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REVIEW OF LITERATURE

NEED/IMPORTANCE OF THE STUDY

STATEMENT OF THE PROBLEM

OBJECTIVES

HYPOTHESES

RESEARCH METHODOLOGY

RESULTS & DISCUSSION

FINDINGS

RECOMMENDATIONS/SUGGESTIONS

CONCLUSIONS

SCOPE FOR FURTHER RESEARCH

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APPENDIX/ANNEXURE

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- Sharma T., Kwatra, G. (2008) Effectiveness of Social Advertising: A Study of Selected Campaigns, Corporate Social Responsibility, Edited by David Crowther & Nicholas Capaldi, Ashgate Research Companion to Corporate Social Responsibility, Chapter 15, pp 287-303.

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- Schemenner, R.W., Huber, J.C. and Cook, R.L. (1987), "Geographic Differences and the Location of New Manufacturing Facilities," Journal of Urban Economics, Vol. 21, No. 1, pp. 83-104.

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ESTIMATION OF TECHNICAL EFFICIENCIES OF INDIAN MICROFINANCE INSTITUTIONS USING STOCHASTIC FRONTIER ANALYSIS

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ABSTRACT

The commercial banking sector does not consider the poor easily bankable due to the high risk factor in the absence of collateral. Microfinance has come in as a potential alternative to address this problem. The key to growth and sustainability of the sector is sufficient and consistent inflow of funds and efficient operation of the microfinance institutions. Research evidence shows that high levels of demand for micro credit reflects a huge gap between supply and demand for credit, which is estimated at around US$ 250 billion. In such a scenario, the efficiency of microfinance institutions in being able to use every bit of input by converting it into loans and reducing their costs of operation and inefficiencies become extremely important. Efficiency studies based on financial ratio comparisons do not have the ability to deal with random noise that arise due to errors in measurement and also inefficiencies that arise due to external influences on the microfinance institutions. Moreover, there are very few studies on efficiencies of Indian microfinance institutions. This study focuses on the estimation of technical efficiencies of microfinance institutions in India using a parametric technique called Stochastic Frontier Analysis. The study is based on the financial data of 36 Indian Microfinance institutions for the period 2005 to 2008, a period where the sector reached its peak in terms of growth in gross loan portfolio. The study determines the firm-wise technical efficiencies for the period of study. In addition, it also estimates the amount of potential conservation in input resources that would be feasible if the microfinance institutions can eliminate their technical inefficiencies and thereby operate on the efficient frontier.

JEL CODES
O1, C1, Y4

KEYWORDS
Microfinance, Technical efficiency, Productivity.

1. INTRODUCTION

Commerce in the 21st century is very different from what was practiced earlier. The rapid growth of technology has aided globalization tremendously. Earlier, in the absence of technology commerce had a wholly different and a much smaller dimension than the one that we are faced with today. In such a situation the distribution of wealth was more equitable. When nations grew post industrial revolution, not all of them grew equally. Although globalisation and information technology has dissolved borders and barriers, it did not include all in the growth wagon. With situations as they prevail, the poor have been extremely isolated and cut off from the mainstream financial services that drive the global economy today **(Sachs, 2005)**.

The commercial banking sector does not consider the poor bankable owning mainly to their inability to meet the eligibility criteria, including collateral. Thus, the poor people[1] in most countries virtually have had no access to formal financial services **(Littlefield *et.al*, 2003)**. In such a scenario the poor turn to informal financial alternatives such as family loans, moneylenders, and traders. These are usually limited in amount and are often extended under very rigid conditions and at very high interest rates. Microfinance has come in as a solution to this problem by facilitating the provision of sustainable economic opportunities at gross root levels by extending the required financial capital at competitive rates. **Robinson (1998)** defines Microfinance as follows:

'Microfinance refers to small-scale financial services, for both credits and deposits — that are provided to people who farm or fish or herd; operate small or microenterprises where goods are produced, recycled, repaired, or traded; provide services; work for wages or commissions; gain income from renting out small amounts of land, vehicles, draft animals, or machinery and tools; and to other individuals and local groups in developing countries, in both rural and urban areas'.

2. REVIEW OF LITERATURE

2.1 CREDIT: DEMAND VERSUS SUPPLY

Ananth (2004), observe that against an estimated annual credit demand of $3 to $9 billion in India, the normal financial services are able to provide only $200 to $300 million. Less than 20% of the rural populations have a bank account and only about 30,000 bank branches cater to the needs of 6,00,000 villages in the country. All this go to show the gap that exists between the demand and supply of credit in the nation. A **Deutsche Bank Research Report (2007)**[2] brings out that in spite of microfinance investments increasingly attracting institutional and individual investors due to their double bottom line (i.e., while they allow investors to adopt a social investment strategy geared toward poverty alleviation, they also offer an attractive risk-return profile) it is unable to serve more than a fraction of today's global sector demand of 1 billion micro-borrowers. This situation translates into an immense funding gap estimated at around $250 billion.

2.2 THE RURAL INDIAN CREDIT SCENARIO

Rural microcredit in India is not a recent phenomenon. The Regional Rural Banks (RRB) were setup in the mid 70s to replace the cooperative banks which were dominated by rural wealthy people. These banks were given a clear mandate to lend to the poor. In the initial decades the focus of the RRBs was on outreach even at the expense of prudent lending practices. This consequently lead to high default rates and accumulated losses exceeding Rs.3000 crores in 1999 **(Bhatt and Thorat, 2001).** Subsequent reforms relaxed the ceiling on interest rates that were imposed on these RRBs and the financial situation has improved since then with over 80% of the RRBs now being profitable. What started as just micro-credit disbursement has now grown to include micro-savings, micro-insurance, etc., with the emergence of Microfinance institutions, both private and NGO. These have emerged over the past few decades as important tools for economic development and the empowerment of the poor.

Over its entire lifetime, the formal rural banking system in India has struggled to balance the dual objectives of outreach and financial performance. A post-reform shift in focus has improved financial performance but only at the expense of the outreach. With their focus shifted to financial performance, the banks are naturally shifting their portfolio to the low cost segment. So the challenge to improve on both the fronts of financial sustainability and outreach rests on the ability of Microfinance institutions to reduce costs and improve the efficiency of their operations. This shifts the focus to productive efficiency. If microfinance institutions are to survive and be sustainable, productive efficiency is imperative.

[1] As per World Bank's standards, poor households are defined as those who fall under the international poverty line of income less than 1 USD per capita per day, measured at purchasing power parity. **Maxell (1999)** observes that poor households generally fall under the category of income/consumption poverty, social exclusion, lack of capability and functioning, vulnerability, livelihood unsustainability, and relative deprivation.

[2] Microfinance: An emerging investment opportunity- Deutsche Bank Research, December 2007.

2.3 PRODUCTIVITY AND TECHNICAL EFFICIENCY

Productivity of a firm is the ratio of output(s) that it produces to the input(s) that it uses,

Productivity = outputs/inputs

This is the case where the process of production involves single input and a single output. However, in most cases firms employ multiple inputs to produce one or more outputs. In such a scenario, measure of productivity should take into account all of these outputs and inputs. This measure of productivity is referred to as Total Factor Productivity (TFP).

The question of measuring the productive efficiency of an institution or an industry is of concern from both an economic and business stand point. If economic planning concerns itself with a particular industry, then it is important to know how far a given industry can be expected to increase its output by increasing its efficiency without absorbing further resources. That is, 'productive efficiency' indicates the extent to which all the input factors are utilized and processed such that they produce the maximum output possible for the given set of inputs.

However, conventional methods of measuring productivity by estimating average output produced relative to the inputs have a serious drawback. While comparing the productivity among firms, it is important to note that not all firms succeed in maximizing the outputs for a given set of inputs and minimizing the inputs without compromising the output. That is, not all firms are technically efficient. **Kumbhakar and Lovell (2000)** explain that technical efficiency although synonymous with Productive efficiency, considers frontiers rather than functions, in the treatment of efficiency. That is, while a function merely computes the ratio of net output to inputs, a frontier explains how much of contraction of inputs is possible for a given output and also how much expansion of output is possible for a given set of inputs. That is, a technically efficient frontier firm is the one which succeeds in converting a minimum set of inputs to maximum output(s). A firm that does this is considered to operate on the efficient frontier while the others operate below the frontier and their technical efficiencies are correspondingly lesser.

2.4 EFFICIENCY STUDIES OF MICROFINANCE

There are very few studies that have been carried out to estimate the operating efficiencies Microfinance institutions. A study by **Farrington (2000)** uses accounting variables like administrative expense ratio, number of loans per loan officer and loan officers to total staff, portfolio size, loan size, lending methodology, source of funds and salary structures as the efficiency drivers and hence as measures of efficiency. Another study by **Lafourcade.*et.al* (2005)** measures the efficiency using cost per borrower and cost per saver as indicators of efficiency. They found that African MFIs incur highest cost per borrower but have the lowest cost per saver. However, both of these studies use only statistical comparisons which have their limitations in productivity measurement.

Guitierrez.*et.al* (2006) have applied DEA to measure the efficiency of 30 Latin American MFIs and subsequently have a multivariate analysis of the DEA results. They identified W-Popayan and Findesa as the most efficient institutions among the group of firms considered.

Varman and Samyukta (2007) use the two stage SFA method suggested by Battesse and Coelli (1992) to estimate the efficiencies of Microfinance institutions in India. They observe that Satin Credit Care and IASC are the most efficient institutions. However, in the two stage model there is an inconsistency with regard to the assumptions about the distributions of v_i and u_i used in the stochastic model, i.e., in the first stage while determining the technical inefficiencies, it is assumed that u_i is an independent normal distribution. However, in the second stage, a regression analysis is done to find out the determinants that contribute to the inefficiencies, which is fundamentally a correlation test that defies the assumption of independence made in the first stage.

A study by **Hassan and Tufte (2001)** using Stochastic frontier analysis found that Grameen Bank's branches staffed by the female employees operated more efficiently than their counterparts with male employees.

Michael. *et.al* (2009) use DEA to compare the efficiencies on an international basis with focus on whether the regulation or status of the MFI (NGO, NBFI, Bank etc) affect the efficient operation of Microfinance institutions. They find that strong outreach and preservation of low operating expenses help Asian MFIs to be efficient. They also find that South Asian MFIs may be more efficient than their East Asian counterparts due to the differences in their lending methodologies.

Against this background of literature on efficiency analysis of Microfinance institutions, it was found that there were no studies conducted to evaluate the efficiency of Indian MFIs during the period 2005-2008 using the single stage SFA model suggested **Battese and Coelli (1995)**, which has shown to be a highly reliable model. This model overcomes the drawback of the two stage model used in the study by **Varman and Samyukta (2007)**.

2.5 PURPOSE OF THE STUDY

Efficiency estimation is relevant for any industry to understand the extent to which they are able to satisfy the fundamental purpose of their existence in business, which is to enhance the economic value the business adds to the society, and in the process growing in a sustainable fashion. When it comes to the Microfinance industry, which is highly constrained for its resources and inputs, the necessity of maximizing the outputs while minimizing the input resources, becomes very critical to their financial sustainability. On this foundation of technical efficiency, directly rests the other pillars of concern like impact, interest rates, operational and administrative costs, bad debts, etc. The estimation of this measure of technical efficiency is an indirect indicator of the other performance parameters which translate into efficient output (Gross loan portfolio) with minimum inputs (capital and labor). Such a study, using a single stage Stochastic Frontier Analysis, has not been undertaken for the Indian Microfinance Industry. Hence, this study attempts to do that.

3. RESEARCH OBJECTIVES

An estimation of technical efficiencies of Microfinance institutions in India over the period 2005-2008 using Stochastic Frontier Analysis.

4. SCOPE OF THE STUDY

The study estimates only the technical efficiencies of Microfinance institutions operating in India. That is, it is a computation of the extent to which the inputs and resources are effectively used and translated into outputs. The study considers for comparison only those Microfinance institutions in India who have reported their financial data to the Microfinance Information Exchange consistently for all the four years (2005-08).

5. DATA SOURCE FOR THE STUDY

The data used in this study is secondary in nature and has been obtained from the official website of the Microfinance Information Exchange (MIX), www.mixmarket.org. The Microfinance Information Exchange, Inc. (MIX) is a leading business information provider dedicated to strengthening the microfinance sector. It is a non-profit organization incorporated in June 2002. The organization's core focus is to provide objective data and analysis on microfinance providers. In doing so MIX promotes financial transparency in the industry and helps build the information infrastructure in developing countries. MIX Market seeks to develop a transparent information market to link MFIs worldwide with Investors and Donors and promote greater investment and information flows. MIX Market currently provides data on over 1400 MFIs, over 100 investors and almost 200 partners[3].

6. INPUTS AND OUTPUT CHOSEN FOR THE STUDY

In this study, there was a need for careful choice of inputs and outputs that are selected from the data provided by MIX Market. The effectiveness of the stochastic frontier analysis depends on that of the appropriateness of the data that is supplied to it. The challenge here is to consider a financial institution in the light of a production unit, producing tangible outputs from tangible inputs. **Escuer.*et al* (2004)** in their study of evaluating the productive efficiencies of European Union Banks using the stochastic frontier technique, present perspectives about the choice of inputs and outputs when it comes to a financial institution. Since banks operate as intermediaries with operations involving assets and liabilities, Escuer.*et al* (2004) take loans as the representative variable for outputs, while number of employees, number of branches, deposits and physical capital are taken as inputs.

[3] Source : http://www.themix.org/about-mix/about-mix -accessed 10.03.2010.

Although Microfinance institutions function as a financial intermediary in some ways, they differ from the commercial banks and financial institutions in many other ways. The primary sources of financial inputs here are donor funds, borrowings, equity and deposits **(Varman and Samyukta, 2007)**. These are aggregated into a single variable called 'Total Fund Input', which represents Capital and under the category of Labor, 'Number of employees' is used as a measure in productivity analysis. The primary output that Microfinance institutions produce is the loans that they give out, measured by the 'Gross Loan Portfolio'.

The variables which are not directly related to the inputs or outputs, but however may indirectly influence the operation of the firm, need to be considered as well. The stochastic model can incorporate these variables in the process of estimation of the model parameters. These are ordinal/categorical variables and the way in which they are incorporated into the data set will be subsequently explained.

This study assumes that there are four such influencing variables. The first variable considered is whether the institution is regulated or not. When a firm is regulated it needs to operate under the regulations prescribed by the Microfinance regulating authority[4] and hence this will influence the number people employed, capital and hence the output. The second variable captures whether the firm is a NGO or NBFC. The nature of the firm also has an indirect bearing on the way it operates, the extent of funding it gets from institutional grants etc. The third variable considered is 'Size' of the microfinance institution determined by magnitude of the gross loan portfolio. Three bands are defined based on portfolio size. Size of the microfinance institution was treated as a categorical variable with three divisions based on the size of gross loan portfolio (US$),

0- 0 to 10 million
1- 10 to 50 million
2- more than 50 million

The fourth variable that is considered is the 'Age' of the institution. With maturity and experience firms are assumed to differ in their operations depending on their learning curves. Age is treated as a categorical variable with the following bands,

1- 0-5 years
2- 6-10 years
3- 11-15 years
4- 16-20 years
5- 21-25 years
6- More than 26 years

These exogenous variables that have been considered are not an exhaustive list. They have been chosen based on reasoning as to what are the common factors that could affect the functioning of a microfinance institution. Also, the choice of variables has also been limited by the availability of data.

7. METHODOLOGY

The computer program, FRONTIER Version 4.1c is used to estimate the maximum likelihood estimates of a subset of the stochastic frontier production function that has been explained so far. The program can accommodate panel data, time varying and invariant efficiencies, cost and production functions, half normal and truncated normal distributions and functional forms which have a dependant variable in logged or original units. However, the program cannot accommodate exponential or gamma distributions, nor can it estimate systems of equations **(Coelli, 1996)**. The FRONTIER Version 4.1c can estimate the parameters of the stochastic frontiers in adherence to two different models proposed by Battese and Coelli.

7.1 MODEL: BATTESE AND COELLI (1995) SPECIFICATION

Battese and Coelli (1995) proposed a stochastic frontier models in which the inefficiency effects (u_i) are expressed as an explicit function of a vector of firm specific variables and a random error. This model imposed allocative efficiency condition and also permitted panel data to be used. The model is as follows:

$Y_{it} = x_{it}\beta + (V_{it} - U_{it})$

Where,

Y_{it}, x_{it}, and β are as defined earlier;

The V_{it} are random variables which are assumed to be normally distributed as $N(0, \sigma_v^2)$, and independent of the U_{it} which are non-negative random variables which are assumed to account for technical efficiency in production and are assumed to be independently distributed as truncations at zero of the $N(m_{it}, \sigma_u^2)$ distribution, where:

$m_{it} = z_{it}\delta$

where, z_{it} is a px1 vector of variables which may influence the efficiency of a firm; and

δ is an 1xp vector of parameters to be estimated.

The replacement made by **Battese and Corra (1977)** σ_v^2 and σ_u^2 are replaced with $\sigma^2 = \sigma_u^2 + \sigma_v^2$ and $\gamma = \sigma_u^2/(\sigma_u^2 + \sigma_v^2)$ is followed even in this model.

This model is chosen for this study. The input vector x_{it} are the 'Total Fund Input' and the 'Number of Personnel Employed'. The output y_{it} is the 'Gross Loan Portfolio'. z_{it} are the influencing variables: 'Regulation', 'NGO/NBFI', 'Size' and 'Age'. The parameters β, γ and δ will be estimated by the program. The two main functional transformations applied to stochastic frontier analysis are Cobb-Douglas and Transcendental logarithm. Here, the Cobb-Douglas functional transformation was preferred over the Transcendental logarithm, because of the nature of the results of estimated co-efficient.

7.2 EFFICIENCY PREDICTIONS

Coelli (1996) explains how the Frontier Version 4.1c computes the efficiency of individual firms from the estimated stochastic production frontiers. The measure of technical efficiency relative to the production frontier is defined as:

$EFF_i = E(Y_i^* | U_i, X_i)/E(Y_i^* | U_i=0, X_i)$,

Where,

Y_i^* is the production of the i-th firm which is directly represented by Y_i when the dependent variable is in original units and will be equal to $\exp(Y_i)$ when the dependent variable is in logs. When EFF_i represents a production frontier, it will take a value between zero and one.

The production efficiency with a logged dependent variable is given by $\exp(-U_i)$ and when the dependent variable is not logged, it is defined by $(x_i\beta - U_i)/(x_i\beta)$. In this study, the dependent variable is logged and hence the former expression is used to denote the production efficiency. These expressions of EFF_i rely upon the value of the unobservable U_i that is being predicted.

8. RESULTS AND ANALYSIS

8.1 OBSERVATIONS FROM THE STOCHASTIC FRONTIER ANALYSIS

The outputs from the computer application Frontier 4.1c are tabulated in the following section. The outputs obtained by applying a Cobb-Douglas functional transformation on the input vectors are tabulated in Table.11 and those obtained by applying a Transcendental logarithm are tabulated in Table.12. The appropriateness of both the functional forms will be subsequently examined.

Coelli. *et.al*. (1998) suggest the verification of the existence of technical inefficiency in the model, in the case of a cross-sectional analysis as well as in the case of panel data. For this, the null hypothesis γ = 0 is compared with the alternative γ > 0, where:

$\gamma = \sigma^2/\sigma_s^2$ and

$\sigma_s^2 = \sigma^2 + \sigma_v^2$

σ^2 is representative of technical inefficiencies and σ_v^2 represents inefficiencies due to random errors. The Null hypothesis states that there is no technical inefficiency. The value of γ in Table.1 is 0.60 with an associated t-statistic of 4.55%. Therefore, the null hypothesis is rejected at 5% level of significance (i.e., 95%

[4] SHGs dealt by banks and NBFCs are regulated by the RBI. Trusts, societies, non-profit companies and co-operatives are not regulated.

confidence level). Therefore, the model indicates the existence of technical inefficiencies apart from random errors and that the measures of the stochastic frontiers are indicative of it.

Secondly, the production function is estimated considering that u_i follows a truncated normal distribution N (μ, σ^2). This hypothesis can be validated by referring to the value of μ estimated by the model. The Null hypothesis is that $\mu = 0$. That is, if the null hypothesis is true, it is inappropriate to assume a truncated normal distribution for the technical inefficiency term u_i. The value of μ in Table.1 is 1.93 with an associated t-statistic of 5.26%. Therefore, the Null hypothesis is rejected at 10% level of significance (i.e., at 90% confidence level) and thus it is inferred that it is reasonable to assume a truncated normal distribution for the technical inefficiency term.

The β coefficients obtained by applying the Cobb-Douglas functional transformation are tabulated below. The values of β_0, β_1, and β_2 are 10.25, 0.10 and 0.78. The signs of these coefficients are all positive and the values are also significant by looking at the standard errors and t-statistics. β_1 and β_2 are coefficients associated with fund input and personnel employed respectively. It is consistent with economic fundamentals that the signs of these coefficients are positive, indicating that capital and labor have a positive correlation to output. It is on this ground that the transcendental logarithm transformation on the input vectors is rejected. From Table.2 it can be observed that the values of γ and μ are consistent with those observed using the Cobb-Douglas transformation. However, the negative sign on β_1 coefficient indicates that capital has a negative correlation to output, which counters the economic fundamentals. Because of this inconsistency, Cobb-Douglas transformation is preferred over the Transcendental logarithm for functional transformation of input vectors.

TABLE 1: COBB DOUGLAS FUNCTIONAL TRANSFORMATION - MAXIMUM LIKELIHOOD ESTIMATES - MODEL PARAMETERS USING COBB-DOUGLAS FUNCTION AND WITH z = 4

Parameters	Coefficient	Standard Error	t-statistic
β_0	10.25	4.44E-01	2.31E+01
β_1	0.10	2.52E-02	4.14E+00
β_2	0.78	5.60E-02	1.40E+01
μ	1.93	3.66E-01	5.26E+00
delta 1	-0.04	7.23E-01	-6.10E-02
delta 2	0.71	7.40E-01	9.61E-01
delta 3	-0.92	3.12E-01	-2.95E+00
Delta 4	-1.03	2.51E-01	-4.12E+00
σ^2	0.63	1.80E-01	3.52E+00
Γ	0.60	1.32E-01	4.55E+00

Log likelihood function = -0.13340334E+03

TABLE 2: TRANSCENDENTAL LOGARITHM FUNCTIONAL TRANSFORMATION - MAXIMUM LIKELIHOOD ESTIMATES - MODEL PARAMETERS USING TRANSLOG FUNCTION & WITH Z = 4

Parameters	Coefficient	Standard Error	t-statistic
β_0	10.83	9.17E-01	1.18E+01
β_1	-0.08	1.04E-01	-7.34E-01
β_2	0.45	2.85E-01	1.57E+00
β_3	0.03	3.90E-03	7.79E+00
β_4	0.11	4.23E-02	2.65E+00
β_5	-0.08	2.25E-02	-3.60E+00
μ	1.49	4.90E-01	3.05E+00
delta 1	0.33	7.15E-01	4.68E-01
delta 2	-1.01	3.60E-01	-2.80E+00
delta 3	0.37	7.05E-01	5.24E-01
σ^2	-1.02	3.23E-01	-3.16E+00
Γ	0.61	1.37E-01	4.44E+00

Log likelihood function = -0.10084946E+03

Thus, the parameters in Table 1 obtained from the stochastic frontier analysis by applying a Cobb-Douglas functional transformation on input vectors, can be fitted into an equation which describes the fundamental stochastic model proposed in the earlier chapters.

ln (Gross loan portfolio$_{it}$) = β_0 + β_1(ln(Total fund input$_{it}$)) + β_2(ln(Personnel employed)) +

+ $v_{it} - u_{it}$.

i.e., ln y_{it} = 10.25 + 0.10 ln(Total fund input) + 0.78 ln(Personnel employed) + $v_{it} - u_{it}$

8.2 EFFICIENCY ESTIMATES

Aigner and Chu (1968) extending the work of Farrel posit that for a given input vector x_i, the ratio of the observed output of the i-th firm, relative to the potential output defined by the estimated frontier, is the estimate of technical efficiency of the i-th firm:

(a) $TE_i = y_i/\exp(F(x_i; \beta) + v_i) = \exp(-u_i)$.

The stochastic model was defined as,

(b) $\ln(y_i) = F(x_i ; \beta) + v_i - u_i$

From (b) it follows that,

$y_i = \exp(F(x_i ; \beta) + v_i - u_i)$

(c) $y_i = \exp(F(x_i ; \beta) + v_i)/\exp(u_i)$

Substituting (c) in (a) yields,

(d) $TE_i = \exp(-u_i)$

The output parameters of the Frontier 4.1c are fitted into this equation and the Technical efficiencies of the individual firms are calculated. The mean efficiency scores are calculated as arithmetic mean of the scores obtained by individual firms from 2005 to 2008. The results are tabulated in Table.3 and 4below

TABLE 3: EFFICIENCY SCORES OF MICROFINANCE INSTITUTIONS FOR THE YEARS 2005-08

Mfi.Id	Mfi Name	2008		2007		2006		2005	
		Rank	%	Rank	%	Rank	%	Rank	%
29	SKDRDP	1	93.47%	1	93.72%	1	93.49%	2	92.43%
26	Sewa bank	2	92.62%	2	92.05%	2	91.80%	1	94.64%
21	RASS	3	90.15%	3	89.84%	6	86.27%	8	80.91%
28	SHARE	4	89.52%	4	89.80%	3	88.96%	3	88.37%
10	BSS	5	87.86%	5	88.53%	4	87.09%	7	82.85%
36	VFS	6	86.86%	7	86.70%	10	84.50%	5	85.73%
30	SKS	7	85.94%	8	86.07%	11	83.53%	10	80.81%
32	Spandana	8	85.47%	6	87.68%	7	86.14%	6	85.66%
3	AMMACTS	9	84.51%	10	84.67%	19	73.38%	13	77.82%
23	Sanghamithra	10	82.20%	9	85.19%	13	81.83%	11	79.51%
5	AWS	11	82.00%	11	84.52%	5	86.30%	21	71.33%
15	GU	12	80.44%	13	82.77%	15	79.59%	16	75.04%
14	GFSPL	13	80.15%	18	78.09%	22	71.55%	25	64.32%
2	AML	14	79.17%	14	80.39%	16	78.57%	15	77.40%
8	BFL	15	75.45%	17	78.77%	8	85.88%	4	87.86%
16	KBSLAB	16	74.80%	21	75.21%	25	68.33%	18	73.76%
17	KRUSHI	17	74.33%	16	79.25%	12	82.99%	14	77.66%
12	CReSA	18	74.02%	23	71.44%	29	61.17%	28	53.97%
13	ESAF	19	73.65%	12	83.03%	9	85.70%	12	78.00%
6	Bandhan	20	73.08%	20	75.54%	26	66.66%	27	57.28%
31	SMSS	21	72.74%	25	70.61%	23	70.46%	24	64.55%
7	BASIX	22	72.63%	22	73.97%	21	73.16%	19	73.73%
11	Cashpor MC	23	72.61%	15	80.22%	17	75.08%	20	71.50%
25	SCNL	24	70.45%	24	70.77%	18	74.06%	17	74.23%
34	SWAWS	25	69.72%	29	64.14%	28	61.77%	23	65.58%
9	BISWA	26	69.64%	28	66.80%	14	80.11%	9	80.83%
22	RGVN	27	65.69%	26	68.77%	31	57.17%	31	50.44%
24	Sarvodaya Nano Finance	28	64.18%	27	67.74%	27	62.80%	26	58.53%
20	NBJK	29	56.83%	30	61.70%	30	58.40%	29	52.26%
35	Ujjivan	30	54.95%	32	48.20%	34	34.57%	36	7.09%
18	Mahasemam	31	51.67%	19	76.81%	20	73.18%	32	50.24%
19	MFI	32	49.69%	34	45.11%	24	69.65%	22	69.18%
33	SU	33	46.18%	33	45.41%	33	49.01%	33	43.53%
1	ABCRDM	34	25.73%	35	27.04%	35	34.50%	34	29.59%
4	Asomi	35	22.34%	31	50.66%	32	51.71%	30	52.26%
27	SFPL	36	18.65%	36	13.04%	36	10.62%	35	12.20%

TABLE 4 : MEAN OUTPUT AND INPUT VARIABLES OF TOP FIVE EFFICIENT FIRMS

Mfi Name	Mean Output (US$)	Mean fund(US$)	Mean Personnel
SKDRDP	64,597,474	76,020,428	1708
Sewa bank	7,421,124	7,924,040	184
SHARE	129,063,648	126,540,460	3025
RASS	5,811,139	6,175,571	91
BSS	56,141,133	75,951,002	2354

FIGURE 1: MEAN EFFICIENCY TREND OF THE SECTOR

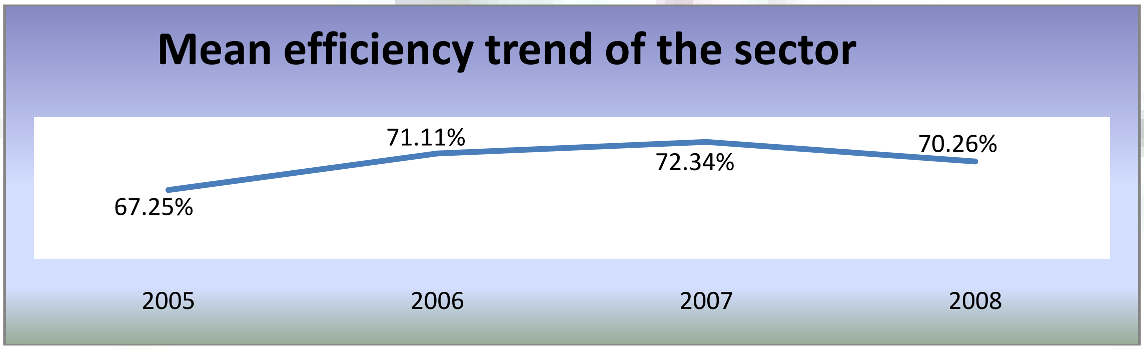

Figure. 1 depicts the trend in mean of efficiencies of all the 36 microfinance institutions computed for each of the years from 2005 to 2008. The trend is indicative of the overall performance of the microfinance sector in India with reference to technical efficiency. It can be observed that the efficiency level has grown consistently from 2005 till 2007 and have dipped in 2008.

8.3 OBSERVATIONS BASED ON MEAN EFFICIENCY SCORES

The mean efficiency scores is obtained as a simple arithmetic mean of the individual efficiencies of each of the 36 microfinance institutions in India, during the period of study from 2005 to 2008. Since technical efficiency is calculated based on frontiers it explains how much of contraction of inputs is possible for a given output and also how much expansion of output is possible for a given set of inputs. That is, a technically efficient frontier firm is the one which succeeds in converting a minimum set of inputs to maximum output(s). A firm that does this is considered to operate on the efficient frontier while the others operate below the frontier and their technical efficiencies are correspondingly lesser.

The ranking done based on these scores reveal that SKDRDP (Shree Kshethra Dharmasthala Rural Development Project) is the most technically efficient firm with efficiency scores of 92.43%, 93.49%, 93.72% and 93.47% from 2005 to 2008, respectively. Its mean efficiency score is 93.28%. A mean efficiency score of 93.28% means that if SKDRDP were to operate at the frontier instead of at its current location, 93.28% of its input resources currently being used would be necessary to produce the same level of output. The converse of an efficiency score of 93.28% is that, the inefficiency level is 6.72% (100% - 93.28%). This means that SKDRDP would require 6.72% more input resources to produce the same level of output as that would be produced if it were to operate on the efficient frontier. In absolute terms (Refer to Table.18), this means that if SKDRDP were to operate on the efficient frontier it can achieve a average gross loan portfolio of $64,597,474 with 93.28% of its current fund input and personnel employed. That is, it can achieve the same output with $70,911,855 of fund input as against $76,020,428 and also by employing only 1593 employees instead of 1708.

The second most technically efficient microfinance institution in India is Sewa Bank with efficiency scores of 94.64%, 91.80%, 92.05%, 92.62% respectively from 2005 to 2008. Its mean efficiency score is 92.78%. Along the same lines, in absolute terms, this means that if Sewa bank were to operate on the efficient frontier it can achieve a average gross loan portfolio of $7,421,124 with 92.78% of its current fund input and personnel employed. That is, it can achieve the same output with $7,351,925 of fund input as against $7,924,040 and also by employing only 170 employees instead of 184.

The third in rank among most technically efficient microfinance institutions is SHARE Microfinance with efficiency scores of 88.37%, 88.96%, 89.80%, and 89.52% respectively from 2005 to 2008. The mean efficiency score is 89.16%. In absolute terms, this means that if SHARE were to operate on the efficient frontier it can achieve a average gross loan portfolio of $129,063,648 with 89.16% of its current fund input and personnel employed. That is, it can achieve the same output with $112,823,474 of fund input as against $126,540,460 and also by employing only 2697 employees instead of 3025.

The fourth in rank among most technically efficient microfinance institutions in India during the period 2005 to 2008 is RASS (Rashtirya Seva Samithi) with efficiency scores of 80.91%, 86.27%, 89.84% and 90.15% respectively from 2005 to 2008. The mean efficiency score is 86.79%. In absolute terms, this means that if RASS were to operate on the efficient frontier it can achieve a average gross loan portfolio of $5,811,139 with 86.79% of its current fund input and personnel employed. That is, it can achieve the same output with $5,359,778 of fund input as against $6,175,571 and also by employing only 79 employees instead of 91.

BSS is the fifth most technically efficient Microfinance institution in India with efficiency scores of 82.85%, 87.09%, 88.53% and 87.86% respectively for the period from 2005 to 2009. The mean efficiency score is 86.59%. In absolute terms, this means that if BSS were to operate on the efficient frontier it can achieve a average gross loan portfolio of $56,141,133 with 86.59% of its current fund input and personnel employed. That is, it can achieve the same output with $65,765,972 of fund input as against $75,951,002 and also by employing only 2038 employees instead of 2354.

9. SUMMARY AND CONCLUSIONS

This study on estimation of technical efficiencies of microfinance institutions in India using a stochastic frontier analysis has determined a number of useful results. By using the financial data of microfinance institutions as reported by the institutions themselves to the Microfinance information exchange, the relevant input, output, and exogenous variables are identified. 'Total fund input' constituted by the sum of borrowings, equity, donor funds and deposits was treated as the first input factor. The 'Number of Personnel' was considered as the second input factor.

On identifying all the relevant variables, the appropriate functional form to be used for the stochastic frontier analysis was decided. Cobb-Douglas transformation was chosen over the Transcendental logarithm owing the observed inconsistency in the estimated stochastic parameters in the latter functional form. Subsequently, the model was adapted to fit the context of the present study. From the estimated parameters obtained from the output of Frontier 4.1 c, it was found that that $\gamma = 0.60$ with an associated t-statistic of 4.55%. This result confirmed the presence of technical inefficiencies and the value of $\mu = 1.93$ and a t-statistic of 5.26% validated the assumption of a truncated normal distribution for the technical inefficiency term used in the stochastic frontier analysis. Further, by applying the estimated parameters the technical efficiencies were calculated at the individual firm level for all the 36 firms for the period from 2005 to 2008. Firms were ranked based on their efficiencies in each year. Further, the mean efficiencies were computed and the firms were ranked based on it. It has also brought out the extent to which these institutions can achieve a reduction in the input resources by operating on the efficient frontier.

10. LIMITATIONS OF THE STUDY

This study being purely quantitative has its own limitations. Especially, when it comes to a field of study like Microfinance, which involves a lot of human element and subtle factors like trust, belief, self-confidence, motivation, commitment, etc., which indirectly influence the way both the lenders and the borrowers behave and operate, a purely quantitative study is limited in its ability to measure and incorporate these factors. For instance, a few highly motivated field workers can play a pivotal role in counseling borrowers who are faced with rough business cycles. By providing technical and moral support they can enable them to turn around their losses and eventually help them to repay their loans and graduate to larger loans. Such actions surely improve the technical efficiency of the firm in the long-run, which cannot be captured by this study. Although the measure of technical efficiency indirectly points to the general effectiveness of the institution and its impact in the area where it operates, it does not explicitly measure these parameters.

11. SCOPE FOR FURTHER WORK

This study can be extended to include microfinance institutions across the globe. However, the challenge that would come up while dealing with such comparisons is that of existence of different external influencing variables. For instance, depending on the country of operation, its geography, entrepreneurial abilities of people, autonomy for women based on cultures, and the political and legal regulations, etc. vary, and hence it is required to account for all these constraints in the stochastic frontier analysis. Another alternative to this would be to identify developing countries that have a lot of similarities in terms of their operating conditions and compare the efficiencies of microfinance institutions across these countries. Such a study will throw light on whether microfinance sector in a particular country is highly efficient in comparison to others. A meaningful extension to this quantitative study would be to complement it with a qualitative research on the identified efficient institutions. It would be useful to select a few top ranked institutions and also two institutions which are at the bottom in terms of technical efficiency, and conduct an explorative case study to understand the reasons for their performances. Another aspect would be to consider the impact that these institutions have on the clients. It would be beneficial to the sector if there's a study to understand whether there is a positive correlation between the technical efficiency of microfinance institutions and the perceived impact it has on the clients.

12. REFERENCES

1. Aigner, D.J. and Chu, S.F. (1968), "On Estimating the Industry Production Function", American Economic Review, Vol.58, pp. 826-839
2. Ananth, B. (2004), "A Blueprint for the Delivery of Comprehensive Financial Services to the Poor in India", Centre for Micro Finance Working Paper Series.
3. Battese, G.E. and Coelli, T.J. (1995), "A Model for Technical Inefficiency Effects in a Stochastic Frontier Production Function for Panel Data", Empirical Economics, Vol.20, pp. 325-332.
4. Battese, G.E. and Corra, G.S. (1977), "Estimation of a Production Frontier Model: With application to the pastoral zone of Eastern Australia", Australian Journal of Agricultural Economics, Vol.21, pp.169-179.
5. Bhatt, N and Thorat, Y.S.P. (2001), "India's Regional Rural Banks: The Institutional Dimension of Reforms", Journal of Microfinance, Vol. 3, No.1
6. Coelli, J. (1996), "A Guide to FRONTIER Version 4.1: A Computer Program for Stochastic Frontier Production and Cost Function Estimation", CEPA Working Paper, 96/07
7. Coelli, T., Rao, P. and Battese, G. (1998), An Introduction to Efficiency and Productivity Analysis, Kluwer Academic Publishers, Dordrecht.
8. Farrington, T. (2000), "Efficiency in Microfinance institutes", Microbanking Bulletin, pp.20-23.
9. Guitierrez Nieto, B., Serrano Cinca, C and Molinero, C.M. (2006), "Microfinance institutions and efficiency.OMEGA", International Journal of Management Science, Vol.35, No.2, pp.131-142.

10. Hassan, M.K. and Tufte, D.R. (2001), "The X-efficiency of a group based lending institution: the case of Grameen Bank", World Development, Vol.29, pp.1071-1082.
11. Kumbhakar, S.C. and Lovell, C.A.K. (2000), Stochastic Frontier Analysis, Cambridge University Press, pp.1-11
12. Lafourcade, A., Isem, J., Mwangi, P and Brown, M. (2005), "Overview of the outreach and financial performance of microfinance institutions on Africa", www.mixmarket.org
13. Littlefield, E., Morduch, J and Hashemi, S. (2003), "Is Microfinance an Effective Strategy to Reach the Millennium Development Goals?", CGAP.
14. Maxwell, S. (1999), "The meaning and measurement of Poverty", Overseas Development Institute Poverty Briefing 3, pp.1-6
15. Michael, S and Mamiza, H. (2009), "Efficiency of Microfinance Institutions: A Data Envelopment Analysis", Asia-Pacific Financial markets.
16. Robinson, S. (1998), "Microfinance: the Paradigm Shift From credit Delivery to Sustainable Financial Intermediation", Strategic Issues in Microfinance, Ashgate Publishing: Aldershot.
17. Sachs, J. (2005), The End of Poverty, Penguin Books, pp.26-30.
18. Varman, P and Samyukta, R. (2007), "Microfinance Institutions and Technical Efficiency in India", IFMR, pp.346-348.

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