A Study of the Efficiency of Micro Finance Institutions Using Data Envelopment Analysis

THANGJAM RAVICHANDRA SINGH

DEPARTMENT OF PROFESSIONAL STUDIES, CHRIST UNIVERSITY, BANGALORE

ABSTRACT *The role of microfinance institutions is to provide credit to the poor who have no access to commercial banks. A major challenge for microfinance institutions is that of financial sustainability, with several of them appearing to be often loss making. Recently, however, there has been a renewed focus on the financial sustainability and efficiency of microfinance institutions, which is essential for the well-being of the financial system in developing countries. This study examines the efficiency of microfinance institutions in India using a modified form of Data Envelopment Analysis. The data for the study was collected on a sample of thirty microfinance institutions in India from the Microfinance Information eXchange (MIX). The results of the analysis indicate the inefficiencies in the microfinance sector*

I. INTRODUCTION

Microfinance institutions play a vital role in developing economies, providing financial services to low-income segments, empowering them and integrating them into the mainstream economy. The services offered by microfinance institutions have experienced tremendous growth during recent years. Currently, several hundreds of microfinance institutions are operating in different parts of the country, but it is generally believed that only few are performing well. Efficient functioning of these microfinance institutions is crucial for their long-term sustainability. Thus, efficiency of microfinance institutions is an area of current academic interest. The major objective of microfinance institutions was to help poor people who were financially constrained and vulnerable, with financial services to enable them to engage in productive activities or start small businesses - that is, outreach to the poor. On the other hand, financial performance is also important for the sustainability of microfinance institutions. These are often seen as conflicting goals for microfinance institutions. This study examines the efficiency of microfinance institutions in India using a modified form of Data Envelopment Analysis.

II. LITERATURE

There are two major streams in the efficiency analysis literature, that of Stochastic Frontier Analysis (SFA), a parametric technique, and that of Data Envelopment Analysis (DEA), a non-parametric technique (Berger and Humphey, 1997).

Gutierrez-Nieto et al (2008) suggested the use of DEA to analyse efficiency of microfinance institutions in Latin America, with operating costs, number of employees, and total assets and overall loan portfolio, total revenue, number of women beneficiaries, and number of poor beneficiaries as outputs.

Masood and Ahmad (2010) applied the SFA approach to measure efficiency of Indian microfinance institutions. They found a lot of variation in efficiency level, with very few of them working efficiently. They found the age/experience of the microfinance institution to be an important determinant of efficiency level, while size did not matter much.

Another issue is that of analyzing financial efficiency (e.g. Hartarska et al., 2006; Isern and Porteous, 2006) or analyzing outreach (Hashemi and Rosenberg, 2006; Ahlin and Jiang, 2008). Hartarska et al (2006) found that labour, physical capital, and financial capital all significantly affect the financial efficiency of microfinance institutions. In particular, as microfinance institutions are financial institutions, there are two distinct approaches in defining inputs and outputs: the intermediation approach and the production approach (Haq et al, 2010).

Haq et al (2010) investigated the cost efficiency of MFIs (bank-MFIs, NBFI-MFIs, cooperative-MFIs and NGO-MFIs) in Africa, Asia, and the Latin America using the intermediation and production approaches of DEA. They found that cost efficiency may have decreased due to the amount of non-performing loans specifically for bank-MFIs under the intermediation approach.

Some studies have tried to balance these two approaches. Hermes et al (2008) used SFA to examine the trade-off between outreach to the poor and efficiency of microfinance institutions. Using a sample of more than 1,300 observations, our study suggests that outreach and efficiency of MFIs are negatively correlated.

Raghunathan et al (2013) stressed the dual function of microfinance institutions, and considered a Bayesian distance function approach to evaluate efficiency of microfinance institutions by balancing their dual outputs of financial growth and borrower levels.

The literature of efficiency analysis in the microfinance sector is dominated by the SFA and DEA approaches. This study also addresses the problem of efficiency measurement for microfinance institutions using a modified form of DEA, extending the scope of DEA.

III. METHODOLOGY

This study uses a modified form of Data Envelopment Analysis (DEA) to analyse efficiency of microfinance institutions. DEA was first developed by Farrell (1957), and extended by Charnes et al. (1978). DEA is a non-parametric method that identifies what proportion of a

DMU's inputs are actually required to produce its given levels of outputs, as compared to other DMUs. Mathematically, it is represented by the model expressed below.

$$\min E \quad s.t. \quad \sum w_j \quad = \quad 1$$
$$\sum w_j I_j \quad \leq \quad E.I_{i*}$$
$$\sum w_j O_j \quad \geq \quad O_{i*}$$

The results of DEA are generally sensitive to the choice of inputs and outputs (Gutierrez-Nieto et al., 2007).

A modification for DEA is proposed, viewing the system as control system. Thus, using the same framework as DEA, but by replacing inputs by control factors, and outputs by performance characteristics, represents a notion of "control-efficiency". Mathematically, the model is represented as follows:

$$\min E \quad s.t. \quad \sum w_j \quad = \quad 1$$
$$\sum w_j C_j \quad \leq \quad E.C_{i*}$$
$$\sum w_j P_j \quad \geq \quad P_{i*}$$

The control factors considered in this study were Equity and Debt (Total Assets), and Portfolio @ Risk (Loans due for more than 30 days). The first two are input factors, Equity and Debt, comprise Total Assets, which represents the total funds available for the microfinance institution to operate with. The latter factor, Portfolio @ Risk, is a control factor, comprising of Loans due for more than thirty days, and representing the risk exposure of the microfinance institution. On the other hand, the performance characteristics considered were Gross Loan Portfolio, Outreach, Total revenue from Loan Portfolio, and Operating Profits. The first, Gross Loan Portfolio, represents the total quantum of Loans disbursed by the microfinance institution to beneficiaries, while Outreach represents the total number of active beneficiaries of the microfinance institution; of course, Revenue and Operating Profit are the usual measures of financial performance.

The analysis was carried out for a sample of thirty microfinance institutions operating in India in the study period 2013-14.The sample units were selected from the Microfinance Information eXchange (MIX), based on availability of the relevant data.

IV. FINDINGS

The efficiency indices of the sample microfinance institutions with respect to financial and outreach performance, with and without Portfolio @ Risk as a control parameter, are shown in the table below.

Table: Comparison Of Efficiency Scores

MFI	control-efficiency			DEA efficiency		
	financial	outreach	Overall	financial	outreach	Overall
AMPL	100.00%	100.00%	76.58%	0.00%	30.40%	42.66%
Arohan	100.00%	100.00%	100.00%	84.03%	100.00%	100.00%
Asirvad	96.82%	100.00%	100.00%	85.34%	100.00%	66.94%
Bandhan	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
BISWA	1.34%	100.00%	100.00%	73.24%	82.80%	82.89%
BJS	100.00%	100.00%	0.00%	0.00%	100.00%	100.00%
BSS	98.41%	100.00%	57.22%	71.51%	68.37%	100.00%
BWDA Finance	57.84%	100.00%	100.00%	57.70%	74.34%	48.51%
Chaitanya	0.00%	85.21%	100.00%	0.00%	63.55%	100.00%
Equitas	100.00%	100.00%	100.00%	88.21%	98.73%	99.06%
ESAF	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
GUARDIAN	22.19%	91.71%	100.00%	0.00%	0.00%	0.00%
Janalakshmi Financial Services Pvt. Ltd.	76.63%	84.48%	86.93%	66.75%	82.91%	87.11%
KCIPL	0.00%	64.92%	0.00%	34.83%	0.00%	65.10%
MMFL	56.93%	86.91%	94.01%	53.26%	69.54%	54.22%
Muthoot	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
RGVN	65.38%	82.87%	76.53%	71.36%	82.85%	65.28%
Sahara Utsarga	35.91%	100.00%	42.90%	70.43%	76.98%	35.67%
Saija	51.03%	100.00%	0.00%	2.59%	50.40%	0.00%
Samasta	53.33%	82.21%	62.84%	51.62%	82.14%	0.00%
Sarala	98.88%	85.35%	100.00%	97.08%	100.00%	0.00%
SCNL	62.65%	100.00%	100.00%	61.27%	98.61%	100.00%
SKS	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
SMILE	100.00%	100.00%	100.00%	100.00%	100.00%	100.00%
Sonata	81.27%	82.51%	78.97%	77.61%	82.48%	63.79%
SVCL	90.90%	98.07%	88.03%	91.22%	98.00%	42.74%
Swadhaar	80.66%	86.13%	54.61%	80.63%	83.77%	52.53%
Trident Microfinance	100.00%	100.00%	67.71%	67.59%	73.86%	54.37%
Utkarsh	50.77%	75.99%	100.00%	50.94%	74.21%	43.11%
VFS	73.29%	78.23%	78.68%	69.43%	78.03%	61.08%
Average	71.49%	92.82%	76.58%	63.56%	78.47%	63.50%

The efficiency scores with Portfolio @ Risk as a control parameter are generally better than the true DEA efficiency scores. The DEA scores suggest that Bandhan, ESAF, Muthoot Finance, SKS, and SMILE are the efficient microfinance institutions with respect to both financial performance and outreach, while the control-efficiency scores suggest that AMPL, Arohan, BJS, and Equitas are also efficient. In terms of financial efficiency, 33.33% of the sample microfinance institutions were control-efficient, while only 16.67% were DEA-efficient. In terms of outreach, 56.67% were control-efficient, while only 30% were DEA-efficient. Also, only 3.33% of the sample microfinance institutions are 100% control-inefficient, while 16.67% of them are 100% DEA-inefficient. Overall, 50% of the sample microfinance institutions were 100% control-efficient, while only 10% of them were 100% control-inefficient, whereas only 33.33% of the sample microfinance institutions were 100% DEA-efficient, while only 13.33% of them were 100% DEA-inefficient.

V. DISCUSSION

The study proposes a modified form of the DEA model, with inputs replaced by control factors and outputs replaced by performance characteristics. Thus, risk exposure, which is actually an outcome, could be taken as a control factor.

The results of the study suggest that the perception that microfinance institutions are relatively inefficient is perhaps wrongly founded. The DEA efficiency scores do indicate a high level of inefficiency, with an average efficiency score of 63.5%, however, the control-efficiency scores indicate a much higher level of efficiency, particularly with respect to outreach performance. This suggests that controlling for risk exposure gives a clearer picture of efficiency for microfinance institutions.

The results of the study also suggest that microfinance institutions have to incur increased risk exposure to achieve better financial performance and outreach. This is clear given the uncertain nature of microfinance operations.

The sample used for the analysis was relatively small, taken

from among the top players in the industry, so the results would not be expected to be generalized to the entire industry. There is a vast scope for further research in the area of efficiency of microfinance institutions and its drivers.

REFERENCE
1. Ahlin, C., Jiang, N., 2008. Can micro-credit bring development? Journal of Development Economics 86, 1-21 || 2. Berger, A.N., and D.B. Humphrey (1997), 'Efficiency of Financial Institutions: International Survey and Directions for Future Research', European Journal of Operational Research, 98, pp. 175-212. || 3. Charnes, A., W.W. Cooper and E. Rhodes (1978), 'Measuring Efficiency of Decision Making Units', European Journal of Operational Research, pp. 429-44. || 4. Farrell, M.J. (1957), 'The Measurement of Productive Efficiency', Journal of the Royal Statistical Society, Series A, CXX, Part 3, pp.253-290. || 5. Gutierrez-Nieto, B., Serrano-Cinc, C., Molinero, C.M., 2007. Microfinance institutions and efficiency. Omega 35, 131-142. || 6. Gutierrez-Nieto, B., Serrano-Cinc, C., Molinero, C.M., 2008. A DEA approach to Microfinance Institutions efficiency. CERMi Microfinance Seminars. Brussels || 7. Hartarska, V., Caudill, S.B., Gropper, D.M., 2006. The cost structure of microfinance | institutions in eastern Europe and central Asia. Technical Report. William Davidson Institute at the University of Michigan Stephen M. Ross Business School. || 8. Hashemi, S. and R. Rosenberg (2006), Graduating the poor into mircofinance: Linkinf safety nets and financial services, Focus note No. 34, Washington DC: CGAP. || 9. Haq, M., Skully, M. and Pathan, S. 2010. Efficiency of Microfinance Institutions: A Data Envelopment Analysis. Asia-Pacific Financial Markets 17, 63–97. || 10. Hermes, N., Lensink, R. and Meesters, A. (2008). Outreach and Efficiency of Microfinance Institutions, Available at SSRN: http://ssrn.com/abstract=1143925 or http://dx.doi.org/10.2139/ssrn.1143925 || 11. Isern, J. and D. Porteous (2006), Commercial banks and microfinance: Evolving modes of success, Focus note No. 28, Washington DC: CGAP. || 12. Masood, T., and Ahmad, M.I. (2010). Technical Efficiency of Microfinance Institutions in India- A Stochastic Frontier Approach, MPRA Paper 25454. || 13. Raghunathan, U., Escalante, C., Dorfman, J.D., Houston, J.E., and Ames, G.C.W., 2013. Measuring Microfinance Efficiency under Dual Goals Financial Performance and Social Outreach, Working Paper. |