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The Measurement and Determinants of Economic Efficiency of Microfinance Institutions in Ghana: A Stochastic Frontier Approach

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Abstract

Microfinance institutions have become central players in socio-economic development especially in developing countries. This paper investigates empirically the economic efficiency of microfinance institutions in Ghana using a Cobb-Douglas Stochastic frontier model. A total of 135 MFIs were sampled for the period from 2007-2010. The underpinning assumption is that there is a possibility for economies of scale in lending if only firms improve strategies of mobilizing savings and provide good quality service to their clients. The estimated results showed an overall average economic efficiency of 56.29%; indicating a high degree of inefficiency in the economic behaviour of the units in the industry. The study further exposed that age and savings indicators of outreach and productivity, and cost per borrower were significant determinants of economic efficiency. It is therefore recommended that practitioners improve upon technical training programmes, operate diversified savings products to improve on portfolio quality and ensure sustainability; and also heighten the extent of social commitment to both staff and clients

1. Introduction

Microfinance has grown over the years to be one of the most effective tools used for fighting poverty. Its establishment was justified on the grounds that it is a first-best policy strategy to capture the existing gap between the poor and the

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financial market.

In Ghana, the use of microfinance is not recent; history suggests that it has long been used as a means of mobilizing funds at the informal sector for the economically active but financially constrained and vulnerable in society through the concept of rotatory savings (*Susu*)[1]. The activities of local money lenders albeit at exploitative terms; and the collective support of family members through shared labour hours (*nnoboa*)[2] and credit (*family loans*)[3] are all forms of microfinance packages which had been in place from time immemorial, (Steel and Andah, 2003)

Microfinance, a substitute for informal credit, covers a broad range of financial services including loans, savings, payment services - leases, and insurance to low-income households and microenterprises, Ledgerwood (1999). Yet like most policy instruments, the road has not been smooth. Its operations have been embroiled with lots of pitfalls that constrain optimum impact. According to Littlefield and Rosenberg (2004), microfinance is reaching only a small fraction of the estimated demand for financial products by the poor. While a few hundred institutions have proved to be sufficiently stable, most institutions are weak and donor dependent.

While it is evident that microfinance institutions have become central players in Ghana's socio-economic development, there are some indications to suggest that MFIs are not operating at full scale capacity or impact. For instance, only 10% of the potential demand for credit by the poor in the financial market is reached by MFIs in Ghana, (UNCDF, 2008). This can either be the result of a poor portfolio quality to meet the excess demand or a misapplication of capital resources in the sector. The significance of either or both of the aforementioned factors requires a conscious effort to improve on performance or efficiency. Similarly, reports also flood the media of huge embezzlements by managers of the scheme; as well as a high rate of default by clients. Though it may be true that lack of training may account significantly for these difficulties, it is also clear that little or no incentives to working staff to improve on individual or team performance or to achieve set targets; coupled with poor quality service to clients also contribute immensely to this phenomenon.

This paper therefore attempts to measure the performance of microfinance organisations in Ghana using the concept of economic efficiency with the application of the stochastic frontier approach. The motivation is based on the composition of economic efficiency (technical and allocative); which means it

captures for the effectiveness of the units in combining scarce inputs to produce the most attainable output.

The study objective is two-fold: to examine empirically the presence of inefficiency in the industry; and to explore the factors that determine the variation of efficiency levels across the units in the industry. The underpinning assumption is that there is a possibility of enjoying economies of scale and scope, if only firms will heighten the strategies of mobilizing enough savings to improve portfolio; as well as providing good quality service to clients in a sustained manner at least cost to members.

Regardless of the growing research in the area of investigating the efficiency of microfinance institutions worldwide including Africa; due to the strong nexus between microfinance and poverty reduction (Morduch and Haley, 2002), and the fact that MFIs have become central players in this development agenda, the study on the measurement of efficiency of MFIs in Ghana is highly unexplored. Known studies on efficiency in Ghana have largely concentrated on the industrial sector (see Mohammed and Alorvor, 2004), and the banking sector (see Frimpong, 2010). We therefore contribute to the growing research on efficiency by focusing on the economic efficiency of microfinance institutions in Ghana.

Secondly, most works on efficiency have largely employed a translog function in assessing the efficiency levels of organisations, (Gropper, *et al*.. 2006; Hermes *et al*, 2009a, Hermes *et al*, 2009b; Saad and El-Moussawi, 2009); our work utilises the Cobb-Douglas function, which is also used highly in empirical research, (Tariq *et al*., 2008; Baten *et al*., 2009). The purpose for using this technique, like most works that uses the Cobb-Douglas function, is to attempt to also find out ultimately the pattern of growth in the microfinance industry in Ghana (that is, whether increasing, constant, decreasing or negative returns to scale). This investigation is vital for policy modelling and discourse; and hence, informs practitioners on the level of expansivity in Ghana.

Finally, most empirical works on efficiency concentrates on estimating only the efficiency ratios and finding out the drivers of efficiency in the industry, this work will go a step further by presenting empirical evidences that gives an idea of how MFIs in Ghana operate.

Our findings lend empirical credence to how significant the institution of savings and a good social commitment to both staff and clients; is to the sustainability and the performance of microfinance institutions. We find that the main sources of inefficiency in the sector in Ghana are mainly due to differences

in management strategies and technical constraints.

The rest of the paper is organized as follows: the second section will review related literature on economic efficiency. Third section will look at the method used in the study. The next section will give the presentation of the results; whilst the final section will give a conclusion of the findings of the study.

2. Literature review

2.1 The Concept of Economic Efficiency and Microfinance

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). Annim, (2010) also provide a working definition for efficiency as the optimal combination of staff time, staff number and cost of operation to respectively disburse and reach the maximum number of loans and clients, especially the deprived, while delivering a range of valued services.

In other words, when an MFI pursues efficiency, it will afford management to concentrate on activities that yield more results at minimum cost to the units and to clients. Hence, attention will be given to the designing of correct product lines, effective market strategy, good targeting efficiency and the gradual removal of bottlenecks in supply.

Gonzalez Vega, (2003) cited in Martinez-Gonzalez (2008) suggest that because there are potentially few technically trained staff in the field of microfinance, available funds may be misapplied. The lack of incentive packages could also influence the behaviour of staff and managers while, lapses in decision making and policy implementation, incorrect regulation and inappropriate intervention by donors, incorrect product designs and methodologies all create enormous wastes. The improvement of the microfinance sector will not suffice when wastes persist, Martinez-Gonzalez, (2008).

2.2 Methodological Framework

Two different methods for measuring efficiency levels have been widely used in empirical research: non-parametric (data envelopment analysis) and parametric approaches (stochastic frontier approach). Both approaches come with their strengths. Indeed, the debates on efficiency have still not come into consensus on the superiority of one approach over the other. Stochastic frontier approach (SFA) utilized in the current study has at least two advantages over nonparametric approaches. First, nonparametric methods assume that the variations in firm

performance are all attribute to inefficiency. This assumption is problematic as it ignores the measurement errors, omitted variables and exogenous shocks in the measurement. Second, hypotheses testing can be carried out for the parameters estimated by parametric methods (SFA). Main disadvantage of using parametric methods is its restrictions on the observed datasets through the imposition of functional form; meanwhile, efficiency measurement is also highly dependent on whether the functional form reflects the reality or not, (Tariq et al., 2008).

SFA models a cost, or a production frontier with an error component that is decomposed into two. One component represents statistical noise; and the other component captures for inefficiency. The inefficiency error component is assumed to be either a half normal, exponential, truncated normal or gamma distributed, (Berger and Humphrey, 1997; Murillo-Zamorano, 2004).

This work, like most empirical works, uses the Battese and Coelli (1995) SFA model specification for panel data generally specified as:

$$\ln C_{i,t} = C\left(y_{i,t}, x_{i,t}; \beta\right) + \varepsilon_{i,t} \tag{1}$$

Where $C_{i,t}$ is the total cost MFI *i* faces at time *t* and $C\left(y_{i,t}, x_{i,t}; \beta\right)$ is the cost frontier. $y_{i,t}$ is the logarithm of output of MFI *i* at time *t*. $x_{i,t}$ is the vector of logarithm of inputs of MFI *i* at time *t*. $\varepsilon_{i,t}$ is the composed error term which is decomposed as $\varepsilon_{i,t} = (v_{i,t} + u_{i,t})$. The term $u_{i,t}$ captures cost inefficiency and is independent and identically distributed with a variance of σ_u^2 whilst $v_{i,t}$ captures random effects, and is distributed as a standard normal variable, such that:

$$v_{i,t} \rightarrow iidN\left(0, \sigma_v^2\right)$$
$$u_{i,t} \rightarrow N^{+}\left(0, \sigma_u^2\right)$$

The stochastic inefficiency term is defined as

$$u_{i,t} = \delta_0 + \sum_n \delta_n z_{n,i,t} \tag{2}$$

Where, *z* represents the vector of *n* variables that determine the inefficiency of MFI *i* at time *t*. $\delta's$ represent the coefficients to be estimated. It is assumed in

this study that the inefficiency term follows a half normal distribution as typified in most econometric works. The expected value of the u_i's conditional on the composed error term is measured as follows:

$$E\left[U_i \middle/ \varepsilon_i\right] = \frac{\sigma\lambda}{1+\lambda^2}\left[\frac{f_s\left(\varepsilon_i\lambda \middle/ \sigma\right)}{F_c\left(-\varepsilon_i\lambda \middle/ \sigma\right)} - \frac{\varepsilon_i\lambda}{\sigma}\right] \tag{3}$$

Where f_s (.) is the density of the standard normal distribution and F_c (.) is the cumulative density function, (Murillo-Zamorano, 2004). To yield consistent parameters of the above equations, maximum likelihood estimation procedure will be used. The restrictions imposed by the model leads to various interesting results; such as the value of

$$\sigma = \left(\sigma_u^2 + \sigma_v^2\right)^{1/2};\ \lambda = \sigma_u \big/ \sigma_v \ \text{ and } \gamma = \frac{\sigma_u^2}{\left(\sigma_u^2 + \sigma_v^2\right)}.$$

Where;

σ = total variation

σ_u^2 = variation due to inefficiency

σ_v^2 = variation due to noise

λ = the ratio of the standard deviation of the inefficiency component to that of the noise component. How high the value of lambda is, expresses how strong the evidence of the presence of inefficiency in the data is.

γ = specifies the ratio of the variation due to inefficiency to the total variation. With a parametric restriction between 0 and 1, a high gamma also represents the explanatory power of inefficiency in total variation. (Radam et al, 2010).

Additionally, a log-likelihood ratio test is also conducted to ascertain whether the estimated frontier model is robust. This is a test to show the significance or otherwise of the inefficiency component. The null hypothesis; which states that there is no inefficiency in the observed behaviour of units sampled (H_0: $\mu=0$) is tested against the alternative hypothesis; H_1: $\mu>0$. If the null hypothesis is true the stochastic frontier model reduces to an OLS model with normal errors.

Empirical application of SFA techniques are found in the works of Hermes et al., (2009a, 2009b) who found indicators of financial development, poverty goals, experience, and type of loan as important drivers of efficiency using a sampled data of 435 MFIs over the period 1997-2007. Chen (2009) also uses

bank level data to study the efficiency of the banking sectors of 10 sub-Saharan African middle-income countries. The author focused on the cost efficiency of the banks utilizing aggregate influence rather than bank or country specific levels. The result of the study indicated a possible 20-30% reduction of total cost by the banks if they operated on the efficient frontier. It was also found that the foreign-owned and private banks were more efficient than the public banks. Among the factors that affected efficiency levels, the authors found that macroeconomic stability, depth of financial development; competition and strong legal framework were important drivers of efficiency.

Mbanasor and Kalu, (2008) conducted a study which applied a translog stochastic frontier cost function to measure the level of economic efficiency and its determinants in commercial vegetable production systems in Akwa Ibom State, Nigeria. The authors used a multi-stage random sampling technique to select 150 farmers from whom input-output data and information on prices were obtained. The results of the study showed that 99% of the variations in the total production cost are due to differences in cost efficiencies. Economic efficiencies ranged from as low as 13% to as high as 99% with a mean efficiency of 61%. The study found the level of education and household size to be negative and significant whilst age, farm experience, extension visits and access to credit were significant and directly related to economic efficiency.

Tariq and Ahmed (2008) also present empirical findings on the case of 40 MFIs in India by applying a stochastic frontier approach for unbalanced data. The findings showed that the mean efficiency scores were low about one-third; even though it was increasing over the sampling period, 2005 – 2008. Their findings also showed no trade-off between efficiency and outreach. The age of the institution representing the level of experience gained; location and regulation were estimated as the significant determinants of the efficiency level.

Mokhtar, Abdullah and Habshi (2006) also attempt to investigate the efficiency of Islamic banks in Malaysia using stochastic frontier technique. The results of their study showed that the average technical and cost efficiencies of the conventional banks were higher than those of the Islamic banking system. Other studies utilizing SFA are Atkinson and Cornwell (1994), Kumbhakar and Lovell (2000).

3. Data and Model Specification

135 sampled units were included in the study from the broad spectrum of microfinance institutions in Ghana. Data was mainly sourced from Ghana

Microfinance Information Network (GHAMFIN), Association of Credit Unions (CUA) and other identifiable microfinance institutions across the country. As already indicated, the cost function was specified using a Cobb-Douglas function although the translog function is widely used in literature. Despite its known limitations, the Cobb-Douglas function was chosen because there is the tendency of the large number of parameters in translog model to exhibit near-multicollinearity, especially given that different output variables are used, (Farsi and Filippini, 2004). Secondly, the use of the Cobb-Douglas function was to aid in identifying the pattern of growth in the microfinance sector in Ghana; such a purpose will not be feasible if a translog function is used. Indeed, Ahmad and Bravo-Ureta (1996) concludes that functional form has a discernible, but rather small impact on estimated efficiency.

Again, in empirical analysis, three alternative approaches - fixed-effects model, random effects model and maximum likelihood techniques – for panel data are used regarding the stochastic frontier technique, (see Kumbhakar and Lovell, 2000; and Murillo-Zamorano, 2004); this study employs the maximum likelihood method as typified in numerous empirical works.

Cost efficiency, here, is measured in terms of how close the actual costs of the lending activities of an MFI are to what the costs of a best-practice MFI would have been in case it produces identical output under the same conditions, Hermes et al., (2009). Using the intermediation approach, the cost function is then specified as:

$$\ln (TC_{i,t}) = \beta_0 + \beta_1 \ln (Salary) + \beta_2 \ln (R_{i,t}) + \beta_3 \ln (Brw_{i,t}) + \beta_4 \ln (GLP_{i,t}) + v_{i,t} + u_{i,t} \quad (4)$$

$TC_{i,t}$ represents total costs MFI i faces at time t, Salary represents the price of one unit of labor for one year, $R_{i,t}$ is the interest payment per deposits held, $Brw_{i,t}$ is the number of active borrowers, $GLP_{i,t}$ is the gross loan portfolio. $v_{i,t}$ is the random disturbance term and $u_{i,t}$ is the inefficiency term. *TC* is measured as the total expenses of an MFI. It is from this cost function that the cost frontier model is going to be estimated including the economic efficiency ratios for the observed units.

To follow the footsteps of most micro econometric researchers on efficiency, the ratios computed will be regressed on other control and firm-specific variables to aid in determining the factors that affect efficiency in Ghana. The efficiency model is specified as:

$$EE = \delta_0 + \delta_1 SAVINGS + \delta_2 CPB + \delta_3 BPF + \delta_4 DPS + \delta_5 ASB + \delta_6 ALB + \delta_7 AGE + v \quad (5)$$

EE represents the log of the efficiency distribution for MFI *i* at time *t*. *v* is the disturbance term. *ALB* is the average loan balance per borrower (in GHS). It is calculated as total loans divided by the number of active borrowers. Higher values of *ALB* indicate that MFIs involve relatively rich clients (middle income earners). A positive (negative) sign of the coefficient indicates that granting huge (small) loans to clients improves efficiency, Hermes et al., (2009a, 2009b)

ASB, on the other hand, is the average savings balance per saver of the MFI (in GHS) calculated as the total deposit divided by the number of savers. Again, higher values for this variable indicate that the clients of the MFIs are rich. A positive (negative) sign for the coefficient also indicates that collecting huge (small) savings from clients improves on the efficiency of microfinance units. ALB and ASB, as indicators of outreach, measure the socioeconomic level of the clients that patronize the services of the microfinance organisation. The inclusion of these two indicators of outreach in the model is critical to the study as it illustrates the operational methods of the MFIs in Ghana.

CPB (cost per borrower) – measured as the operating expenses (personnel and administrative) divided by number of active borrowers. This is an indicator that shows how much the microfinance unit spends on borrowers. It is therefore a proxy for good service delivery. *Savings* is the total number of savings mobilized by the MFI at time, *t*. Two indicators of staff productivity are included in the efficiency model to estimate their significance on the performance of MFIs: borrower per field officer (BPF) and depositor per staff member (DPS). *BPF* (borrower per field officer) – measured as the total number of active borrowers over the number of field officers, whilst DPS (depositor per staff member) – is measured as the total number of savers over staff member.

Age is a measure of the experience of the MFI, i.e. the number of years since its establishment. The sign the parameter assumes is critical: a positive sign shows that experience counts in the microfinance sector; whereas, a negative sign indicate that younger firms are more efficient than the older firms. All the exogenous variables are in natural logs. It is expected that all the coefficients of the explanatory variables (Salary, Interest expenses, and Gross loan portfolio) in the cost frontier model will be positive and significant; since a rise in any of the above variables is expected to cause an increase in total expenditure of the

microfinance institution. Yet again, it is expected; a priori, that the coefficient of the indicators of outreach, *ALB* and *ASB*, will alternate in signs plus the parameters for *Savings, CPB, AGE*, and indicators of staff productivity (*BPF* and *DPS*) also assuming positive and significant signs.

4. Empirical results

Based on the model specified above (model 4), table 1 presents the maximum likelihood results of the cost function parameters. All the parameters are significant at 1% significant level. The results of the maximum likelihood estimates of the parameters of the Cobb –Douglas Stochastic Cost frontier function indicate that all the parameters are positive and significant at 95% confidence interval. The sum of the elasticities of the input variables to cost (1.030) shows a constant cost to size. This is an indication that there is a possibility of growth in the microfinance sector. Also, it is shown that cost on personnel (salary) constitute a greater percentage of the operational cost of firms sampled, about 42%; whilst interest payments on member savings takes 18% share of total cost. This is observed because a number of institutions sampled did not make any interest payment on deposits within the sample period or are not simply qualified to receive savings from members according to the regulatory policies of the Bank of Ghana.

Table 1: Maximum Likelihood Estimates of the Cost Function

Coefficient	Parameter estimate	Standard error	Z – values	P-values
ln Glp	.2975237	.0386824	7.69	0.000
ln Salary	.4154607	.0328936	12.63	0.000
ln R	.1849503	.0337918	5.47	0.000
ln Borrow	.132414	.038758	3.42	0.001
Constant	3.172176	.3967053	8.00	0.000
Sigma v	.5086646	.042525		
Sigma u	.7683274	.0874075		
Sigma2	.8490666	.1122605		
lambda	1.510479	.1188459		

Notes: Log likelihood = -309.52761 Wald chi2(4) = 755.2 Prob > chi2 = 0.0000 Nos. of iterations = 6

The likelihood ratio test result also shows that the null hypothesis is to be rejected for the alternative hypothesis of the existence of inefficiency in the observed behaviour of units sampled. The $\chi^2 = 13.28$ with a probability of 0.00 shows the

strength of the cost frontier model to estimate the relationship between observed variables of the industry.

The value of $\sigma^2 = 0.849$ indicates that a significant variation in cost is due to differences in cost efficiencies. This therefore illustrates the goodness of fit and the correctness of the distributional assumption about the error term. Based on $\lambda = 1.5105$, the estimate of gamma can be derived which measures the effect of cost inefficiency in the variation of in the observed unit [$\lambda^2/(1+\lambda^2)$]. The estimated value of 0.6953 implies 69.53% of the total variation in the level of total cost is due to the presence of inefficiency.

Overall, the distribution of economic efficiency scores displayed ranged from 7.12% to 79.92% across the sampled units between 2007 -2010 with an average of 56.29%. The microfinance units therefore exhibited significant differences in inefficiency from 20.08% to 92.88%. The average economic efficiency score indicate that on the whole, the average microfinance unit can reduce cost by 43.71% and still produce the same output by improving on its technical and allocative efficiency performances. Nonetheless, if the average microfinance unit were to attain the level of the most cost efficient unit within the sampled units then the average MFI could experience cost savings of 29.57% [1-(56.29/79.92)]. The same computation for the most economically inefficient firm reveals cost savings of 91.09%. The trend of average scores over the years also shows some notable results: average economic efficiency declined from 2007 to 2008 but begun to improve afterwards. This phenomenon can be logically alluded to the global economic crisis between those periods. It is also noted that 2007-2008 were very challenging years in Ghana where a downturn in economic performance were encountered and this might have affected the MFIs as well. The mean annual efficiency scores from 2007-2010 are 62.20%, 53.22%, 55.58% and 60.98% respectively. A frequency distribution of the economic efficiency scores of the MFIs calculated over the 3year sample period is presented on the following frequency table. Analysis shows that the majority of the sampled units had efficiency ratio greater than 0.60 but less than 0.70.

Table 2: Frequency Distribution of Economic Efficiency of MFIs for 2007 -2010

Efficiency levels	Frequency	Percentage
EE $\leq$ 10	1	1.5
10 < EE $\leq$ 20	1	0.7
20 < EE $\leq$ 30	0	0
30 < EE $\leq$ 40	8	4.4
40 < EE $\leq$ 50	23	9.6
50 < EE $\leq$ 60	37	28.15
60 < EE $\leq$ 70	40	35.56
70 < EE $\leq$ 80	10	9.6
80 < EE $\leq$ 90	0	0.7
EE > 90	0	0

Mean Score: 56.29%. Minimum Score: 7.12%. Maximum Score: 79.92%

To delve deeper in the exploration of economic efficiency in Ghana requires an investigation into the determinants of efficiency. The efficiency model results indicate that factors such as savings, cost per borrower, age, average loan balance, average saving balance, and indicators of productivity are significant determinants of efficiency. However, apart from the constant and average saving balance which was negative, all the coefficients of the other parameters were positive. The alternate signs between *ASB* and *ALB* agreed with a priori expectations. The implication is that the microfinance institutions are dealing with both poor and relatively rich (middle income) households. This may describe a good scope of outreach. It could also mean that MFIs are rewarding the small regular savings of clients with huge loans; and not that they target the relatively rich per se. Average loans per savings index computed shows that on the average the MFIs grant loans of about 4 times higher than the savings amount of the clients.

Table 3: Loans per Savings Ratio of MFIs

Variable	Mean	Std Err	Min	Max
Loans per Savings	3.70068	6.4919	0.759375	63.47647

It will therefore not be erroneous, from the results obtained, to conclude that the operational objectives of MFIs in Ghana may not necessarily be to target the ultra-poor per se; but to capture the non-banked sector of the economy; both the relatively rich and the poor alike.

The results obtained for savings and cost per borrower also supports the assumption that the possibility of enjoying economies of scale and scope can be achieved if the microfinance industry as a whole will improve on strategies to mobilize more savings whilst providing good customer care to members. . It is also implied that MFIs that collect enough savings perform better than the MFIs which do not. This has various implications for policy modelling: for the microfinance institutions to be financially self-sufficient, regulatory bodies must allow the institutions to introduce savings into their operations. MFIs must not be prohibited from receiving deposits because they do not qualify to do so. Furthermore, management of institutions legally mandated to collect members' savings must determine surrogate strategies of mobilising more savings to ensure long term sustainability and efficiency.

Table 4: Determinants of Efficiency

Variables	**Coefficient**	**Std. Error**	**z-Statistic**	**Prob.**
Constant	-0.097095	0.092433	-1.050443	0.2935
ASB	-0.000135	3.76E-05	-3.602092	0.0003
ALB	1.15E-05	2.87E-06	4.020605	0.0001
Savings	0.022392	0.008788	2.548135	0.0108
CPB	0.058259	0.005950	9.791692	0.0000
DPS	0.018625	0.005346	3.483907	0.0005
BPF	0.001313	0.000632	2.077701	0.0377
Age	0.022147	0.009650	2.295068	0.0217

The positive coefficient of the parameters for productivity (*BPF* and *DPS*), prove that the performance of the staff has a significant impact on the efficiency of the MFIs: the higher the productivity of the workers, the more efficient the institution. The variation of productivity levels of workers across the industry

can be explained by the nature of training programmes the MFIs conducts for the staff, the skills sets of the staff, the capacity of the MFI to attract skilled personnel, the degree of motivation – salary structure and other incentives to output; and also may be as a result of the marketing strategy of the microfinance institution. The positive coefficient of *AGE* suggests that inefficiency deteriorates as the microfinance institutions grow. This also goes to confirm the importance of training and experience in the microfinance industry, as the evidence shows the existence of a learning curve effects in the sector. This is consistent with the findings of Tariq et al (2008).

There is therefore enough evidence to conclude that the sources of the high variation of inefficiencies across the group of microfinance institutions in Ghana is due to variation in management practices and technical capacities: the product designs, portfolio quality, effectiveness of the marketing strategies, the degree of commitment towards clients and staff, the level of experience of the MFI, the effectiveness of training programmes plus the productivity of the workers are important factors that account for these variation.

5. Conclusion

The paper has presented maximum likelihood estimates of economic efficiency of 137 microfinance units in Ghana for 2007-2010 sample periods using a Cobb-Douglas stochastic frontier model. The paper found that the MFIs are producing at constant cost to size with an overall average economic efficiency for the group of MFIs to be 56.29%; giving an indication of a possible substantial reduction in cost. In the estimation of the efficiency model, the significance of savings, indicators of productivity and cost per borrower were revealed, giving proof to the assertion that microfinance units must explore avenues and strategies to mobilize more savings. Hence, there is a possibility of enjoying economies of scale in lending, so long as the microfinance units institute and or heighten savings mobilization strategies in their operations. However this will only take effect if there are well-motivated and well-equipped staffs that are set to offer valued financial services to clients. The results on CPB indicate that MFIs that spend time and resources on customers tend to improve efficiency than those that neglect their social responsibility (monitoring, technical training and advice, meetings) towards their members. A good quality of service will boost the confidence of customers and provide the clients with more leverage to improve their lives and business more than the credit facility alone.

It is also implied from the results obtained that the operational objective of

microfinance organisations in Ghana is not necessarily to target the ultra-poor, but to serve the market with innovative services and products where the formal financial system had failed; and that may include services to both the rich and poor clients.

To sum up, the study results confirm that the main sources of inefficiencies in the microfinance sector in Ghana are due to the variation in management practices and differences in technical capacities (both in training and portfolio quality). We therefore recommend that practitioners improve upon technical training programmes. Firms should also endeavour to operate diversified savings products to improve on portfolio quality in order to ensure sustainability; instead of relying greatly on subsidised funds from donor agencies or on-lending credit facilities from government agencies and other second-tier organisations. We also call for a flexible but stringent policy that will allow for all microfinance institutions to be able to receive deposits from clients and not be barred from doing so; on the grounds of not meeting technical or regulatory requirements. However, at the firm level, management must also heighten the scope of social commitment to both staff and clients whilst improving on marketing strategies; these efforts will ensure long term sustainability.

Indeed, it is obvious that the model utilized by the paper incorporates only few variables. Several factors that may be crucial indicators of efficiency were not included such as the external environment MFIs operates, the market structure, competition and subsidies. Caution is therefore advised on the interpretation of the estimated results of the study.

Notes

1. *Susu* is a system whereby members make daily savings contribution into a group fund with the purpose of rotating the monthly accumulated savings among the members until each member have an equal opportunity of receiving the accumulated mobilized savings; or an emergency loan if the time for a receipt is not due a member.
2. The *nnoboa* system is the traditional mutual assistance where communities, families or friends will mutually agree to assist one another to undertake projects or harvest farm produce through either labour exchange or financial arrangements. This is for the purposes of reducing harvest losses and labour costs.
3. Family loans are credit individuals receive from family heads, relatives, friends, and neighbours.

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