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DEA and SFA research on the efficiency of microfinance institutions: A meta-analysis

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ABSTRACT

Microfinance has played a key role in the fight against exclusion and the promotion of entrepreneurship in developing countries. An important question today is how to increase the reach and profitability of microfinance, in a context where subsidies are withdrawing to promote the viability and sustainability of microfinance institutions (MFIs). Efficiency analysis has found favor in this context and has attracted growing interest among professionals, partners, and researchers. Abundant empirical work has been conducted over the last ten years on this subject, in very different contexts and with different methodologies. The purpose of this article is to provide a meta-regression analysis on parametric and nonparametric estimations of Mean Technical Efficiency (MTE) in microfinance, using a data set of 262 observations from 38 studies. The results show that, in the microfinance industry, MTE scores have increased over time. However, with an MTE rate of approximately 61.1%, there is room for improving efficiency. MFIs use more resources than necessary for the results achieved in terms of outreach and revenue generated. Our results show heterogeneity of MTE according to the methodological approach of the studies. Studies with a larger number of variables (inputs and outputs) produced higher MTE scores than did those with a smaller number of variables. Studies using the variable returns to scale assumption resulted in higher MTE scores than those using constant returns to scale. In addition, those with a production approach had higher MTEs than did those using the intermediation approach, while studies of a large number of MFIs had lower scores than did those involving a small sample size. Moreover, research estimating social efficiency generated lower MTEs compared to those estimating financial efficiency. Studies using data from African MFIs obtained lower MTEs than did those on MFIs in Latin America and MENA, which confirms the poor performance of African microfinance.

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1. Introduction

Microfinance has played a key role in the fight against exclusion and the promotion of entrepreneurship in developing countries (Dupas & Robinson, 2013; Khandker, 2001; Pitt & Khandker, 1996). Microfinance differs from classical banking in particular because of its dual social and commercial mission, which also creates constant pressure for the microfinance institutions (MFIs) that truly pursue this double objective. Today, additional pressure has been added: the gradual withdrawal of subsidies for microfinance. Increasingly, donors are withdrawing from the microfinance sector because they are concerned about the continued existence of MFIs. Therefore, the overarching goal of MFIs has become to demonstrate viability. At the same time, management practices in MFIs have prioritized efficiency and cost reduction (Blanco-Oliver, Irimia-Dieguez, & Reguera-Alvarado, 2016). This particular context has created an interest in research on the effectiveness of microfinance, making it a crucial issue today. This body of research provides empirical evidence on the sources of waste and inefficiencies in microfinance, which is key information for regulatory authorities and MFI managers. Also, with increasing financing by the capital market, efficiency analysis is a growing priority in this industry. Moreover, this interest in microfinance efficiency can be explained by greater awareness of the role of efficiency in reconciling the social and financial objectives of microfinance (see: Bassem, 2008). For these reasons, over the past ten years, there has been an abundance of empirical research analyzing microfinance efficiency.

Studies on microfinance efficiency have essentially adopted two main estimation methodologies: Data Envelopment Analysis (DEA), a nonparametric approach to data envelopment, and Stochastic Frontier Analysis (SFA), a parametric approach to estimation by stochastic boundaries. Empirical research on this issue has also been conducted in different regions, with different data, and for different periods. Studies have also covered very different MFIs in terms of their status, size, and primary orientation, etc. Although the results seem to converge toward the low efficiency of microfinance, the studies have yielded rather disparate results. Despite the abundance of research, the literature has not yet provided empirical evidence about the factors that influence efficiency estimates. Another difficulty is that the techniques often used (DEA and SFA) are debatable because of their inherent weaknesses. Therefore, if we want an accurate appreciation both of the role played by estimation techniques and of the characteristics of studies on Mean Technical Efficiency (MTE) in microfinance, an overall analysis of current research is necessary. To date, such a study is non-existent in microfinance. However, due to its important place in the policies designed to alleviate poverty, microfinance has been the focus of much academic research. An impressive amount of empirical work has been conducted in microfinance on a wide variety of themes, such as the impact of microfinance, lending methodologies, the profitability/social dilemma, commercialization and mission drift, performance, governance, and efficiency. Despite the breadth of microfinance research, very few systematic reviews of the literature have been conducted. Although some systematic reviews do exist on the themes of responsibility and the profitability/social dilemma (Hermes & Lensink, 2007), and sustainability (García-Pérez, Muñoz-Torres, & Fernández-Izquierdo, 2017), none of this work has focused on a meta-analysis, and no synthesis has been made of the work on the analysis of efficiency.

The purpose of this article is to explore the sources of heterogeneity in Microfinance Efficiency literature by using a Meta Regression Analysis (MRA) on parametric and nonparametric estimations of MTE in microfinance. MRA is a quantitative method that allows us to synthesize the results of many studies and draw conclusions from a large number of studies using rigorous statistical tools (Glass, 1976; Glass, Smith, & McGaw, 1981; Stanley & Jarrell, 1989; Stanley, 2001, 2005; Harbord & Higgins, 2008; Higgins & Thompson, 2004). The challenge is to see how the methods used and the characteristics of these studies influenced their estimation of MTE. We focus particularly on the following questions: Can the differences in MTE results be explained by differences in methods? Is the MTE score determined by study characteristics, such as sample size, study area, number of variables, date of publication, or quality of the journal in which it is published? Is the MTE score influenced by the returns to scale specification used (CRS *vs.* VRS)? Do the results change depending on whether the estimated model examines either social or financial efficiency? Does the MTE score change when moving from an intra-country to an inter-country level? These major issues have not been addressed in the microfinance literature.

MRA is implemented by using a doubly-censored Tobit model with a cluster option that provides robust estimates when the dependent variable is bounded between 0 and 1 (Thiam, Bravo-Ureta, & Rivas, 2001; Bravo-Ureta, et al., 2007; Odeck & Bråthen, 2012). To gauge the robustness of the results to heteroscedasticity and publication bias, we also estimated a Weighted Least Squares (WLS) model with the cluster option and a Random Effect Maximum Likelihood (REML), which is commonly used in this type of analysis (Stanley, 2008; Doucouliagos & Stanley, 2009; Doucouliagos & Laroche, 2013; Aiello & Bonanno, 2016, 2018). Given the risk of correlations between the estimated technical efficiency (TE) scores and the study characteristics, we also used a Simar and Wilson model (2007) with the bootstrap option.

The results seem robust to the econometric model and show that MTE scores have increased over time in the microfinance industry. However, with an MTE rate of approximately 61.1%, there is room for improving efficiency by 38.9%. The discrepancies between studies in their estimations of technical efficiency depended on the number of variables used. Studies with a larger number of variables (inputs and outputs) produced higher MTE scores than did those with a smaller number of variables. Studies using the variable returns to scale (VRS) assumption produced higher MTE scores than did those using constant returns to scale (CRS). In addition, those studies with a production approach had higher MTEs than did those using the intermediation approach, while studies of a large number of MFIs had lower scores than did those involving a small sample size. Moreover, research estimating social efficiency generated lower MTEs compared to research estimating financial efficiency. Studies using data from African MFIs obtained lower MTEs than did those on MFIs in Latin America and MENA. Thus, this article makes four contributions to the literature:

First, it provides the first systematic review of the literature on the analysis of efficiency in microfinance. To date, despite the abundance of work on the issue, no synthesis of this subject exists. This study fills out this gap by proposing a quantitative synthesis of the literature on efficiency at a global scale. It provides useful information on the structuring of research on efficiency analysis and informs on the overall state of efficiency of the microfinance industry. Second, to our knowledge this study is the first to provide strong empirical evidence of the factors explaining variability in results on estimating the efficiency of microfinance using a meta-analysis. Third, contrary to the usual studies, whose recommendations stem from the exploitation of context-specific data and data on the form of microfinance organizations, our study leads to more generalizable conclusions, since we have used several studies with very different contexts. Our study provides more consistent and relevant information for regulators, investors, and managers of MFIs. Fourth, this meta-analysis is based on extensive data