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Efficiency of Microfinance Institutions in East Africa: A Data Envelopment Analysis

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Abstract

This study evaluates the efficiency of Microfinance institutions operating in East African using non parametric approach (Data Envelopment Analysis). The study used production approach to estimate efficiency scores of 35 MFIs under both constant and variable returns to scale. The results show that, MFIs in East Africa have higher efficiency scores in average. The average technical efficiency scores were 0.706 (2009), 0.798 (2010) and 0.852 under constant return to scale and 0.823, 0.892 and 0.891 under variable return to scale for three years respectively. The average efficiency trend was found to be positive with low efficiency scores in 2009 and high scores in 2011. The numbers of MFIs at efficient frontier line under both returns to scale were 5, 8 and 11 in 2009 to 2011respectively. The findings also show that, on average the banks and non bank financial Institutions were more relatively efficient compared to NGOs and Cooperatives while the country efficiency averages show that, Kenya and Rwanda had higher average efficiency scores for three years under constant return to scale while Tanzania and Uganda have higher average efficiency scores under variable return to scale. The study recommends that, MFIs in the area should improve their efficiency by better allocation of input resources used and reduction of the amount of waste, since most of the inefficiency was found to be technical in nature.

Keywords: Microfinance Institutions in East Africa, Efficiency, Data Envelopment Analysis (DEA)

1. Introduction

Microfinance Institutions emerged as an alternative financing source and a powerful instrument for poverty reduction among relatively poor people through the provision of broad range of financial services such as loan, deposits, payment services, money transfer and insurance services (Robinson, 2003; ADB, 2000). Among the major objective of these institutions was to help poor people who are financial constrained and vulnerable, with financial services to enable them to engage in productive activities or start small businesses (CGAP, 2009). With a primary objective of social mission through outreach to the poor, Microfinance institutions were originally financed entirely by grants, low-interest loans and donor's subsidies (Zeller & Mayer, 2002), and offered financial services at low cost to ensure that the poor could access the services. This resulted into highly dependence on subsidies and grants from the donors, governments and other development agents (Armendariz & Morduch, 2005). With rapid growth of Microfinance sector, they have been a change in the line of thoughts among donors, policy makers and other stakeholders about the profitability and efficiency of these institutions (Cull et al, 2009; Barres et al, 2005), also they have been changes in business environment including, increased competitions, involvement of more commercial banks offering microfinance services and advancement in banking technology which have affected Microfinance institution's operations and their way of doing business (Rhyne & Otero, 2006). This has led to the increasingly debate on the need for sustainable and efficient Microfinance institutions, which can cover their operating costs with better allocation of scarce resources (Morduch, 2000; Hermes et al, 2008).

In East Africa, Microfinance Institutions emerged as a result of financial sector reforms, which took place in 1990's aiming at developing sustainable, efficient and effective financial systems through strengthening monetary control, boosting deposit mobilization, stimulating competition in financial markets, enhancing the efficiency in financial services provision and financial resources allocation, structuring insolvent banks and promoting the diversification of financial services (Kibirango et al, 1992). Among the major roles of financial sector reforms were to restructure the financial sector to allow the establishment of private banks and financial institutions so as to foster the provision of financial services to the people and institutions which could not be reached by the licensed public banks. As a result

of the reforms, Microfinance Institutions were established aiming at establishing the basis for efficient and effective systems that will serve the low-income segment of the society and thereby contribute to economic growth and reduction of poverty (URT, 2000; Kavura, 1992). Different types of Microfinance institutions such as NGOs, SACCOs, SACAs, CBOs, commercial banks offering microfinance services, microfinance companies, government microfinance programs and other microfinance institutions (BOT, 2005), were then established with the primary objective of offering financial services to the poor by giving them opportunities to support their enterprises, economic activities as well as their household financial management and consumption needs in order to ensure poverty reduction and country economic growth.

The financial reforms in East African countries have significantly improved the financial service's conditions to the poor through MFIs which unlike traditional banks with formal lending systems, MFIs use informal lending mechanism using group lending and family lending with small size loans and shorter maturity. Although the importance of MFIs in the area has increased recently as the alternative financing source not only to the poor clients but also to small enterprises, most of MFIs in the area still operate at loss with negative returns and face liquidity problems due to more dependence on donations, grants and other subsidies to support their operations (Marry & Tubaro, 2011; Nyamsogoro, 2010). So far, very few empirical studies have been conducted in the areas to seek the evidences on the causes of failure and poor performance of these institutions. Most of the studies conducted in the area have focused on outreach to the poor and poverty alleviation with few studies analyzing sustainability of these institutions, in particular, member countries using performance indicators (Nyamsogoro, 2010; Kessy & Urio, 2006;Kiiza *et al*, 2004;Barnes *et al*, 2001). Still little is known about performance of MFIs in East Africa, especially on the efficiency use of the resources from both public and private sources. This study therefore aims at providing empirical evidence on performance of MFIs in East Africa in terms of their relatively efficient as the producers of financial services to the poor people who are financially constrained. The study also aims at providing the benchmark for performance of MFIs operating in East African community members, to assist in policy formulation for improving performance and growth of the firms in order to meet millennium goals of poverty reduction and country's economic growth as well.

2. Literature Review

Efficiency in Microfinance institutions refers to efficient use of resources such as the subsidies, human capital and assets owned by Microfinance institutions to produce output measured in terms of loan portfolio and number of active borrowers (ILO, 2007). Efficiency is an important attribute in any organization including MFIs in a number of reasons, first input resources (Time, money, raw materials, machine, labor, etc) used by MFIs are scarce and limited since donors are unwilling to fund MFIs to the required capacity to serve all poor clients (Rosenberg, 1994), second the rapid growth of MFIs sector across the world has increased competition for donor funds, third the recognition of MFIs by development expertise as a promising and new tool for poverty alleviation has increased the need for their efficiency in the use of public funds, fourth increased competition among MFIs themselves has resulted into lowering interest rates and operating more efficiency (Hermes *et al*, 2009), fifty profitability potentials of microfinance industry have attracted commercial banks and other private investors to engage into microfinance business with efficient operations, better utilization of the resources and reduction of the amount of wasted and lastly most of the donors are now interested in funding MFIs which are sustainable and efficient (Barres *et al*, 2005). Efficiency measurement in MFIs is also very crucial as it gives information about the firm performance especially on the use of resources and minimization of wastes. It helps organizations in setting their targets for monitoring activities through better management of their bottlenecks and its barriers hindering the performance and also helps the measurement, monitoring and improvements of results leading into increased performance and profitability of the firm (Reynolds & Thompson, 2002).

Efficiency in Microfinance institutions can be divided into two components in order to capture the double bottom line mission of microfinance institution, the financial efficiency and social efficiency (Nieto *et al*, 2009). Financial efficiency in microfinance institutions is based on technical efficiency, which is based on assumption that the larger the productive that microfinance institutions are, the more the efficiency (Sanchez 1997). Microfinance institution financial efficiency can be viewed as either production efficiency or intermediation efficiency depending on the choice of inputs and output variables. The production approach views microfinance institutions as producers of services for poor clients and assumes that, the services are produced by utilizing physical resources of the institution

such as capital, labour, assets and operating costs to produce loans, revenues, and savings (Nghiem *et al*, 2006;Bassem, 2008; Haq *et al*, 2010; Nieto *et al*, 2007; 2009) . Under intermediation efficiency, Microfinance institutions are considered as intermediary institutions which collect funds from economic units with excess resources (Savers) and channels them to economic units with the deficit (borrowers) hence transferring the purchasing power from surplus units to deficit units in the society (Kipesha, 2010). Social efficiency on other hands indicates the ability of Microfinance institutions to manage its resources such as assets and personnel (Von Stauffenberg *et al*, 2003). Social efficiency is related to welfare policy as it evaluates the efficiency to which resource utilization in MFIs impact to the society especially on women and poverty impact.

Empirical studies on efficiency of Microfinance institutions around the world has shown different results, with most of them indicating that Microfinance institutions are not yet efficient in the use of their input resources to produce output. Among the recent findings on Microfinance institutions efficiency across the world, included the study by Haq *et al*, (2010) which examined the cost efficiency of Microfinance institutions across Africa, Asia and Latin America under two assumptions, microfinance institutions as producer of loans to clients (productivity efficiency) and Microfinance institutions as intermediary institutions (Intermediation efficiency). The results indicated that nongovernmental MFIs were more efficient particularly under production efficiency. The results were consistent with the dual objective of Microfinance institutions of poverty alleviation and achieving financial sustainability. The results also indicated that banks with microfinance services outperform nonbank Microfinance institutions in terms of measures of efficiency under intermediation efficiency and that there was no trade off between efficiency and outreach. Likewise the study by Hassan & Sanchez, (2009) investigated technical efficiency and scale efficiency of MFI in three regions, Latin America, Middle East and South Africa and South Asia countries by comparing their efficiencies across the regions and across different types of MFIs. The study found out that technical efficiency was high in formal microfinance than in informal microfinance and the source of inefficiencies was found to be pure technical rather than scale suggesting that, MFIs in reviewed are either wasting resources or are not producing enough output.

Elsewhere, studies on MFIs efficiency in Latin America show that most of MFIs in the region have high efficiency (Farrington, 2000) and that, the level of efficiency depends on the variable specifications and the model used (Nieto *et al*, 2007). The study by Bassen, (2008) on efficiency of MFIs in the Mediterranean zone reported that only 8 MFI were relatively efficient and the size of MFIs was found to affect their efficiency, while Ahmad, (2011) evaluated how efficient were Microfinance in delivering credit to the poor in Pakistan, found out that only three MFIs out of twelve were efficient with decreasing efficiency trend as compared to previous years. Islam *et al,* (2011), provided evidence from Bangladesh in which technical, economic and allocative efficiency of agricultural microfinance institutions borrowers and non borrowers in rice faming was examined. Using survey data the study reported that the mean technical, allocative and economic efficiencies were 72%, 66% and 47% respectively in the pooled sample under variable return to scale specifications and a significant difference was observed between efficiency scores of Microfinance borrowers and non borrower's institutions. Likewise Qayyum & Ahmad, (2006) estimated the efficiency of Microfinance institutions operating in three countries of Pakistan, India and Bangladesh in South Asia. The findings from the study reveals that, most of inefficiency MFIs was mainly technical in nature and only three MFIs were efficient in Bangladesh and only two MFI were efficient in India. The study suggested that MFIs in South Asia should improve the managerial expertise and technology used in offering services in order to improve efficiency in such institutions.

In Africa, the evidence on efficiency of MFIs operating in the region indicates that most of them are still inefficient. The study by Lafourcade *et al,* (2005) on efficiency of African microfinance Institutions reported that, formal MFIs had higher efficiency as compared to semi formal and cooperative MFIs are less efficient as compared to other type of Microfinance institutions. Furthermore the study found out that, Africa was the most productive MFI region on the basis of cost per borrower and cost per saver than other regions. On other hand, the study by Abayie *et al*, (2011) investigates economic efficiency of 135 Microfinance institutions in Ghana, the results shows an average of 56.29% overall economic efficiency which indicate a high degree inefficiency in the economic behaviour among the MFIs surveyed in Ghana. The study recommended improvement in technical training programs, operation of diversified saving products in order to improve portfolio quality and ensure sustainability and also improvement in social commitment on both staff and clients in order to improve social efficiency. Likewise the study by Baumann, (2005) compared performance of selected MFIs (micro credit, and NGOs) that have poverty alleviation focus in South

Africa and found out that most of MFIs in the country were not efficient as compared to other MFIs in the world.

3. Model Specification and Data

Efficiency of firms have traditionally been measured using performance indicators by the use of ratios, recently two advanced approaches have emerged and widely used by different scholars in different fields as the measures of efficiencies of economic units. The approaches include the parametric approach (Stochastic Frontier analysis) and mathematical programming approach also known as Data envelopment analysis (DEA). Stochastic frontier analysis specifies a functional form for the cost, profit or production relationship among inputs, outputs and environmental factors (Coelli *et al*, 1998). Stochastic frontier defines the best combination of inputs that can be used to produce an output and is estimated using maximum likelihood method which incorporates a composed error term. On other hand DEA does not use specific functional forms in estimating efficiency of firms (Drake & Hall, 2003) rather it construct the best practice production function solely on the basis of observed data, hence no possibility of making mistake in specifying production function (Jemric & Vujcic, 2002). DEA as a non parametric model has the ability to handle variable return to scale and multiple variables without prices of input and output requirement which make it a favorable approach in efficiency measurement than stochastic frontier analysis (Ruggiero, 2005). DEA model was a result of Farrell, (1957) work, it was a piecewise linear convex isoquant also known as mathematical programming technique. The model was later developed and extended by Charnes, Coopes & Rodes, (1978), Banker, Charnes & Cooper, (1984) and others to form Data envelopment analysis model. DEA provides estimates for the projection of inefficient decision making units (DMUs) as compared to efficiency frontier, the projections involves input contractions or output expansion or both. Regardless of its weakness in measuring efficiency such as lack of measurement of error and luck factors, sensitivity to error and outliers, inability to measure absolute efficiency and ignoring of price information (Fiorentino *et al*, 2006; Berger & Mester, 1997), DEA has continued to be an important and powerful measure of firm's efficiency (Jemric & Vujcic, 2002) and has become more popular tool used in evaluating efficiency (Zhu, 2003). Moreover DEA have widely been used in analyzing efficiency of financial institutions such as studies by Portela & Thanassoulis, (2007), Akhtar (2002), Sathye (2001) and Aikaeli (2008) which used DEA to measure different aspects of efficiency in banking industry and studies such as Bassem (2008), Qayyum and Ahmad (2006), Nieto et al (2009) and Nghiem et al (2006) which used DEA to measure efficiency of microfinance institutions. This study also uses DEA model to evaluate the efficiency of Microfinance institutions in East Africa using both CCR (Charnes et al 1978) and BCC (Banker et al 1984) in order to explore efficiency under both return to scale specifications.

To construct a DEA model for measuring technical efficiency (TE) in Microfinance Institutions using input oriented approach, let's assume there K decision making units (DMUs) which represents Microfinance Institutions (MFIs), which use N inputs resources to produce M outputs. If we denote inputs by xjk (j=1,……..,n) and the outputs by yik (i=1,……,m) for each DMU then technical efficiency of DMUs under input orientation can be expressed as:

:

$$MinTE = \frac{\sum_{i=1}^{m} u_i y_{is}}{\sum_{j=1}^{n} v_j x_{jk}} - - - - - - r = 1,...., K \quad (1)$$

$$Subjecto = \sum_{i=1}^{m} u_i y_{ir} - yi_F + w \geq 0 \quad (2)$$

$$X_{jr} - \sum_{j=1}^{n} u_j x_{jk} \geq 0 \qquad u_i, and, v_j \geq 0 \quad (3)$$

Were yik is the quantity of input produced by the kth DMU, xjk is the quantity of jth input used by the nth DMU, ui and vj are the output and input weights respectively. In the above model, if W = 0 the efficiency measure is technical efficiency under constant return to scale (CRS) and if W is used unconstrained then it changes to variable return to scale hence estimating pure technical efficiency (Haq et al, 2010; Shui, 2002; Worthington, 1999; Coelli, 1998).

The study involves efficiency analysis of 35 Microfinance institutions operating in five countries in East Africa

(Tanzania, Kenya, Uganda, Rwanda and Burundi) for three years 2009 to 2011. The data were obtained from mix market exchange (www.mixmarket.org) an international database for Microfinance Institutions. The sample included all microfinance institutions operating in East Africa which had complete information required for the analysis at mix exchange web.

Due to the data availability we adopted production approach to efficiency taking three input variables and two output variables. The selection of variables considered the frequency of their use in the studies of efficiency in Microfinance Institutions, hence input variables used were, total assets, personnel/staffs and operating revenues while output variables used are gross loan portfolio and financial revenue. These variables have been used in several studies of efficiency in Microfinance institutions such, Ahmad (2011), Annim, (2010), Masood *et al* (2010), Haq (2010), Nieto et al (2009, 2007), Bassem (2008), Hermes *et al* (2009, 2008), Hassan and Sancez (2009). Input oriented approach was used under assumption that MFIs reviewed have the ability to control the resources available such as machine (assets), labour (Personnel) and fund (Operating expenses), but cannot control the outputs. Efficiency scores were computed under both constant return to scale (CRS) and variable return to scale (VRS) since CRS assumption is only appropriate when all DMUs are operating at an optimal scale (Banker *et al*, 1984), but due to imperfect competition among MFIs in the area, constraints in the fund availability and age difference of the MFIs, some of them do not operate at optimal efficiency, it was therefore relevant to compute efficiency under VRS so as to take into account scale efficiency which is the difference between technical efficiency and pure technical efficiency. A comparative analysis is then conducted using the efficiency score among the countries and within the countries.

4. Results

The efficiency results shows that 5, 8 and 11 MFIs were relatively efficient in 2009 to 2011 respectively under constant return to scale (CRS) assumption while 12, 8, and 17 MFIs were relatively efficient under variable return to scale (VRS) for 2009 to 2011 respectively. The average technical efficiency under both constant return and variable return to scale (Table 1) were generally high with increasing trend from 2009 to 2011. The average technical efficiency under CRS was found to be 0.706 (2009), 0.798 (2010) and 0.852 in 2011, while the average efficiency under VRS was found to be 0.823, 0.892 and 0.891 for 2009 to 2011 respectively. This implies that on average, MFIs reviewed only needed 70.6%, 79.8% and 85.2% of the resources that they used for them to be efficient without affecting the output (under constant return to scale) and 82.3%, 89.2% and 89.1% of the resources used for them to be relatively efficient for the three years without affecting the output values under VRS. We can also indicate this as; MFIs operating in East Africa were supposed to reduce their input resources by 29.4%, 20.2%, and 14.8% for three years under CRS and by 17.7%, 10.8%, and 10.9% for three years respectively under VRS for them to be efficient without affecting the outputs levels (Table 1).

Table 1: Efficiency Results summary

Efficiency Results: Input Oriented			
	Results Summary		
	2009	2010	2011
Number of DMU	35	35	35
Number of Efficient DMU Under (CRS)	5	8	11
Number of Efficient DMU Under (VRS)	12	16	17
Average Technical Efficiency Score(CRS)	0.706	0.798	0.852
Average Pure Technical Efficiency Score(VRS)	0.823	0.892	0.891
Average Scale Efficiency Score	0.867	0.895	0.956

The average scale of efficiency scores were found to be 0.867, 0.895 and 0.956 for the 2009 to 2011 respectively, indicating an average of 13.3%, 10.5% and 4.4% divergence from most productive scale among MFIs. The average scale efficiency results were higher than the average pure technical efficiency results in all three years; this implies that the source of technical inefficiency is generally due to pure technical inefficiency resulting from misallocation of inputs in the production of outputs. The return scale results indicated that among 35 MFI studied 57.1%, 54.3% and 51.4% were at stage of decreasing return to scale for the three years respectively while 28.6%, 22.9% and 17.1%

were at increasing return to scale in 2009-2011 respectively. This implies that most of the MFIs in the area do not operate at optimal scale with only few MFIs operating at constant return to scale. The results also shows that among the firms which operates at a decreasing return to scale most of them were from Kenya (40%, 42.1% and 44.4%) and Uganda (30%, 31.6% and 33.3%) for the three years respectively (Appendix 2).

The results show that, banks and non bank financial institutions were more relatively efficient than NGOs and Cooperatives. Among the efficient MFIs under both returns to scale, 2 were bank, 2 NBFI and 1 NGO in 2009, in 2010 efficient MFIs included 3 banks, 4 NBFI, 1 NGO while in 2011, 3 Banks, 5 NBFIs and 3 NGOs were relatively efficient. The results also shows that, the individual MFIs which were at efficiency frontier under both CRS and VRS included NMB, Equity Bank, MUL and Duterimbere which were relatively efficient in all three years consecutively while 4 MFIs (IDYDC, K-Rep, MCL and RML) were efficient in the last two years consecutively and 4 MFIs were efficient in 2011 only. On other hand 7, 8 and 6 MFIs in 2009 to 2011 respectively were efficient only under variable return to scale suggesting that, they operate at inappropriate scale, poor management of operations or suboptimal operations (Appendix 2). The average technical efficiency scores of MFIs by status indicates that under constant return to scale, banks had efficiency score of 0.862, 0.936 and 0.939 for the three years respectively, NBFIs had average technical efficiency of 0.706, 0.802 and 0.849 for 2009 to 2011 respectively, NGOs had average technical efficiency of 0.695, 0.786 and 0.877 for three years and Cooperatives had average technical efficiency of 0.538 (2009), 0.636 (2010) and 0.698 (2011). This indicates that while banks needed to reduce their inputs by less than 20% while maintaining output for them to be efficient in average, the cooperative needed to reduce more approximately 30% of the inputs in order to be efficient while maintaining the output levels.

The results also show that, the number of efficient MFIs was distributed among the countries. Country wise, average technical efficiency scores under both CRS and VRS were high for banks as compared to other types of MFIs followed by NBFI and NGOs except in Rwanda where NBFIs were more efficient than cooperatives. This implies that banks utilized efficiently their inputs as compared to other types of MFIs although in average they all have chance for improvement by better allocation of their input resources. In Tanzania banks average technical efficiency was above 0.8 in all three years indicating that they only have to reduce less than 20% of their total average input to reach efficient frontier while maintaining their average output level under both CRS and VRS while NBFIs have poor efficiency scores for both CRS and VRS in Tanzania indicating inefficiency use of resources. The situation in Kenya and Uganda and Rwanda was the same as in Tanzania, with Banks operating more efficient than others under both return scales while Burundi with only cooperative MFIs indicated low average efficiency in all three years in which more than 40% reduction of inputs was needed in order to attain average efficiency while maintaining its average output levels.

5. Conclusion

The aim of the study was to evaluate the efficiency of microfinance institutions operating in five East African countries (Tanzania, Kenya, Uganda, Rwanda, Burundi) using non parametric approach (Data Envelopment Analysis). Input oriented assumption was used in estimating relative efficiency of 35 MFIs including 5 banks, 17 NBFIs, 9 NGOs and 4 Cooperatives. The study used production approach with three input variables (Total assets, Personnel, Operating expenses) and two output variables (Gross loan portfolio, financial revenue) under both constant return to scale and variable return to scale.

In general MFIs in East Africa were found to have higher efficiency scores under both variable return to scale and constant return to scale. The average technical efficiency scores were 0.706 (2009), 0.798 (2010) and 0.852 under constant return to scale and 0.823, 0.892 and 0.891 under variable return to scale for three years respectively. The average efficiency trend was found to be positive with low efficiency scores in 2009 and high scores in 2011. The numbers of MFIs at efficient frontier line were 5, 8 and 11under CRS and 12, 16 and 17 under VRS for the three years respectively. The findings also shows that, on average the banks and non bank financial institutions were more relatively efficient compared to NGOs and Cooperatives while the country efficiency averages shows that Kenya and Rwanda had higher average efficiency scores for three years under constant return to scale while Tanzania and Uganda have higher average efficiency scores under variable return to scale.

From the findings above, it is recommended that MFIs in the area should improve their efficiency by better use of

resources and reducing the amount of waste. Although the average results indicates high efficiency the number of MFIs in the frontier line was low indicating that most of them still have chance for improvement in order to reach efficiency frontier line. Most of inefficiency observed was mainly technical in nature hence calling for better allocation of resources and reduction in amount of wasted input resources. Most of efficient MFIs were banks and NBFIs, this is an alert to NGOs and Cooperatives which traditionally were the only providers of microfinance services, to take into accounts the changes in the market structures and technology and the increased competition from commercial banks and NBFIs by offering microfinance services at a profitable and efficient means if they want to survive in the future.

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6Abbreviation

MFIs= Microfinance Institutions, **TE**= Technical Efficiency, **CRS**= Constant return to scale, **VRS**= Variable return to scale, **DMU**= Decision making unit

TZ= Tanzania, **KN**= Kenya, **UG**= Uganda, **RW**= Rwanda, **BR**= Burundi

TZ1=Akiba Commercial bank, **TZ2**=BRAC, **TZ3**=FINCA, **TZ4**=IDYDC, **TZ5**=National Microfinance Bank (NMB), **TZ6**=Opportunity TZ, **TZ7**=SEDA, **TZ8**= ECLOF TZ, **KN1**=BIMAS, **KN2**=ECLOF KN,**KN3**=Equity Bank,**KN4**=Faulu KN,**KN5**=K-Rep, **KN6**= KADET, **KN7**=KWFT, **KN8**=MCL, **KN9**=Micro Kenya, **KN10**=Opportunity KN, **KN11**=RAFODE, **KN12**=SMEP, **UG1**=BRAC UG, **UG2**=Centenary Bank, **UG3**=Finance Trust,**UG4**=Madfa SACCO, **UG5**=MED Net, **UG6**=MUL, **UG7**=Opportunity UG, **UG8**=RML, **BR1**=CECM, **BR2**=COSPEC, **RW1**=ACBsa, **RW2**=Duterimbere, **RW3**=RML, **RW4**=Union Des Coopecs Umutanguha, **RW5**=UOB

Appendix 1

		Average Efficiency Results					
		2009		**2010**		**2011**	
Country	Status	CRS	VRS	CRS	VRS	CRS	VRS
	Banks	0.841	0.891	0.874	0.935	0.873	0.902
	NBFIs	0.290	0.292	0.376	0.377	0.512	0.513
	NGOs	0.742	0.862	0.852	0.965	0.958	0.960
	Mean	0.710	0.798	0.798	0.884	0.881	0.890
Tanzania	Efficient MFIs	2	3	2	4	4	5
	Banks	0.920	1.000	1.000	1.000	1.000	1.000
	NBFIs	0.676	0.799	0.823	0.910	0.840	0.888
	NGOs	0.664	0.691	0.718	0.791	0.777	0.839
	Mean	0.715	0.815	0.835	0.905	0.856	0.899
Kenya	Efficient MFIs	1	3	3	5	4	6
	NBFIs	0.813	0.872	0.830	0.872	0.898	0.919
	Cooperatives	0.789	0.806	0.873	0.902	0.845	0.871
	Mean	0.808	0.859	0.839	0.878	0.888	0.910
Rwanda	Efficient MFIs	1	1	2	2	2	2
	Banks	0.785	1	0.931	1	0.950	1
	NBFIs	0.765	0.957	0.837	0.980	0.902	0.971
	Cooperatives	0.316	1	0.408	1	0.789	1
	NGOs	0.609	0.720	0.686	0.765	0.775	0.826
	Mean	0.672	0.908	0.757	0.931	0.862	0.942
Uganda	Efficient MFIs	1	5	1	5	1	4
Burundi	Cooperatives	0.523	0.539	0.632	0.727	0.578	0.603
	Mean	0.523	0.539	0.632	0.727	0.578	0.603
Mean 5	Banks	0.862	0.957	0.936	0.974	0.939	0.961
4	Cooperatives	0.538	0.721	0.636	0.839	0.698	0.769
17	NBFIs	0.706	0.824	0.802	0.886	0.849	0.893
9	NGOs	0.695	0.793	0.786	0.882	0.877	0.903

Appendix 2

	2009				**2010**				**2011**			
DMU	CRS	VRS	Scale	RTS	CRS	VRS	Scale	RTS	CRS	VRS	Scale	RTS
BR1	0.677	0.680	0.995	irs	0.807	0.833	0.968	irs	0.703	0.704	0.999	irs
BR2	0.370	0.397	0.930	irs	0.457	0.620	0.736	irs	0.454	0.502	0.903	irs
KN1	0.731	0.739	0.990	irs	0.763	0.783	0.974	drs	0.890	0.913	0.974	drs
KN10	0.702	0.844	0.832	drs	0.837	0.955	0.876	drs	0.833	0.854	0.976	drs

KN11	0.596	0.644	0.925	irs	0.673	0.798	0.844	irs	0.664	0.764	0.869	irs
KN12	0.782	0.959	0.815	drs	0.877	0.959	0.915	drs	0.941	1	0.941	drs
KN2	0.627	0.724	0.866	drs	0.773	0.826	0.935	drs	0.749	0.790	0.949	drs
KN3	1	1	1	-	1	1	1	-	1	1	1	-
KN4	0.692	0.922	0.7508	drs	0.705	1	0.705	drs	0.794	0.888	0.895	drs
KN5	0.840	1	0.8400	drs	1	1	1	-	1	1	1	-
KN6	0.579	0.738	0.7850	drs	0.641	0.723	0.886	drs	0.556	0.574	0.969	drs
KN7	0.843	1	0.8431	drs	0.937	1	0.937	drs	0.846	1	0.846	drs
KN8	0.766	0.790	0.9695	drs	1	1	1	-	1	1	1	-
KN9	0.417	0.418	0.9968	irs	0.811	0.815	0.995	irs	1	1	1	-
RW1	0.704	0.714	0.9866	irs	0.713	0.715	0.996	irs	0.777	0.778	0.998	drs
RW2	1	1	1	-	1	1	1	-	1	1	1	-
RW3	0.962	0.999	0.964	drs	1	1	1	-	1	1	1	-
RW4	0.789	0.806	0.979	irs	0.873	0.902	0.968	irs	0.845	0.871	0.970	irs
RW5	0.584	0.775	0.753	drs	0.609	0.774	0.788	drs	0.817	0.898	0.910	drs
TZ1	0.683	0.783	0.872	drs	0.749	0.870	0.861	drs	0.746	0.804	0.928	drs
TZ2	0.378	0.508	0.743	drs	0.734	0.937	0.784	drs	1	1	1	-
TZ3	0.763	1	0.763	drs	0.850	1	0.850	drs	1	1	1	-
TZ4	0.871	0.963	0.904	irs	1	1	1	-	1	1	1	-
TZ5	1	1	1	-	1	1	1	-	1	1	1	-
TZ6	0.290	0.292	0.994	irs	0.376	0.377	0.998	drs	0.512	0.513	0.999	drs
TZ7	0.699	0.840	0.832	drs	0.722	0.888	0.813	drs	0.791	0.800	0.988	drs
TZ8	1	1	1	-	0.956	1	0.956	irs	0.999	1	0.999	irs
UG1	0.694	0.880	0.789	drs	0.637	0.738	0.863	drs	0.830	0.931	0.891	drs
UG2	0.785	1	0.785	drs	0.931	1	0.931	drs	0.950	1	0.950	drs
UG3	0.736	1	0.736	drs	0.798	1	0.798	drs	0.902	1	0.902	drs
UG4	0.712	1	0.712	drs	0.772	1	0.772	drs	0.859	0.950	0.904	drs
UG5	0.316	1	0.316	irs	0.408	1	0.408	irs	0.789	1	0.789	irs
UG6	0.524	0.561	0.934	drs	0.736	0.792	0.928	drs	0.720	0.722	0.997	drs
UG7	1	1	1	-	1	1	1	-	1	1	1	-
UG8	0.611	0.827	0.739	drs	0.777	0.921	0.844	drs	0.846	0.933	0.907	drs
	0.706	**0.823**	**0.867**		**0.798**	**0.892**	**0.895**	**Mean**	**0.852**	**0.891**	**0.956**	