



# Prediction-oriented PLS path modeling in microfinance research<sup>☆</sup>



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## ABSTRACT

By using a prediction-oriented PLS path model, this study predicts the financial performance (FP) of Microfinance Institutions (MFIs) by means of their social impact (SI) and portfolio quality (PQ). The empirical study uses a dataset, obtained from the Mix Market database, for the year 2012 with 563 MFIs worldwide. Firstly, the findings show that the higher the SI, the higher the FP in the microfinance sector. Secondly, the results suggest that the PQ increases substantially the ability of the model to predict the FP of MFIs, providing a full mediation in the relationship between SI and FP. Thirdly, in consequence, both SI and PQ are powerful and accurate predictors of the FP of MFIs since the average  $R^2$  is 58%, with a standard deviation of 0.18 (by using a 10-fold cross-validation procedure) and an SRMR of 0.05. The main contribution of the current study is to show that MFIs can continue serving the poorest people (achieving their SI) while obtaining high financial results via increasing the quality of their portfolio, since in the microfinance sector great poverty implies lower default risks.

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## 1. Introduction

Microfinance Institutions (MFIs) provide microcredits to those sectors of the population who have no access to commercial banks. The basis of their origin is their social commitment (known as outreach) since they financially support and help the poorest people to create their own income-generating businesses.

Despite their great social commitment, the survival of most MFIs is currently at risk due to the substantial reduction of donations and the growth of competence in this sector (Tchakoute-Tchuigoua, 2014). In this context, the main objective of MFIs is to become financially self-sufficient because dependence on external financial sources jeopardizes their continuity. Consequently, a recent trend in the microfinance industry fosters management tools that prioritize both the efficiency and the reduction of costs, including the microcredit default loss rate (Griffin & Husted, 2015).

Nevertheless, some authors argue that this focus on financial sustainability seems to be moving MFIs away from their social mission (often referred to as mission drift) since providing credit to the poorest

people is a costly activity and, therefore, social impact (SI) and financial performance (FP) may, at least theoretically, be in conflict (Hermes, Lensink, & Meesters, 2011). To date, neither academics nor practitioners share common thinking about the possibility of attaining the double bottom line: to serve the “poorest-of-the-poor” and increase FP and efficiency within the microfinance industry. Notwithstanding, SI is inherent to the nature of MFIs and should be a potential predictor of their FP, as opposed to that of traditional banking. Accordingly, a hefty debate exists in the literature on the sign of the relationship between the social and financial results of MFIs. Empirical evidence shows negative relationships (Copestake, 2007; Cull, Demirgüç-Kunt, & Morduch, 2007; Hermes et al., 2011; Morduch, 2000; Von Pischke, 1996) and positive relationships (Gutiérrez-Nieto, Serrano-Cinca, & Molinero, 2007; Louis, Seret, & Baesens, 2013; Mersland & Strøm, 2010; Quayes, 2012) between them.

In addition to SI, the literature also employs other variables as predictors of MFI sustainability. In this sense, portfolio quality (hereinafter, PQ) is particularly relevant in previous studies since, for any lending organization, high levels of credit risk not only may cause a decrease of earnings but may also generate an increase in default losses, thereby resulting in potential bankruptcy situations for the lenders. The inclusion of the PQ as a predictor variable leads to testing whether in the microfinance industry is still occurring the widely-known “Grameen Bank Model” under which the poorest people repay their loans better than people from a superior socioeconomic level.

Therefore, the main objective of this study is to predict the FP of MFIs by means of both their SI and PQ. The empirical study applies the partial least squares path modeling (hereinafter, PLS) method to a large and

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worldwide sample with data of 563 MFIs referring to the year 2012 from the Mix Market database.

The paper updates the literature in three ways. Firstly, from a theoretical view, the main contribution of the paper is to show that – both directly and indirectly via PQ – the higher the SI, the higher the FP of the MFIs. The social commitment of MFIs implies granting microcredits based on trust conditions which decreases the default rate of MFIs and, as a consequence, increases their FP. Secondly, from a methodological point of view, the contribution of the paper lies, on the one hand, in the fact that this study is the first time that researchers apply a prediction-oriented PLS model in microfinance. And, on the other hand, this paper employs the R package to fit the PLS model and validates the results by using a 10-fold cross-validation procedure. To the best of the authors' knowledge, this paper constitutes the first study to apply a validation procedure (*k*-fold) by using R software in order to confirm the accuracy ability of a PLS model, which enhances the robustness of the results.

This paper proceeds as follows. Section 2 provides an overview of the literature on SI, PQ, and FP in microfinance, and establishes the research hypotheses of this study. Section 3 explores the data and describes the methodology. Section 4 summarizes the results. Lastly, Section 5 concludes with the findings and with a discussion of the implications of the study.

## 2. Literature review: theory and research hypotheses

### 2.1. The relationship between social impact and financial performance

The literature has yet to agree on a consensual way to measure the SI of MFIs, despite the fact that the social commitment of these lenders is the reason for the existence of microfinance. Previous research often uses variables, such as the microcredit size and gender to measure SI, since they seem to provide the best measures of the level of socio-economic exclusion of the poorest people (Schreiner, 2002). Firstly, since MFIs lend microcredits to the poorest people so that they may start a very small business through which to generate their own incomes, a small loan size is associated with vulnerable businesses. For this reason, the literature (Assefa, Hermes, & Meesters, 2013; Hermes et al., 2011; Roberts, 2013) considers that the smaller the size of the loan, the greater the level of socio-economic exclusion of the borrower. Secondly, in underdeveloped areas women usually have fewer rights and are in a more vulnerable situation than men. In this sense, women cannot work, own property, open a bank account, or travel without their husband's permission.

Consequently, a use of microfinance can eradicate the social and labor grievance that women have traditionally experienced by targeting the microcredit programs worldwide as a socio-political mechanism of social cohesion and empowerment of women. Thus, the microfinance literature often uses the percentage of women borrowers as a measurement of the SI of MFIs (Guérin, Kumar, & Agier, 2013). The first hypothesis states:

**H<sub>1</sub>.** *The higher the social impact of the MFIs, the greater their financial performance, ceteris paribus.*

### 2.2. The portfolio quality

For lending institutions, the probability of default (portfolio at risk) constitutes a key management measurement because non-payments lead to default losses which may affect their financial feasibility and future survival. Accordingly, the paper employs the construct PQ, which is the inverse of the portfolio at risk, as the measurement of the quality of the portfolio of MFIs.

The general agreement of the banking literature supports a negative relationship between the lenders' PQ and the level of poverty and social

exclusion of their borrowers since the poorest people have a greater probability of not paying their loans back. The main cause is their greater dependence on status changes, destabilizing factors, and uncertainty associated with the future (Quayes, 2012). Nevertheless, despite the economic basis of this logic, the microfinance industry remains underpinned by an impossible idea known worldwide as the "Grameen Bank Model" of the Nobel Peace Prize-winner, Mohammed Yunus: when the poorest people obtain a microcredit without any collateral, they often repay the loan because of the trust conditions of the grant (Agier & Szafarz, 2013; d'Espallier, Guérin, & Mersland, 2011; Griffin & Husted, 2015). Under the belief that a positive link exists between SI and PQ, Yunus created the Grameen Bank in India in 1983, which substantially contributes toward reducing the poverty of the poorest people from rural areas in that country (Sharma & Zeller, 1997). Theoretically, the high quality of the MFIs portfolios depends on the small size of the microcredit, which produces a higher diversification of the credit risk among many customers, and on the high social costs linked to not borrowing the microcredit.

A greater PQ associated with higher social performance is also due to the female participation as MFI borrowers. In this sense, the literature suggests that women invest in types of businesses that allow easier repayment, since they are more conservative and cautious in their investment strategies. Furthermore, women have fewer credit opportunities than men and must repay their loans to ensure continued access to credit (Armendáriz & Morduch, 2010). Consequently, the second hypothesis (a) states:

**H<sub>2a</sub>.** *The higher the social impact of the MFIs, the greater their portfolio quality, ceteris paribus.*

In addition, the FP of any financial lending institution highly depends on the quality of its portfolio (Angbazo, 1997). Default losses not only reduce the profit of lenders but also substantially decrease their volume of equity, thereby leading to a demand for more capital requirements (Shrieves & Dahl, 1992). Accordingly, Mersland and Strøm (2009), and Quayes (2012) suggest a positive relationship between the PQ and the FP of MFIs. Therefore, the second hypothesis (b) states:

**H<sub>2b</sub>.** *The higher the portfolio quality of the MFIs, the greater their financial performance, ceteris paribus.*

Close to the debate on whether negative or positive relationships exist between SI and FP, many authors link the sign of this relationship to the profit or non-profit orientation of the MFI (Servin, Lensink, & van den Berg, 2012). Firstly, those researchers that align themselves with the profit orientation of MFIs uphold that a greater social performance implies lower financial results. From a theoretical view, they argue that reaching the "poorest-of-the-poor" (i.e., to have a higher SI) through microcredit programs is highly costly due to the relatively high unit cost of the small loans and their greater need for business training, technical advice, mentoring, and also personnel support, among others (Brau & Woller, 2004; Conning, 1999; Von Pischke, 1996). For this reason the authors who advocate the profit-orientation of MFIs recommend a strategy for these entities which consists of reaching a greater FP by means of the promotion of economies of scale, efficiency and technological innovations, whereby social objectives – to serve the people at the base of the socio-economic pyramid – remain in a secondary position.

Secondly, in contrast, other studies that support the social mission of MFIs show the existence of a positive relationship between social impacts and financial results (Louis et al., 2013; Quayes, 2012). In this sense, Roberts (2013) supports that MFIs with a stronger non-profit orientation have lower costs and higher productivity than profit-orientated lenders. From a theoretical perspective, the researchers sustain that, in non-profit MFIs, the collaborative

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