. (2022), Brownbridge (2002)
5	Harmonization of Regulations	7	Create unified regulations across regions and coordinate efforts to align regulatory standards.	Chitimira and Torerai (2021), Valiante (2023), Trujillo et al. (2014), McCarthy (2023), Ally (2024), Rafiuddin (2023), Bara (2013)
6	Supervisory control	11	Enhance regulatory supervision	Girijan and Ramachandran (2022), Singhe and Louche (2020), Nayak and Silva (2019), Kanobe et al. (2017), Nikolaeva et al. (2019), Tran and Koker (2019), Zainal et al. (2020) and Cull et al. (2011), Besong et al. (2022); Halouani and Boujelbène, (2015); Dorfleitner et al. (2013)

Appendices

Appendix 1.

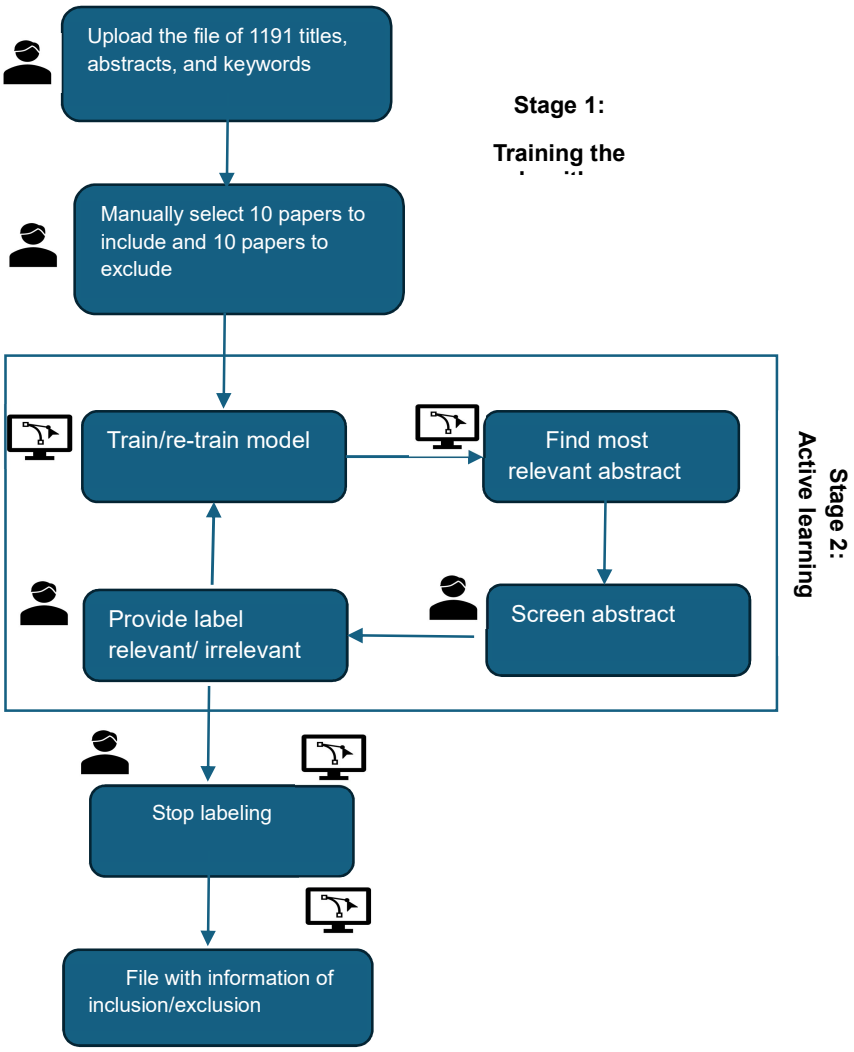

Figure A1. ASReview AI guided process for screening 1191 abstracts, keywords, and titles retrieved from SCOPUS

Source: Authors' construct based on Van de Schoot et al. (2020) and Quan et al. (2024)

Appendix 2. Data extraction form

Data Extraction Form

1. Article code
2. Author (s)
3. Year of publication
4. Title
5. Journal
6. Abstract

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7. What is the focus of this study?
8. What type of MF regulation does the paper consider?
9. How have the authors measured the regulation/treatment variable?
10. The paper analyzes impact/Effects on:
    a. MFI Financial performance
    b. MFI social performance
    c. Both
    d. Financial stability
    e. Other
11. What is the specific outcome variable?
12. How did the authors measure the outcome variable?
13. What is the method of analysis used in this paper?
14. Any other relevant specification regarding the method used/such as robustness check?
15. Sample (total number of MFIs/respondents):
16. Specify sampling design:
17. What is the data source?
18. What is the context/region/country:
19. Has the research observed any impact/effect between the treatment and response variable?
    a. Positive
    b. Negative
    c. Unclear
20. What is/are the main characteristics of MFI?
21. Other relevant characteristics of the product/services or MFIs:
22. What is/are the key conclusion (s) of the study authors?
23. What challenges associated with microfinance regulation were discussed, and what was concluded?
24. What are the limitations of this study?
25. What future research is recommended?

Appendix 3.

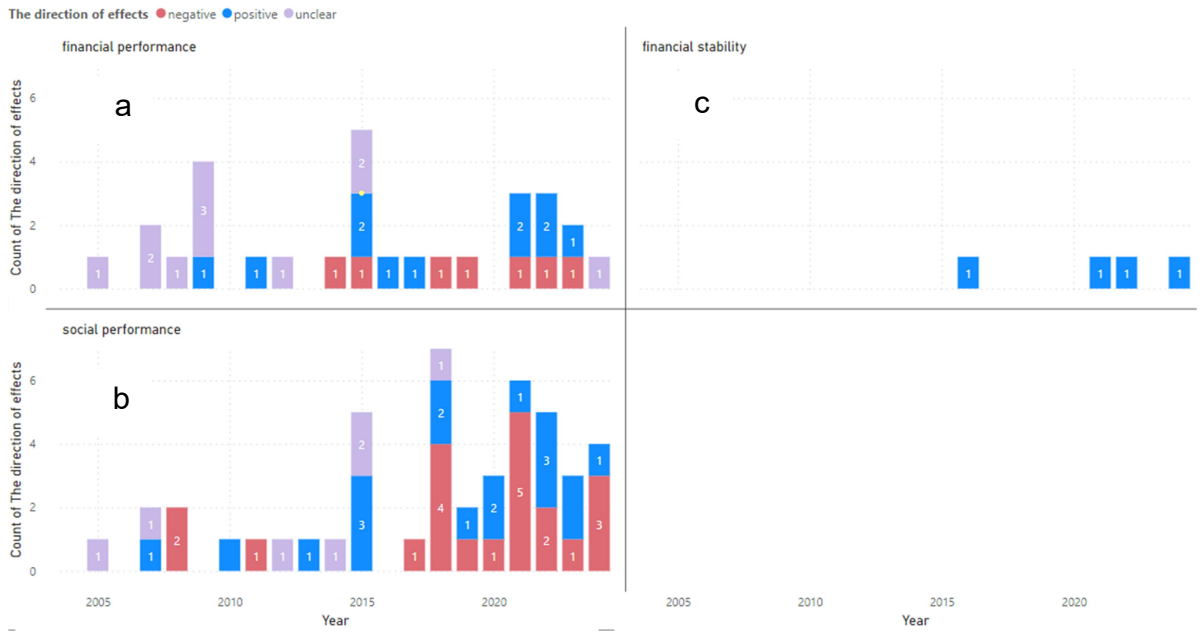

Figure A2. a) trend in the direction of effects in the individual analyses on financial performance; b) social performance; and c) financial stability

List of research reports

2019001-EEF: Lugalla, I.M., J. Jacobs, and W. Westerman, Drivers of Women Entrepreneurs in Tourism in Tanzania: Capital, Goal Setting and Business Growth

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