

TECHNICAL EFFICIENCY AND ITS DETERMINANTS OF MICRO FINANCE INSTITUTIONS IN ETHIOPIA: A STOCHASTIC FRONTIER APPROACH

Bereket Zerai¹,

Andhra University, India & Mekelle University Ethiopia

Email: bereketzg@yahoo.com

Lalitha Rani²,

Andhra University, India

E-mail: mlalitha@yahoo.com³

ABSTRACT

This study aims to examine technical efficiency performance of Ethiopian Micro Finance institutions (MFIs) over the period of 2004 to 2009 using Stochastic Frontier Analysis (SFA) model. The results of the analysis revealed that an overall average technical efficiency of 71.72%; imply that there is a substantial scope for Ethiopian MFIs to improve their performance without the need to use additional resources. The study further shows that asset, operational sustainability, women, i.e., depth of outreach and trend are significant determinants of efficiency. Our findings also provide evidence on tradeoff between efficiency and outreach of microfinance institutions. Overall, the findings imply that the MFIs should devise strategies and practices boosting scale and ensuring sustainability while maintain social goals.

Key words: technical efficiency, stochastic frontier analysis, microfinance institutions, Ethiopia

JEL Codes: D24, G21

¹ Ph.D. candidate at Andhra University, Visakhapatnam - 530 003, Andhra Pradesh, India; and Lecturer in Department of Accounting & Finance, Mekelle University, P o. Box 451, Mekelle, Ethiopia

² Professor of Marketing and Entrepreneurship, Department of Commerce and Management studies, Andhra University, Visakhapatnam- 530 003, Andhra Pradesh, India email mlalitha@yahoo.com

I. INTRODUCTION

In developing countries, including Ethiopia, Micro Finance Institutions (MFIs) emerged with unique opportunity to poor people who do not have access to commercial Banks. Microfinance involves the provision of micro-credit, savings, and other services to the poor that are excluded by the commercial banks for collateral and other reasons. Microfinance is relatively new to Ethiopia and came to appear in 1994/95 with the government's Licensing and Supervision of Microfinance Institution Proclamation.

As of 2010, there were 30 MFIs operating in the urban and rural parts of the country and have tried to reach more than 2.3 million poor clients (AEMFI, 2010). Indeed, the figure seems large in absolute term; however, it is small in relation to the potential poor clients.

Cognizant to the fact Ethiopian MFIs have made notable progress in the past decade in terms of outreach(see Amaha, 2008) yet covering only a small percentage of the population and many of the poor in the country are heavily dependent on informal credits and informal financial institutions. The demand for microfinance is far from being met by the existing MFIs. Studies such as (Chao-Beroff et al, 2000; Amaha, 2008) show that the existing MFIs in the country reach only a fraction of the country's poor, i.e., 10-20 percent of microfinance demand of the country. This study, however, argues that such limited outreach could be due to inefficient utilization of limited resources in producing the required output apart from weak governance and ownership and other challenges that the industry is facing (Itana, 2003; Pfister et al, 2008; Amaha, 2008; Bienen 2009).

The ownership structure of Ethiopian MFIs is thought to be very loose in the sense that firstly, the so-called owners have no real control over the shares and hence may not have sufficient interest to control and guide the management of MFIs. Secondly, it is dominated by the groups with different historical and strategic camps -government affiliated verses NGO affiliated. In some cases, such dominances have been spoiling the market and remain a threat for the industry due to the practice of some illegal government and NGO operations (Amaha 2008). Moreover, microfinance industry of the country is highly concentrated. The four largest - Amhara Credit and Saving Institution (ACSI), Dedebit Credit and Saving Institution (DECSI), Oromia Credit and Saving Share Company (OCSSCO) and Omo Micro Finance Institution - are backed by the government account for 81 per cent of client outreach and 85 per cent of total

loans outstanding(AEMFI, 2010). Ethiopian MFIs are also criticized for not being innovative of their own approach rather they replicate each other and in most cases the financial products of these institutions seem to be the same (Berihun et al, 2009). Thus it seems timely to have a study that signifies the efficiency/performance status of the MFIs and factors accounting for inefficiencies therein with the expectation that helping them to reach more clients in sustainable way if there is possibility of scale to operate.

These institutions, in fulfilling their social and commercial objectives in a sustainable way in the long run, need to be efficient. In other words, they should allocate their resources efficiently such that resources such as labor, capital and other resources should be allocated in a way that maximize social and financial objectives. However, we are not aware of any study that attempts to estimate efficiency of these institutions. In this paper, therefore, we have tried to evaluate the efficiency of Ethiopian MFIs using a widely applied parametric measure - stochastic frontier approach. The underlining assumption of this study is that an efficient microfinance may satisfy both the interests of the institution and its clients. Micro finances, in striving for efficiency, need to maximize outputs and minimize inputs and in the meantime enhance growth and sustainability. Such performances would help Ethiopian MFIs to charge reasonable and affordable interest rates to poor clients while meeting interests of owners.

So far, various studies have been done in Ethiopia concerning microfinance. However, most of them focused only on impact of such institutions in the livelihood and well being of the poor (cf: Gobeze,2001; Thehay and Bediye, 2002; Amaha, 2003;Borchgrevink et al 2005; Assefa et al, 2005;Garber et al 2006; Negash ,2008; 2009; Berhane, 2010). Notable studies on regulation and governance and ownership include Itana et.al (2003), Amaha (2005); Amaha (2008). Some performance analysis papers also Amaha (2003), Amaha (2007), Amha (2008). The two exceptions are those of Keriata (2007) and Ejigu (2009) who tried to evaluate the performances of Ethiopian MFIs in terms of outreach and sustainability and are found to be less rigorous. This is the first paper that addresses efficiency performances of Ethiopian MFIs. Therefore, this paper is expected to influence policy makers and practitioners by giving empirical evidences on efficiency status and operating circumstances of Ethiopian MFIs. The study is also expected to add value to the limited stock of literature in the area of MFIs efficiency. In literature one could find substantial papers on efficiency in banking in different parts of the world

following the first application paper of Sherman(1982) unlike to a few recent in MFIs.

Our findings provide empirical evidence on efficiency status of the MFIs. Despite the efficiency improvement experienced in the period there still is substantial room to expand their outreach level using the existing resources. Further, the study observes considerable differences in inefficiency among Ethiopian MFIs and the variation in output/performance is due to the differences inefficiency effect. These are mainly attributed to scale, sustainability, management practices, and goal orientation of the institutions.

The rest of the paper is organized as follows. Section 2 puts brief review of empirical studies on efficiency of MFIs in the world. Section 3 provides data and methodology. Section 4 presents results and discussions. Finally, Section 5 ends up with conclusions.

II. LITERATURE REVIEW

Efficiency in microfinance is a question of how well an MFI allocates inputs such as staff, assets and subsidies to produce the maximum output such as number of loans, financial self-sufficiency and poverty outreach, (Balkenhol, 2007). MFIs are expected not only to become financial self sufficient but also to reach the poor. To that end they should allocate their resources efficiently, i.e., resources such as labor, capital and other resources should be allocated in a way that maximize social and financial objectives. Traditionally, microfinance institution's performance has been commonly measured using various accounting ratios. Though ratios provide great deal of information they are not without problem. Ratios provide only partial measures of efficiency and partial efficiency may be misleading when we draw conclusions on the overall efficiency of MFIs. Studies attempted to measure efficiency of MFIs using ratios include (Farrington, 2000; Lafourcade et al., 2005; Baumman, 2005). On the other hand, studies such as (Nghiem, 2004; Gutierrez-Nieto et al. 2005; Gutierrez-Nieto et al., 2009; Hassan & Tuffe, 2001; Abdul Qayyum & Ahmed, 2006; Haq et al., 2007; Sufian, 2006; Bassem, 2008; Hermes et al., 2008; Hassan & Benito, 2009; Nawaz, 2009; Masood and Ahmed, 2010; Oteng-Abayie et.al 2011) have applied frontier efficiency measures either the Data Envelopment Analysis or Stochastic Frontier Analysis. These recent studies on MFIs are quite minimal comparing to more than 130 studies made before the year 1997 in banking (see Berger and Humphrey 1997). Following is explained the findings of empirical studies on efficiency of MFIs around the globe.

Guitierrez-Nieto et al. (2006) applied a DEA non-parametric approach to analyze the efficiency of 30 Latin American MFIs. In their study, they tried to explore the multivariate analysis of the DEA results by developing 21 specifications using two inputs and three outputs. Their study found that an NGO and a non-bank financial institution are the most efficient among the various group of MFIs. Bassem (2008) estimated efficiency of 35 MFIs in the Mediterranean zone for the period 2004–2005 using DEA and found that eight institutions were efficient. Further, the study found that size of the MFI has a negative effect on efficiency. Masood and Ahmed (2010) applied a stochastic frontier model to estimate the efficiency of 40 Indian microfinance institutions for the period 2005-2008. They found that mean efficiency level of microfinance institutions is low. Further, the study found that regulated microfinance institutions are less efficient and age of microfinance institution has a positive effect on efficiency. Haq et al. (2009) investigated the efficiency of 39 MFIs in developing world (Africa, Asia, and Latin America) using the data envelopment analysis (DEA) based intermediation and production approaches. These different approaches tend to give conflicting results. Their findings show that non-governmental microfinance institutions under production approach are the most efficient. On the other hand, the study shows bank-microfinance institutions outperform and are more efficient under intermediation approach.

Abdul Qayyum and Ahmad (2006) tried to investigate the efficiency of 85 MFIs in South Asia (consisting of 15 Pakistani, 25 Indian, and 45 Bangladeshi). The analysis revealed that the inefficiency of the MFIs in Pakistan, India, and Bangladesh is mainly of technical nature and to improve their efficiencies, they suggest that the MFIs need to enhance their managerial expertise and improve technology.

Nghiem et al. (2004) investigates the efficiency of microfinance industry in Vietnam through a survey of 46 schemes in the north and central regions by employing the Data Envelopment Analysis (DEA). The result of the study reveals that the average technical efficiency score of schemes is 80%. Further, the study found that age and location have positive effect on efficiency of the schemes.

Hassan and Tufte (2001) examine cost inefficiency and determinants of the Grameen Bank (GB) using branch level cost data over the 1988-1991 period. Using a stochastic frontier analysis they found that Grameen Bank's branches staffed by the female employees operated more efficiently than their counterparts staffed by the male employees.

Hermes et al. (2008) used stochastic frontier analysis to examine a trade-off between outreach to the poor and efficiency of microfinance institutions based on 435 MFIs and found that outreach and efficiency of MFIs are negatively correlated. Their finding further indicates that efficiency of MFIs is higher if they focus less on the poor and/or reduce the percentage of female borrowers. Oteng-Abayie et.al (2011) applied a Cobb-Douglas Stochastic frontier model for Ghana MFIs for the period from 2007-2010. They found that average economic efficiency of 56.29%; and further age and savings indicators of outreach and productivity, and cost per borrower found to be significant determinants of economic efficiency.

III. METHODOLOGICAL FRAMEWORK

In literatures of financial institutions there are two computing approaches commonly used to measure efficiency of institutions namely parametric which include among others, Stochastic Frontier Approach (SFA) and non parametric mainly the Data Envelopment Analysis(DEA). DEA and stochastic frontiers are two alternative methods for estimating frontier functions and thereby measuring efficiency of production. DEA involves the use of linear programming whereas stochastic frontiers involve the use econometric methods (Coelli, et al., 1998). In contrast to SFA which attempts to determine the absolute economic efficiency of institution DEA tries to evaluate the efficiency of an institution relative to other institutions in the same industry. Studies acknowledged that both approaches have advantages and limitations as well (see for example, Berger and Humphrey, 1997; Coelli, et al., 1998).The superiority of one approach over the other has been a subject of discussion and is still remaining debatable in literature. Apparently, however, others suggest that, for instance, (Resti 1997; Bauer et al., 1998; Ondrich and Ruggiero, 2000; Leon 2001) both produce similar rankings, and conclude that both approaches are complimentary to measure efficiency.

Stochastic frontier analysis (SFA) is an econometric method that can be used to measure efficiency in a similar way to DEA. This approach was first introduced simultaneously by Aigner Lovell and Schmidt (1977) and Meeusen and Van den Broeck (1977).SFA specifies the relationship between output and input levels and decomposes the error term in to two components, one to account for random effects and another to account for technical inefficiency. SFA has the advantages over DEA of accommodating data 'noise' and statistical tests, but has the disadvantages of requiring a functional form to be specified and it does not provide the wealth of information on things such as peers and peer weights, which are provided by DEA.

Indeed, unlike DEA hypotheses testing can be carried out for the parameters estimated by parametric methods (SFA). This study is based on Stochastic Frontier Analysis (SFA) even with the limitations therein. Following previous empirical studies the study is based on Battese and Coelli (1995) SFA model. Battese and Coelli (1995) propose a stochastic frontier production function for panel data which has a firm effect which are assumed to be distributed as truncated normal random variables, which are also permitted to vary systematically with time and it can be described as:

$$y_{it} = x_{it}\beta + V_{it} - U_{it} , \quad i = 1,2, \dots, N \quad t = 1,2, \dots, N \quad (1)$$

Where y_{it} denotes the logarithm of output for the i -th microfinance institutions in the t -th time period; x_{it} denotes the vector of input quantities; β is a vector of unknown parameters to be estimated; V_{it} 's are the error components of random disturbances, independent and identical distributed (i.i.d) $N(0, \sigma_v^2)$ and independent from U_{it} . U_{it} 's are non-negative random variables associated with the technical inefficiency of production and to be independently distributed as truncations at zero of the $N(\mu, \sigma_u^2)$ distribution; where:

$$m_{it} = Z_{it}\delta + W_{it} \quad (2)$$

where Z_{it} is a $(1 \times p)$ vector of variables which may influence the inefficiency of microfinance institutions; and δ is a $(1 \times p)$ vector of parameters to be estimated. The parameterization from Battese and Corra (1977) are used replacing σ_u^2 and σ_v^2 with $\sigma^2 = \sigma_v^2 + \sigma_u^2$ and the parameters are estimated by maximum likelihood approach. The value of γ lies between 0 and 1. Zero value of γ shows that variance of the inefficiency effects is zero and deviations from the frontier are entirely due to noise. Value $\gamma = 1$ indicates that all deviations are due to technical inefficiency. The Parameters of the stochastic frontier given by Equation 1 and inefficiency model given by Equation 2 are simultaneously estimated by using maximum likelihood estimation.

The technical efficiency of i -th firm at t -th time period is given by:

$$TE_{it} = \exp -U_{it} = \exp -Z_{it}\delta - W_{it} \quad (3)$$

Coelli et al. (1998) suggest the one-side generalized likelihood-ratio test to determine the technical inefficiency effect under both the null and alternate hypotheses. This can be calculated through the generalized likelihood ratio-test that expresses as follows:

$$LR = -2\{\ln L_{H_0} - \ln L_{H_1}\} \quad (4)$$

Where L_{H_0} and L_{H_1} are the values of the likelihood function under the null and alternative hypotheses H_0 and H_1 . λ has an approximately chi-square distribution with degrees of freedom equal to the number of restrictions. Under the null hypothesis $\gamma = 0$, which specifies that technical inefficiency are not present in the model and $\gamma = \delta_i = 0$, which specifies that inefficiency effects are not stochastic, λ has mixed chi-square distribution with the number of degree of freedom equal to the number of restrictions imposed (Coelli, 1995).

IV. DATA AND MODEL SPECIFICATION

The study uses secondary data. It is based on the annual data covering the period from 2004-2009 for the 19 micro finance institutions operating in Ethiopia. In fact, there are 30 MFIs currently operating in the country; however, data cannot be generated from all the MFIs as some lack sufficient data while others are new to be included in the analysis. The data is extracted from the financial statements provided by the Association of Ethiopian Microfinance Institutions (AEMFI), National Bank of Ethiopia (NBE) and Mix Market⁴.

In empirical studies of financial institutions there are two common approaches to be followed in selecting outputs and inputs namely production approach versus intermediary approach (Berger and Humphrey 1997). Under the production approach, financial institutions are viewed as institutions making use of various labor and capital resources to provide different products and services to customers. Thus, the resources being consumed such as labor and operating cost are deemed as inputs while the products and the services such as loans and deposits are considered as outputs. Under the intermediation approach, financial institutions are viewed as financial intermediaries which collect deposits and other loan able funds from depositors and lend them as loans or other assets to others for profit. Indeed, MFIs are also financial institutions though they may have different motives and

⁴ is the most renowned and global web-based microfinance information platform. It yields information on micro finances institutions around the globe and provides information to sector actors and the public at large.

approaches. Using the production approach, the model specification of the stochastic frontier function is then defined as:

$$\ln(\text{GLP}_{i,t}) = \beta_0 + \beta_1 \ln \text{Employees}_{i,t} + \beta_2 \ln \text{Operating expenses}_{i,t} + v_{i,t} + u_{i,t} \quad (5)$$

$\text{GLP}_{i,t}$ represents the total gross loan portfolio of i MFI at time, Employees represents the total number of staff members of i microfinance institution at time. $\text{Operating expenses}_{i,t}$ is the total operating expenses/administrative expenses. β_i - parameters to be estimated $v_{i,t}$ is the random disturbance term and $u_{i,t}$ is the inefficiency term.

Technical inefficiency effect model is

$$\mu_{it} = \delta_0 + \delta_1 \text{Assets}_{it} + \delta_2 \text{Ownership}_{it} + \delta_3 \text{Age}_{it} + \delta_4 \text{OSS}_{it} + \delta_5 \text{DER}_{it} + \delta_6 \text{Women}_{it} + \delta_7 T + W_{it} \quad (6)$$

Assets_{it} represents total of all net asset account of the i -th microfinance institutions at time t . measured in dollar. In financial institutions asset is usually taken a proxy for size. Larger size could result in scale efficiency and is expected to have positive effect on efficiency. However, for institutions which are extremely large, the effect of size could be negative. Ownership_{it} is a dummy variable reflecting 1 if MFI is government affiliated, 0 otherwise. Age_{it} is age of the i -th microfinance institutions at time t , measured in number of years and shows the experience of the MFI. Matured and experienced institutions are expected to be more efficient than the young or new institutions. OSS_{it} measures microfinance sustainability is achieved when the operating income of an MFI is sufficient enough to cover all operational costs. The OSS is expected have positive impact on efficiency as most efficient MFIs generate higher returns and there by sustainable. Women_{it} is an indicator of depth outreach and social orientation of MFIs. It is dummy variable 1 if MFI has more than 50% women borrowers, 0 otherwise. Higher value for women indicates more depth of outreach, since lending to women is associated with lending to poor borrowers. (Hermes et.al, 2009) Finally T is the time trend with the expectation that inefficiency effects may change over time.

The parameters in the model and technical efficiency scores are estimated using the Frontier 4.1 program developed by Collie et al. (1998).

EMPIRICAL RESULTS

Table 1 provides summary statistics of the variables. These summary statistics indicate that there are large variation among Ethiopian MFIs in terms of output and inputs used. For

example, the output - gross loan portfolio ranges from 1,034800 USD to 156,000000USD with an average of 16,100000.

Table 1:

Summary of Descriptive Statistics of Output and Inputs

<i>Variables</i>	<i>Obs</i>	<i>Mean</i>	<i>Std. Dev.</i>	<i>Min</i>	<i>Max</i>
Gross loan portfolio	114	1.61e+07	3.27e+07	103480	1.56e+08
Total number of employees	114	836101.2	1360518	25894	7394112
Operating expenses	114	415.9035	650.5306	17	2732

The maximum-likelihood estimates for parameters of the stochastic production frontier model and the technical inefficiency model (equation 5 and 6 specified above) are presented in Table 2. The results of the maximum likelihood estimates of the parameters of the stochastic production frontier function indicate that the parameters are positive and significant at 95% confidence interval. The input elasticities of operating expenses (β_1) and labor β_2 show increasing returns to scale, since the sum of the estimated input coefficients obtained from the stochastic frontier model is higher than unity, i.e., 1.317.

The results of the various hypothesis tests for the model are presented in Table 3. All hypothesis tests are obtained using the generalized likelihood-ratio statistic (defined equation 4 above). The estimated value of the variance parameter $\gamma = 0.693$ is statistically significant at the 5% level, which implies that more than 64 percent of the variation in output among the MFIs is due to the differences inefficiency effect. Null hypothesis $\gamma = 0$, which specifies that inefficiency effects are not stochastic, is strongly rejected. Thus, the stochastic frontier with inefficiency effects is a more appropriate representation than the standard OLS estimation of the production function. In addition, we test the null hypothesis that the inefficiency effects are not present, that is, $\gamma = \delta_i = 0$ is also rejected at 5% significance level. For the null hypothesis that all the variables included have no effect on inefficiency, that is, $\delta_i = 0$ is rejected. Finally, we test for the null hypothesis that the technical inefficiency effect did not vary significantly over time. The null hypothesis of time-invariant inefficiency $\eta = 0$ is also rejected at a statistically significant level, implying that inefficiency varies over time. Thus, the choice of the time-varying decay model is appropriate.

The second section of Table 2 reports the technical inefficiency model. The result revealed that all the explanatory variables conform to our prior expectation. However, the result of t - ratio test shows variables asset, operational self sustainability, women and trend are

statistically different from zero at 5 percent level of significance. Thus, these variables are important determinant of efficiency of the MFIs. The negative value of parameters asset financial sustainability and trend in the technical inefficiency function indicates the positive influence on the performance of the MFIs. In other words, asset, operational sustainability and time are inversely related with inefficiency implying that these variables are found to improve efficiency. The negative coefficient of asset to inefficiency suggests that large MFIs are more efficient than the small MFIs. This would support the assumption that large firms tend to enjoy economies of scale. Coefficient of the variable operational sustainability is negative indicate that sustainable MFIs are more efficient than the unsustainable MFIs. The negative coefficient of time implies that technical efficiency increases significantly over time. The positive sign linked to the variable women is also expected. The positive coefficient of women to inefficiency suggests that more social oriented MFIs are less efficient. This also shows a tradeoff between efficiency and outreach which is consistent with the findings of Hermes et al., (2008).

Table 2

Maximum Likelihood Estimates of the Production Function

<i>Model</i>	<i>Parameter</i>	<i>Coefficient</i>	<i>Standard error</i>	<i>t-ratio</i>
Constant	β_0	0.595*	0.176	3.381
Ln total operating expenses	β_1	0.872*	0.130	6.708
Ln number of employees	β_2	0.383*	0.139	2.755
Technical inefficiency:				
Constant	δ_0	0.114	0.350	0.326
Time	δ_1	-0.451*	0.125	-3.608
Total asset	δ_2	-0.873*	0.209	-4.177
Ownership	δ_3	-0.132	0.281	-0.469
Age	δ_4	-0.109	0.110	-0.991
Financial sustainability	δ_5	-0.685*	0.121	-5.661
Women	δ_6	0.669*	0.210	3.185
Sigma-squared	σ^2	0.252	0.119	2.117
Gamma	γ	0.639	0.188	3.399
Log likelihood estimation		-39.41		

* shows the significance of variable at 5% level of significance

Table 3**Generalized likelihood-ratio (LR) tests of null hypotheses ^(a)**

<i>Null hypothesis</i>	<i>Test statistics</i>	<i>Critical value*</i>	<i>Decision</i>
No stochastic ($\gamma = 0$)	43.870	7.045	Reject
No inefficiency ($\delta_i = 0$)	21.297	14.853	Reject
No inefficiency effect	40.69	11.911	Reject
Time invariant efficiency ($\eta = 0$)	36.605	5.138	Reject

^(a)The test statistics have χ^2 distribution with degrees of freedom equal to the difference between the parameters involved in the null and alternative hypothesis. *All critical values are at 5% level of significance. The critical values are obtained from table of Kodde and Palm (1986).

The frequency distributions of technical efficiency scores of the MFIs are presented in Table 4. The result of the mean technical efficiency of the MFIs during the period 2004 to 2009 is found to be 71.72% ranging from 26.74% to 91.23%. The MFIs thus show considerable differences in inefficiency from 8.77% to 73.28 %. The average efficiency indicates that Ethiopian MFIs have realized 71.72 % of the potential output to be realized. In other words, the average microfinance institution can increase its output level by 40.6 % using the same amount of inputs. However, if the average microfinance institution has to attain the level of the most efficient MFI within the sampled institutions, then the average MFI may increase output by 21.38% [$1 - (71.72/91.23)$]. Similarly the most inefficient institution can increase its output by 70.69%. The estimated mean technical efficiency of Ethiopian MFIs is reasonably high compared to those African MFIs; for instance Zerai and Tesfay (2011) applied same methodology, i.e., Stochastic frontier model to estimate the technical efficiency of African MFIs and found the mean technical efficiency to be 0.589(58.9%).

Table 4**Frequency Distribution of Technical Efficiency of MFIs for 2004 -2009**

<i>Efficiency levels</i>	<i>Frequency</i>	<i>Percentage</i>
TE ≤ 10	0	0
10 < TE ≤ 20	0	0
20 < TE ≤ 30	2	1.75
30 < TE ≤ 40	1	0.88
40 < TE ≤ 50	6	5.26
50 < TE ≤ 60	18	15.79
60 < TE ≤ 70	19	16.67
70 < TE ≤ 80	31	27.19
80 < TE ≤ 90	31	27.19
TE > 90	6	5.26
Total observation	114	100
Mean	0.717	
Std. Dev.	0.139	
Minimum	0.267	
Maximum	0.912	

Table 5**Average efficiency year wise**

<i>Year</i>	<i>Mean efficiency</i>
2004	0.634
2005	0.716
2006	0.733
2007	0.726
2008	0.753
2009	0.740

As it can be seen in year 2004, Ethiopian MFIs reported mean efficiency of 0.634 which is relatively low; however, in 2009 the mean efficiency turned to be 0.74 and in the period they have shown notable improvement in their efficiency performance except slight efficiency decline from 2006 to 2007 and 2008 to 2009. Overall, over the period the mean efficiency increased by about 16.6 percent. The efficiency improvement in the period is more visible in figure 1 below.

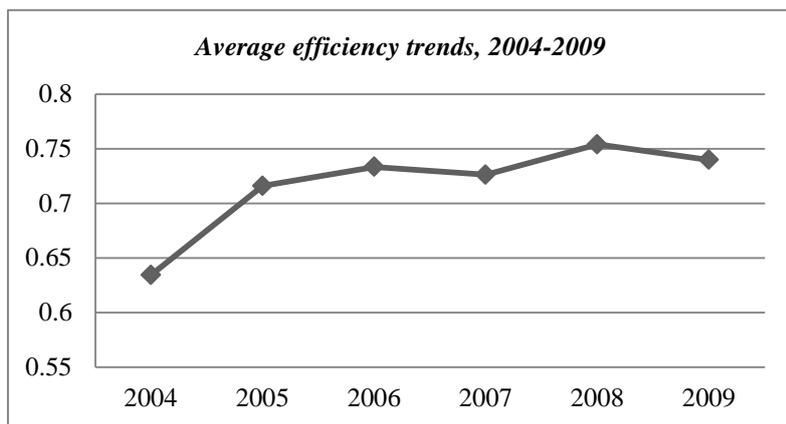


Figure 1 average efficiency trends of Ethiopian MFIs

It is interesting to observe a clear trend in time from the figure above and suggests that Ethiopian MFIs have experienced continuous improvement in their efficiency performance over the period.

V. CONCLUSIONS

This paper investigates the technical efficiency of Ethiopian microfinance institutions with panel data for 19 MFIs during 2004-2009 using the Stochastic Frontier Analysis. The results show that Ethiopian MFIs are operating at a sub optimal size with an overall mean efficiency for the group of MFIs to be 71.72%; indicating that there is substantial scope for improving efficiency performance of the MFIs without the need to use more resources. Moreover, provided that the prevalence of large variation in the level of technical efficiency across the institutions, the potential for increasing MFIs output (outreach) through efficient use of existing inputs varies greatly across the MFIs. Further the results reveal that asset, operational sustainability, women, and trend are important determinants of efficiency of MFIs. The negative signs linked to the variables of asset, sustainability and trend to inefficiency signifies that the positive influence of these variables on the efficiency performance of MFIs. Our findings also provide evidence on the tradeoff between efficiency and outreach of microfinance institutions. It can be concluded that the main sources of inefficiency for Ethiopian MFIs are attributed to scale, sustainability, management practices, and goal orientation of the institutions.

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