Sustainability Check of Microfinance Institutions during Financial Crisis: Evidence from Pakistan

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Abstract

The study scrutinizes the efficiency and sustainability of Microfinance Institutions in Pakistan during financial crisis era for 2008 and 2009. For this progression, firstly Data Envelopment Analysis is applied to quantify efficiency and then sustainability check is tested. The results reveal that due to macroeconomic shocks, portfolio quality has been affected. More microfinance activities are being done in Punjab and Sindh whereas such high concentration increases multiple borrowing in market.

Keywords: Pakistan, Efficiency, Financial Crisis, Sustainability, Microfinance Institutions

Introduction

In 1980's, the success of the Orangi Pilot Project (OPP) and the Agha Khan Rural Support Programme (AKRSP) through Community Based Organizations (CBOs) made the paradigm shift giving a thought to address the issue of prevailing poverty in country through financial services. During 1990's, several NGO-MFIs joined the existing institutions and thus provided their services for developing the infrastructure policy for microfinance industry. In 1996, there was a turning point in microfinance sector when microfinance was recognized as a specialized activity in Pakistan and not just a part of various poverty alleviation programme's. In 1998, the Microfinance Group-Pakistan was established which evolved into meso level institution as Pakistan Microfinance Network (PMN).

With the assistance of international agencies, during 2000, the Pakistan Poverty Alleviation Fund (PPAF) was established as an apex body for providing wholesale lending to the microfinance institutions operating in the country. Such developments made government acknowledge the value of the microfinance sector to be the effective tool for poverty reduction in the government strategy document which was "Poverty Reduction Strategy Paper". An essential step was taken in 2001 by introducing Microfinance Ordinance which established a separate regulatory and legal framework for promoting formal microfinance institutions called Microfinance Banks (MFBs). In literature this is recognized as the start of the commercial era of microfinance sector in Pakistan. Under special ordinance Khushali Bank (KB) was established. During 2002 the first private sector MFB came into being after changing the microfinance operations of AKRSP into the First Microfinance Bank Limited (FMFBL). It announced the start of NGO-MFIs to transform into MFBs in Pakistan.

Types of MFIs in Pakistan

Currently the microfinance sector in Pakistan has microfinance providers (MFPs) which are categorized into 5 peer groups by industry network PMN as Microfinance Formal Banks (MFB), specialized MFIs, Rural Support Programme (RSP), multi-dimensional NGOs working as microfinance service providers and others.

MFBs are licensed, regulated and supervised by SB. They are a part of formal banking industry and are licensed, supervised and regulated by the central bank. Separate prudential guidelines are issued by the central bank for the MFBs. These regulations are issued under Pakistan Microfinance Ordinance 2001 guidance. It has set different criteria for microfinance banking operations with respect to Capital Asset Ratio (CAR), paid-up capital, and maximum exposure to one borrower, group etc.

The non-bank MFPs which includes Specialized MFIs, NGO-MFIs and RSPs, are registered with Securities Exchange Commission of Pakistan (SECP) under the Societies Registration Act 1860, Trust Act 1882 or Companies Ordinance 1984. The non-bank MFPs mostly remains unregulated and due to this reason they are not allowed to provide a full wide range of financial services. Deposits cannot be mobilized by them from general public. No specific notification by SBP or SECP prohibits non-bank MFPs from mobilizing savings from member, and they are indeed offering such saving services to their members. Recently SBP has taken negative view regarding this practice. SBP is encouraging them to transform to MFBs. Therefore 2 of the largest MFPs have now transformed; Kashf has completed the process while NRSP is underway in its transformation. SBP has issued guidelines pertaining to this transformation. There are also guidelines for commercial banks to start providing microfinance services. But no commercial bank has started operating microfinance window, yet few commercial banks provide the facility of microfinance.

Among PMN members, 8 are MFBs, 8 are specialized MFIs, 5 RSPs, and rest 12 are in other categories. In their legal status, all MFBs, four RSPs and three specialized MFIs are registered as Section 42 companies. The rest are registered under Trust or Societies acts under different provincial registration authorities. Under section 42, the institutions are registered as NBFI or NGOs. NBFIs are not allowed for non-specialized activities and deposit mobilization by regulation other than those for which they have made their registration.

According to the latest available data for end of March 2010, RSPs lead in number of insurance policy holder and savers, whereas MFBs have largest share in number of active borrowers. However, a significant shift in MFBs market share from 45 percent to 55 percent would be there when NRSP's transformation to MFB will be completed. The shift favoring MFB peer group would continue in the next years making a final 60-40 split in market share by 2015 between non-MFBs and MFBs.
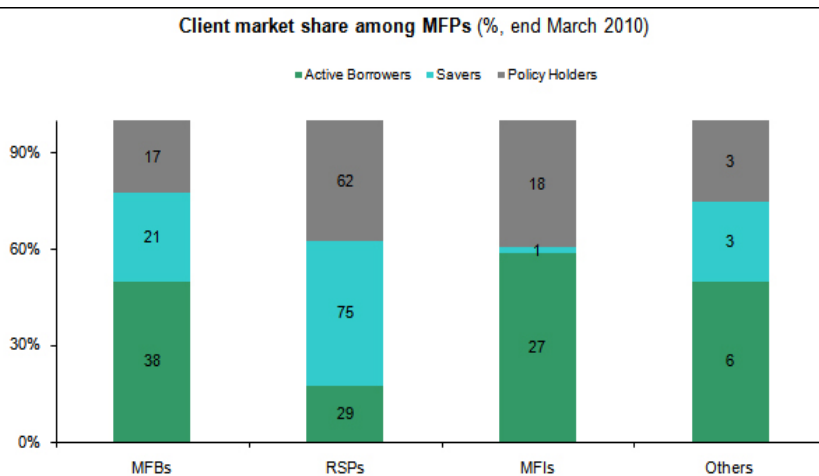

Figure 1: Client market share among MFPs

Growth

During the five years from 2004 to 2008, there was 67 percent Compounded Annual Growth Rate (CAGR) in microfinance sector. After that growth slowed down and in 2009, in microfinance industry there was just an increase of 5 percent in active borrowers and 16 percent increase in Gross Loan Portfolio (GLP). However, insurance policy holders and active savers have constantly shown remarkable growth. During 2008-09, savers grew by 35 percent and saving grew by 59 percent, while sum-insured and insurance policy holders increased 27 percent and 48 percent respectively. For 2010, the first quarterly data reveals substantial growth in the insurance policy holders and number of active savers.
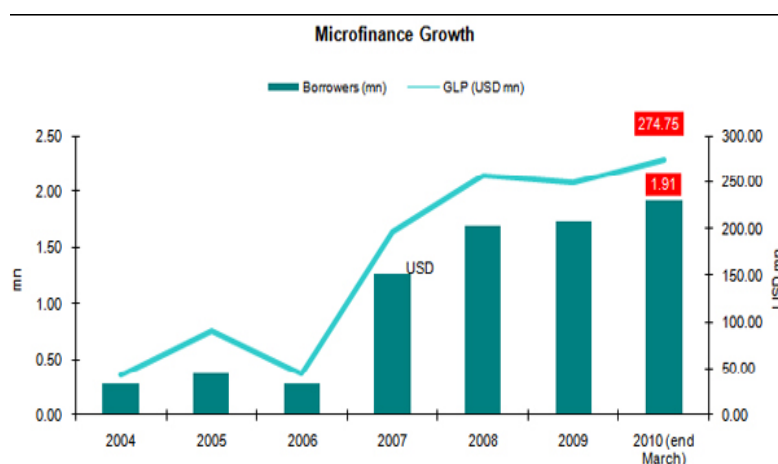

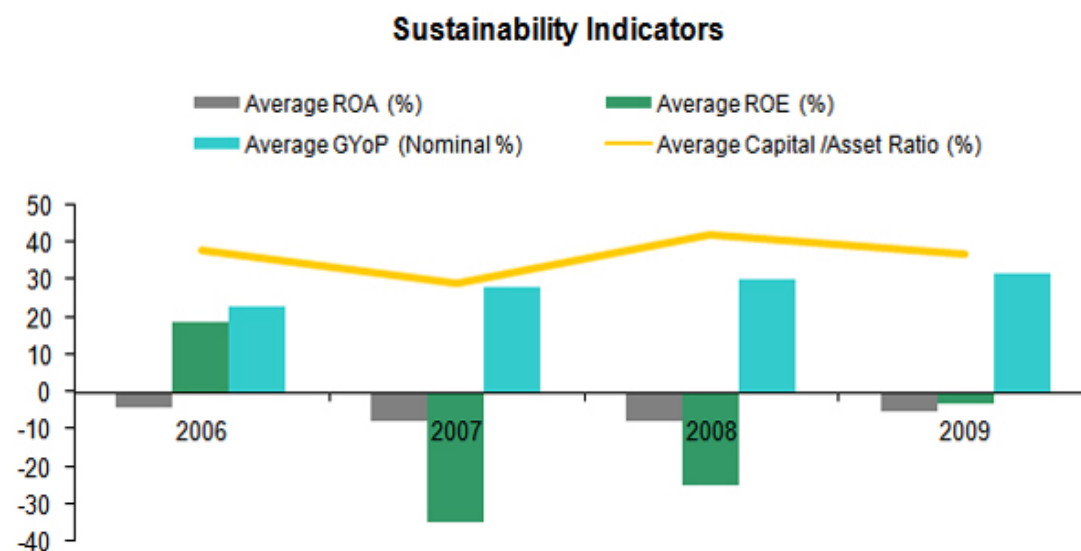**Figure 2: Microfinance growth**

Figure 3: Sustainability indicators

Sustainability

On sustainability grounds, Pakistan microfinance industry is struggling very hard. During 2009, with an increasing trend the ratio for industry average financial revenue to assets was just

above 80 percent. For the entire sector, the average operating expense/asset ratio was found stable at almost 20 percent, but there was an increase in average operating expense/loan portfolio from 33 percent to 44 percent for the year of 2009. On basis of 2009 MFI reporting to the MIX Market, strives for sustainability success has been constrained by the rise in delinquency profile of microfinance sector for 2009 with about 15 percent write-off ratio. It shows 100 percent increase from last year which was about 7 percent in 2008.

In USD terms the ratio of gross loan portfolio (GLP) to total assets (TA) stays at 49 percent.
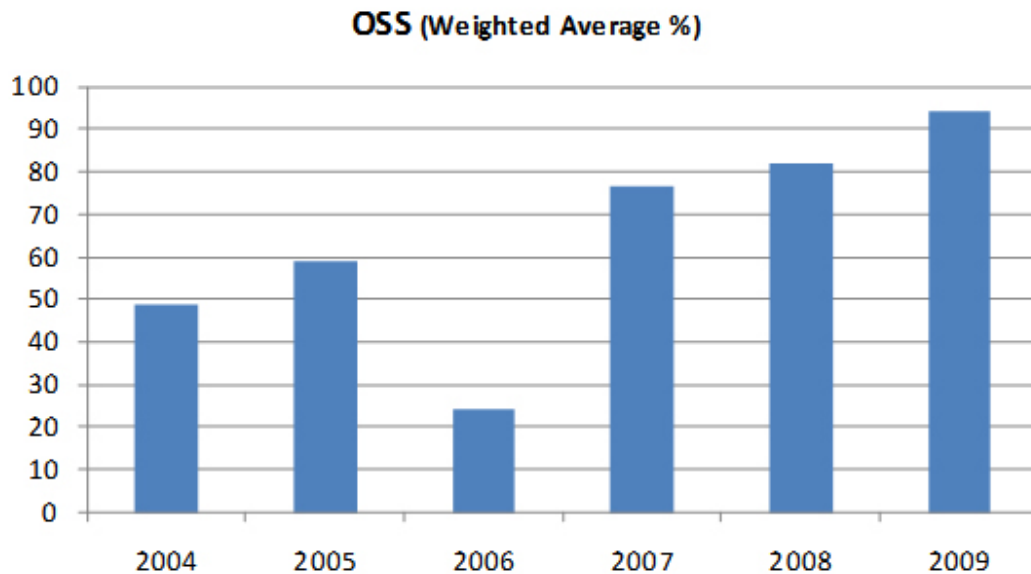

Figure 4: OSS

Methodology

The paper adopts DEA approach and Sustainability parameter. Data Envelopment Analysis is a piece-wise linear combination which connects the best practice observations and also forms a convex production possibility set. Developed by Charnes et al., 1978, DEA is also applied to non-profit organizations where the objectives of cost minimization and profit maximization may not be considered as the vital factor. DEA has the advantage of working with a sample size that is small and which does not require any price information.

Mathematical form

The formula of technical efficiency is:

Technical Efficiency (TE) = Pure Technical Efficiency (PTE) × Scale Efficiency (SE)

Both input and output oriented approach is used in the study with both the models of CCR and BCC, for finding technical efficiency of MFIs.

Charnes-Cooper-Rhodes Model (Technical Efficiency):

Inputs are assumed as R to be used to produce S outputs, when we have K decision making units (DMU) as K. Inputs are denoted as $x_{j,k}(j = 1, \dots, r)$ and outputs are denoted as $y_{i,k}(i = 1, \dots, s)$, for MFI k(k=1,…,K).MFI will be represented by DMU. Efficiency measure for DMU can be calculated as follows:

$$TE_k = \sum_{i=1}^{s} u_i \, y_{i,k} / \sum_{j=1}^{r} v_j \, x_{j,k} \qquad (1)$$

Where $y_{i,k}$ is quantity of i-th output produced by k-th DMU , $x_{j,k}$ is quantity of j-th input used by k-th DMU and u_i is the output weight and v_j is input weight. DMU maximizes technical efficiency TE_k, subject to :

$$TE_k = \sum_{i=1}^{s} u_i\, y_{i,k} / \sum_{j=1}^{r} v_j\, x_{j,k} \leq 1 \text{ where } u_i \text{ and } v_j \geq 0 \tag{2}$$

Output Oriented Model:

Max TE_k

Subject to $\sum_{i=1}^{s} u_i\, y_{i,k} - x_{j,k} + w \leq 0$ where k=1,….,K

$$v_j x_{j,k} - \sum_{j=1}^{r} u_j\, x_{j,k} \geq 0 \text{ and } u_i \text{ and } v_j \geq 0 \tag{3}$$

Input Oriented Model:

Min TE_k

Subject to $\sum_{i=1}^{s} u_i\, y_{i,k} - y_{j,k} + w \geq 0$ where k=1,….,K

$$x_{j,k} - \sum_{j=1}^{r} u_j\, x_{j,k} \geq 0 \text{ and } u_i \text{ and } v_j \geq 0 \tag{4}$$

The above model shoes technical efficiency under CRS if w=0 and it changes into variable return-to-scale when w is used unconstrained. In the first case it leads towards technical efficiency and in the later case pure technical efficiency is estimated.

Banker – Charnes - Cooper Model (Pure Technical Efficiency):

For VRS, it is essential to add convexity condition for u_j in model 4 that is

$\sum u_j = 1$.

Resulting model becomes BCC model. For each DMU, when the model is solved, BCC efficiency scores are attained with same interpretation as of those values in CCR model. These scores are termed as "pure technical efficiency score".

Scale Efficiency (SE):

Scale Efficiency is defined as the ratio of CCR/BCC or TE/PTE (Wang & Huang 2005).If scale efficiency equals 1 it shows that DMU is scale efficient. If scale efficiency is less than 1, it shows that DMU is inefficient.

Variable selection

Defining inputs and outputs for financial intermediaries particularly for MFIs has been a debatable issue among researchers. To determine the formation of inputs and outputs of an MFI, firstly one should determine the nature of the respective MFI's technology (Sealey and Lindley 1977). In the literature, across different studies the definition of inputs and outputs differs depending on nature of financial institution and on the estimation approach used. For performing DEA analysis, inputs and outputs to be selected should be in conformity because their selection affects the efficiency results.

Pure production and pure financial intermediation approach cannot be used in this study as "deposits" is not taken as a variable. A mixture of both of these approaches is used in this study, like Nieto, Cinca and Molinero (2007). The study model considers MFI as financial institutions who keep in focus their dual mission of social and financial sustainability (Woller *et al.*, 1999; Schreiner, 2002; Nieto *et al.*, 2008). In this study outputs are formed in accordance with MFI's social and financial goals.

Depth can be calculated by considering gender and poverty level of clients (Christen, 2001). Depth of outreach is measured in terms of women borrowers and it denotes the social goals of an MFI. It is assumed that outreach will be deeper if greater number of women clients is served. Women clientele is considered in the study as an output under production approach. Women clientele is calculated as:

No. of women borrowers= No. of borrowers * percent of women borrowers

Gross loan portfolio and number of loans outstanding is taken as output under production approach. Ability of an MFI to generate revenue on its increasing loan portfolio denotes its financial goals (Otero, 2000; Robinson, 2001). A lot of financial institutions focus on return on assets which is in form of interest mostly. ROA is taken as output under production & intermediation approach.

A variety of studies have used assets to measure the size of the firms in finding the banking efficiency (Casu and Molyneux, 1998; Jackson and Fethi, 2000; Chang and Chiu, 2006). Furthur studies suggest that for producing loans the primary required inputs are labour and expenditure (Norman and Stocker, 1991). The study uses personnel as a proxy of labor and operating expense is taken for representing expenditure. Three variables are taken as inputs i.e. total assets, personnel and operating expenses. Assets and personnel are taken under production approach whereas operating expense is taken under intermediation approach.

Following table is a summary of inputs and outputs used with their corresponding definitions.

Table 1: Definition of Inputs and Outputs

Definition of inputs and outputs		
Variable name	Abbreviation	Formula Description
Inputs		
Assets	TA	Total assets, adjusted for inflation and standardized provisioning for loan impairment and write-offs.
Personnel	PER	Total number of staff members.
Operating expense	OE	Personnel expense + All administrative expense
Ouputs		
No. of women borrowers	NWB	No. of borrowers * percent of women borrowers
Gross loan portfolio	GLP	Gross Loan Portfolio, adjusted for standardized write-offs
No. of loans outstanding	NLO	Number of Loans Outstanding, adjusted for standardized write-offs
Return on assets	ROA	(Adjusted Net Operating Income - Taxes) / Adjusted Average Total Assets

The study model thus becomes as follows:
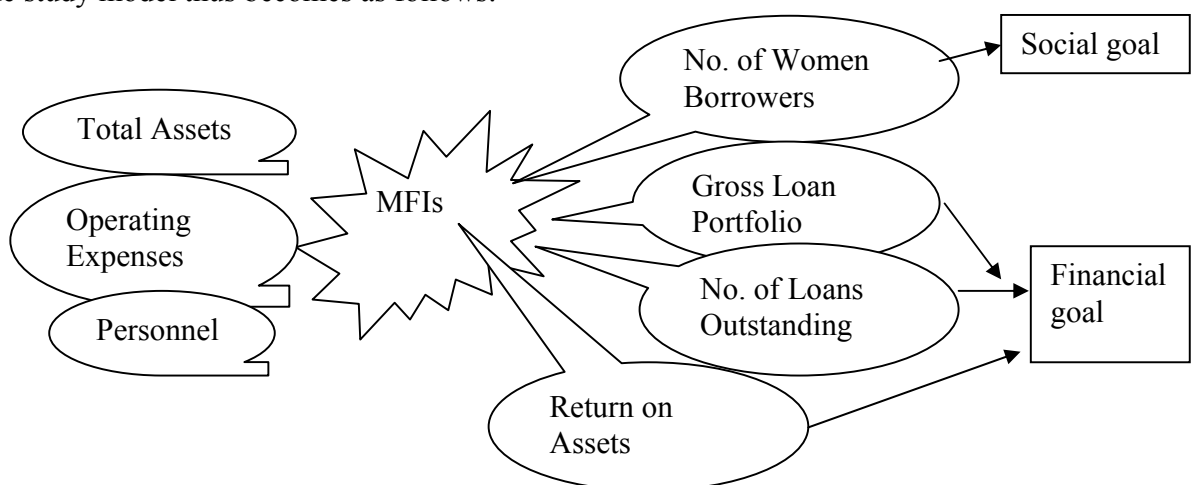
Results

The DEA technical efficiency 18 MFIs of Pakistan has been calculated by assuming CRS, VRS and Scale efficiency. While measuring technical efficiency output oriented methods have been used. The results are presented in the table below.

Table 2: Technical Efficiency Estimates by DEA (Pakistan)

		Pakistan							
		Year=1 (2008)				**Year=2 (2009)**			
SL no	**Firm name**	**CRS**	**VRS**	**Scale**	**Desc**	**CRS**	**VRS**	**Scale**	**Desc**
1	Asasah	1	1	1	-	0.85	0.853	0.996	Drs
2	CSC	0.62	0.631	0.982	Irs	1	1	1	-
3	CWCD	0.317	0.317	1	-	0.706	0.712	0.991	Drs
4	DAMEN	1	1	1	-	1	1	1	-
5	FMFB	0.241	0.561	0.429	Drs	0.566	0.766	0.738	Drs
6	JWS	1	1	1	-	0.99	1	0.99	Drs
7	Kashf Bank	0.236	0.352	0.670	Drs	0.432	0.437	0.988	Drs
8	KB	0.53	1	0.53	Drs	0.675	0.904	0.746	Irs
9	NMFB	0.152	0.153	0.993	Irs	0.323	0.326	0.991	Irs
10	NRSP	0.814	1	0.814	Drs	0.991	1	0.991	Drs
11	Orangi	1	1	1	-	1	1	1	-
12	POMFB	1	1	1	-	0.18	0.187	0.963	Drs
13	Rozgar	1	1	1	-	0.015	1	0.015	Drs
14	SAFWCO	1	1	1	-	0.968	0.972	0.995	Drs
15	SRSP	1	1	1	-	0.619	1	0.619	Drs
16	Sungi	1	1	1	-	1	1	1	-
17	TMFB	0.227	0.34	0.667	Drs	0.676	0.781	0.865	Drs
18	TRDP	0.616	0.64	0.962	Drs	0.879	1	0.879	Drs
Mean		0.709	0.777	0.891		0.715	0.83	0.876	

The results indicate that 3 (out of 18) MFIs namely DAMEN, Orangi and Sungi are on the fully efficient frontier border for both years 2008 and 2009. All 3 are working as not-for-profit institutions. Asasah, JWS, POMFB, Rozgar, SAFWCO and SRSP show fully efficient score for 2008. NRSP and Khushali Bank show technical efficiency when variable returns to scale is assumed for 2008 only. CWCD is only scale efficient for year 2008. CSC is fully efficient for 2009. JWS, NRSP, Rozgar, SRSP and TRDP show technical efficiency frontier while assuming variable returns to scale for 2009.

The average technical efficiency for CRS, VRS, and Scale for 2008 is 0.709, 0.777, and 0.891 respectively. Whereas average technical efficiency for CRS, VRS, and Scale for 2009 is 0.715, 0.83 and 0.876 respectively. It indicates that MFI can increase its number of women borrowers, loan portfolio, number of loans outstanding and return on assets by 22.3percent for 2008 and 17percent for 2009 with the existing level of inputs by efficiently utilizing the inputs that are assets, personnel and operating expenses. The results also show that 33.33 percent (6 firms out of 18) exhibits decreasing returns to scale while 11.11 percent (2 out of 18) exhibits increasing returns

to scale for 2008. For 2009, 66.66 percent (6 out of 18) show the decreasing returns to scale while 11.11 percent (1 out of 18) are showing increasing returns to scale.

Summary results

The results of the CCR model indicate that during the period of study only nine for 2008 and four for 2009 (on 18) microfinance institutions were efficient. The average efficiency was found to be 0.709 for 2008 and 0.715 for 2009. This reveals that an average institution which is operating on the efficient border requires only 70.9percent (2008) and 71.5percent (2009) of the inputs currently employed. In terms of average of inefficiency average, it would be in need of 41percent (on 2008) and 39.8percent (on 2009) of inputs required for producing the same outputs as needed by an efficient institution (Table 3).

Table 3: Summary of results of CCR-model (Pakistan)

Summary of the results of CRR-model (Pakistan)		
	2008	**2009**
Number of DMU	18	18
Number of efficient DMU	9	4
Average of efficiency M	0.709	0.715
Average of inefficiency (1-M)/M	0.410	0.398
Percentage of the DMU in 1	50 %	22.22 %

The results of the BCC model depict that during study period eleven for 2008 and nine for 2009 (on 18) microfinance institutions were fully efficient. The average efficiency was 0.777 for 2008 and 0.83 for 2009. This means that an average institution which is functioning on the efficient border needs only 77.7 percent (2008) and 83 percent (2009) of the inputs currently used. In terms of average of inefficiency average, it would be in need of 28. 7 percent (on 2008) and 20.4 percent (on 2009) of inputs supplementary to produce the same outputs as needed by an efficient institution.

Table 4: Summary of results of BCC-model (Pakistan)

Summary of the results of BCC-model (Pakistan)		
	2008	**2009**
Number of DMU	18	18
Number of efficient DMU	11	9
Average of efficiency M	0.777	0.83
Average of inefficiency (1-M)/M	0.287	0.204
Percentage of the DMU in 1	61.11%	50%

If variable return to scale (that is, BCC model) is focused, a variant change is observed for the same time period of study in conducting analysis. The microfinance institutions has depicted a higher average efficiency under variable return on scale because the DMUs which showed efficiency in the CCR model are also accompanied by other new efficient DMUs that can increase or decrease the return on scale.

Technical efficiency distribution

DEA results for Pakistan are distributed over efficiency range by segregating the data into profit oriented MFIs and non-profit MFIs for all three defined scales. Following table shows the result in percentage.

Table 5: Technical Efficiency Distribution for 2008

Efficiency Class	π	∅	π	∅	π	∅
	CCR %	**CCR %**	**BCC %**	**BCC %**	**Scale %**	**Scale %**
	2008		**2008**		**2008**	
≤ 0.60	71.43	9.09	57.14	9.09	28.57	9.09
0.61 − 0.80	0	18.18	0	18.18	28.57	0
0.81 − 1.00	28.57	72.72	42.85	72.72	48.57	90.90
Total	7	11	7	11	7	11
Minimum	0.236	0.317	0.153	0.317	0.429	0.814
Maximum	1	1	1	1	1	1

For 2008, CCR results are indicating that for profit oriented MFIs 71.43 percent and for non-profit MFIs 9.09 percent are operating below 0.6. Profit MFIs are 0 percent and non-profit are 18.18 percent functioning from 0.61 to 0.8. Similarly, 28.57 percent for profit firms and 72.72 percent non-profit firms range from 0.81 to 1. BCC results for profit oriented MFIs show that 57.14 percent are below 0.61 whereas 42.85 percent are in between 0.81 to 1. For non-profit MFIs, results show that 9.09 percent are below 0.61, 18.18 percent lie in between 0.61 to 0.80 and 72.72 percent are operating in range of 0.81 to 1. Results for Scale efficiency signifies that 28.57 percent are under 0.61, 28.57 percent are in the range of 0.61 to 0.80 and 48.75 percent profit MFIs are operating in between 0.81 to 1; whereas for non-profit MFIs 9.09 percent lie below 0.61 and 90.90 exist above 0.81. The minimum value for profit MFIs is 0.236 for CCR, 0.153 for BCC, 0.429 for Scale whereas for non-profit MFIs it is 0.317 for CCR, 0.317 for BCC and 0.814 for Scale. The maximum values for profit and non-profit MFIs is 1 for CCR, BCC and Scale.

Table 6: Technical Efficiency Distribution for 2009

Efficiency Class	π	∅	π	∅	π	∅
	CCR %	**CCR %**	**BCC %**	**BCC %**	**Scale %**	**Scale %**
	2009		**2009**		**2009**	
≤ 0.60	71.43	0	42.85	0	14.29	0
0.61 − 0.80	28.57	18.18	28.57	9.09	0	9.09
0.81 − 1.00	0	81.81	28.57	90.90	85.71	90.90
Total	7	11	7	11	7	11
Minimum	0.015	0.619	0.187	0.712	0.015	0.619
Maximum	0.676	1	1	1	0.988	1

In 2009, CCR DEA results for profit MFIs show that 71.43 percent are below 0.61 whereas 28.57 percent are in between 0.61 to 0.8. Whereas non-profit MFIs have shown that 18.18 lie in 0.61 to 0.80 and 81.81 percent operate in the range of 0.81 to 1. For profit oriented MFIs, BCC results depicts that 42.85 percent MFIs operate under 0.61, 28.57 function in between 0.61 to 0.80 and 28.57 percent are in between 0.81 to 1. Non-profit MFIs show that 9.09 percent are in the range of 0.61 to 0.80 whereas 90.90 percent are in between 0.81 to 1. For profit MFIs, scale results signifies that 14.29 percent are below 0.61 and 85.71 percent are above 0.81. Whereas non-profit MFIs

illustrates that 9.09 percent lie in between 0.61 to 0.80 and 90.90 percent operate in between 0.81 to 1. For profit MFIs, the minimum value for CCR is 0.015, for BCC is 0.187 and for scale is 0.015. For non-profit MFIs the minimum value for CCR is 0.619, for BCC is 0.0.712 and for scale is 0.619. The maximum value for profit MFIs for CCR is 0.676, for BCC is 1 and for scale is 0.988; whereas non-profit MFIs for all CCR, BCC and scale is 1.

Sustainability Check

DEA gave the efficient MFIs which attained the score of 1. Sustainability check is applied on those MFIs, which were fully efficient for both years showing the efficiency estimate of 1. 3 out of 18 MFIs were on efficiency scale for both years under study. Besides calculating the efficiency scores of the MFIs, our analysis also does a sustainability assessment on the identified 3 efficient MFIs. The purpose is to identify a set of those MFIs, which are efficient and at the same time sustainable in their operations. Those MFIs will be considered to be sustainable who attain sustainability according to Operational Self Sustainability (OSS) or Financial Self Sustainability (FSS) ratio combined by having more than 10,000 active borrowers. The financial self-sustainability ratio (FSS), operational self-sustainability ratio (OSS) and scale parameters of the efficient MFIs are depicted below:

Table 7: Sustainability check

SL no	MFI name	Country	OSS Ratio (per cent)	Scale or NAB
1	DAMEN	Pakistan	109.52	44,912.00
2	Orangi	Pakistan	135.99	49,155.00
3	Sungi	Pakistan	163.15	3,653.00

By means of Microfinance Information Exchange (MIX) and Consultative Group to Assist the Poor (CGAP) standards, an Operational Self-sustainability ratio (OSS) of 100 percent and above indicates the operational sustainability of a MFI. It signifies that an MFI has enough revenue to cover its operational cost, cost of funds, and loan loss provisions. According to Gow (2006) a scale parameter of above 10,000 active borrowers indicates sustainability of a MFI. Considering these two metrics into account, 2 out of the 3 efficient MFIs are found to be sustainable. Sungi did not meet the terms with the scale parameter of 10,000 active borrowers. So the efficient and sustainable MFIs are 2 in number i.e. DAMEN and Orangi.

In general, the MFI, with annual losses of about 5 percent tend to become unsustainable (Rosenberg et al., 2009). A very important aspect to consider when looking at the relatively low number of sustainable microfinance institutions is the size of these institutions. The sustainable MFIs are much larger than unsustainable and it is quite related to the study by Rosenberg, 2008. The sustainable MFIs do not depend on donor agencies to run their operations, which show their long term availability in the market.

Conclusion

Macroeconomic shocks are the industry specific risks which include high inflation, energy failures, economic fundamentals and economic shocks caused by natural calamities such as floods and earthquakes. It affects the livelihood and income level of rural and urban poor, thus affects the portfolio quality. The devastating flooding in the country not only caused human casualties but also resulted in large scale human displacements and damaged crops, rural infrastructure, livestock, and affecting over 17 M people and 1.38 M acres of agricultural land (30percent of agricultural land of country).

More microfinance activities are being done in Punjab and Sindh having a lower penetration in Baluchistan and Khyber Pakhtunkhwa. Such high concentration increases multiple borrowing in market.

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