Total Factor Productivity of Selected MFIS in India

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I. INTRODUCTION

Microfinance is the provision of financial serves offered to the poor people with very small business or business projects (Otero, 1999 cited in Marzys, 2006). Avery small proportion of the world population has access to financial instruments, mainly because commercial banks consider the poorest of the poor people as unbankable due to their lack of collateral and information asymmetries. It is evident from the above that microfinance is a tool to serve the poor and to alleviate poverty and it acts as a means to provide access to financial services to the poor and vulnerable sections of the society. So many developing countries across the globe were benefited with this tool including India by contributing to socio economic development of the country through its efforts in alleviation of poverty, supporting in establishment of microenterprises and their development and in empowering women. Bangladesh pioneered in microfinance with the efforts of Muhammad yunus. Since then the concept of microfinance was introduced in so many developing countries   including India. Microfinance was introduced in the country more than three decades before. With the ongoing progress in the sector, several microfinance institutions were established and were actively indulged in providing access to financial services to the poor, rural farmers in general   and with a special focus on poor women in particular. The tool of Microfinance helps the poor by enabling them to take up some income generating activities which eventually leads to their empowerment. At present many Microfinance Institutions were operating in the country. The sector was stuck with a crisis in the year 2010, followed by which the operations of MFIs were put under close observation. In India wide range of research was conducted in the area of microfinance particularly on assessment of impact of microfinance (studies eg) on poor and a good number of studies are available on microfinance and its role in women empowerment. This study is an attempt to measure the productivity of selected MFIs in India from 2008 to 2012 in the light of sector being stuck with the crisis during the period. This study particularly focuses on measuring productivity of MFIs in India particularly NBFIs and NGOs using the Malmquist total factor productivity index. Therefore, this study provides empirical analysis of productivity of sample microfinance institutions in India.

Objectives of the study

The objective is to analyze the productivity of sample microfinance institutions in India during the period 2008 to 2012.

The specific objectives of the study are as follows:

* To determine the total factor productivity change of microfinance institutions in India.
* To suggest measures to improve the productivity of sample MFIs in India.

II. METHODOLOGY

According to (Sufian, 2009), there are three alternate methods which are in use for measuring the productivity changes of financial institutions which are Malmquist index, Tornqvist index and Fisher index. Among them Malmquist index is most popularly used for measuring the productivity change (Casu etal; 2004). Malmquist idex is advantageous over fisher index and tornqvist index. The Malmquist index has advantages like firstly assumptions of profit maximization or cost minimization are not required, secondly Malmquist index does not require input and output prices information and also if the study involves using panel data (as in this study), the productivity change can be decomposed in to technical efficiency change which is otherwise called as catch up and technology change(or changes in the best practice).The degree in which a DMU or a firm improves or worsens efficiency can be considered as catch up or recovery , while frontier shift is the shift in the efficient frontier of the DMUs between two time periods(Cooper et al 2007). The productivity change or efficiency change overtime can be measured with Malmquist Index and the productivity change of MFIs is mainly due to either technical efficiency change or technology change. Hence the product of technical

efficiency change and technology change gives the total productivity of MFIs. Technical efficiency change is further divided in to two components pure technical efficiency and scale efficiency change. The study employs output oriented Malmquist productivity index as output oriented Malmquist productivity index focuses on maximizing the outputs, at a given level of inputs. If Total factor productivity value is greater than one (>1), it indicates efficiency and technological improvement, while value less than one (<1) represents decrease in efficiency and technology improvement.

Selection of inputs and outputs

Unlike any other financial institution, the subject of our study i.e. microfinance institutions are financial institutions have different motive. MFIs prime focus is on poor and vulnerable who were incapable of fulfilling any collateral requirements and the main motive of Micro Finance Institutions is not to maximize their profits but to strive for the well being of poor.

The inputs and outputs for this study were mainly selected on the basis of two important objectives of micro finance institutions viz outreach and sustainability framework which is in line with the prior study of (Gutierrez-Neito et al. 2007; Bereket Zerai and Rani 2012). The two inputs selected for the study include the number of employees, and operating expenses/administrative expenses while the three outputs include interest and fee income, gross loan portfolio, and number of loans outstanding (number). Table 1.1 presents descriptive statistics of the inputs and outputs used in the study. The data is collected from MIX (Microfinance Information Exchange) website. Around 140 companies from India have reported data to MIX, USA as of the year 2014. Out of which only 36 MFIs (i.e. 25% of MFIs which submitted their data to MIX, USA) have continuous data from 2008-2012 i.e. for a five year period. Hence 36 MFIs were selected as the sample for the study.

Empirical Results
Table 1.1 provides the descriptive statistics of the variables included in the analysis of productivity changes including their mean, standard deviation, minimum and maximum values for the sample of 36 MFIs during the period 2008-2012.

Table 1.1: Summary statistics of variables for performing productivity analysis using MPI

|			2008	2009	2010	2011	2012
Outputs	Gross loan portfolio	Average	34,368,231	74,530,048	90,098,131	79,834,858	87,204,443
		Std dev	66765451.5	145643756	163656900	153743842	159212733.7
		Min	171,067	551,901	1,368,238	1,069,611	1,063,211
		Max	367,344,547	787,304,262	778,869,436	733,282,475	814,457,811
	no of loans outstanding	Average	300,336	534,171	622,109	547,769	569,250
		Std dev	568199.42	957185.692	1065318.8	959637.218	980033.7221
		Min	1,539	6,040	10,896	9,305	9,014
		Max	2,990,000	5,043,601	5,393,379	4,335,712	4,433,885
	Interest& fee income	Average	7,070,946	13,574,654	21,134,396	15,248,654	14,583,769
		Std dev	12815933.2	27811506.2	36055391.3	29144534.1	28938258.37
		Min	6,550	120,183	262,282	379,197	291,386
		Max	67,542,735	153,134,906	169,188,003	160,875,620	161,745,118
Inputs	Operating expenses	Average	2,592,692	4,112,720	7,048,570	6,568,636	5,219,158
		Std dev	3883282.58	6466450.42	10963410.5	9795246.5	7115441.235
		Min	4,431	67,657	130,771	142,582	127,098
		Max	16,959,367	30,930,863	47,608,241	40,038,459	31,752,340
	No of employees	Average	987	1,466	1,866	1,550	1,383
		Std dev	1351	2191.72688	2725.04484	2232.69194	2168.612147
		Min	5	19	19	23	36
		Max	6,373	10,428	11,697	9,548	11,450

It is indicative from the statistics presented in table 1.1 above that the mean gross loan portfolio of selected MFIs in India has increased from 34.36 million in 2008 to 90.09 millions in the year 2010, but observed a fall in the mean gross loan portfolio in 2011 i.e. 79.83 million due to the sector being struck by the crisis and again revived with increase in the mean gross loan portfolio to 87.204 million due to the reforms in the sector. There was an increase in the number of loans outstanding i.e. 300,336 in 2008 to 622,109 in 2010, but a fall in number of loans outstanding was observed in 2011 i.e. 547,769 and further there was a raise in number of loans to 569,250 in 2012. Also the average interest and fee income has raisen from 7.07 million to 21.13 millions in 2010.A drop in the mean interest and fee income was observed after 2010 due to crisis in the sector. There was an increase in the number of employees from 987 in 2008 to 1866 in 2010, thereafter a fall in the number of employees was observed i.e. 1550 and 1383 in the years 2011 and 2012 respectively. From the standard deviation values of the variables used in the study, it can be inferred that there appears to be variation among the select MFIs in size as measured in output produced(Number of employees, interest and fee income and Gross Loan Portfolio) and inputs used (Operating expenses and Number of employees). This signifies that microfinance industry in India comprises of small, medium and large size MFIs.

Table 1.2: Malmquist Index Summary Of Annual Means (output oriented)

Year	Efficiency change	Technological change	Pure technical efficiency change	Scale change	Total factor productivity change
2008-2009	0.851	0.572	0.836	1.018	0.487
2009-2010	1.304	0.73	1.11	1.175	0.952
2010-2011	0.828	1.4	0.934	0.887	1.159
2011-2012	1.26	0.654	1.112	1.133	0.824
Mean	**1.037**	**0.786**	**0.991**	**1.047**	**0.816**

From the table 1.2 above the following observations are made. It is evident from the analysis that the selected Microfinance Institutions in India have experienced a fall in productivity growth during the period. It was only 0.487 in 2008-2009, but increased to 0.952 during 2009-2010, this is due to increase in technical efficiency change i.e; due to efficient management practices and MFIs operating at optimum scale. Total Factor Productivity (TFP) was increased to 1.159 in 2010-2011 due to improvement in technological change, but fall in technical efficiency change was observed during 2010-2011. But the Total Factor Productivity (TFP) was declined to 0.824 in 2011-2012, during this period improvement in technical efficiency change was observed but fall in technological change was experienced.

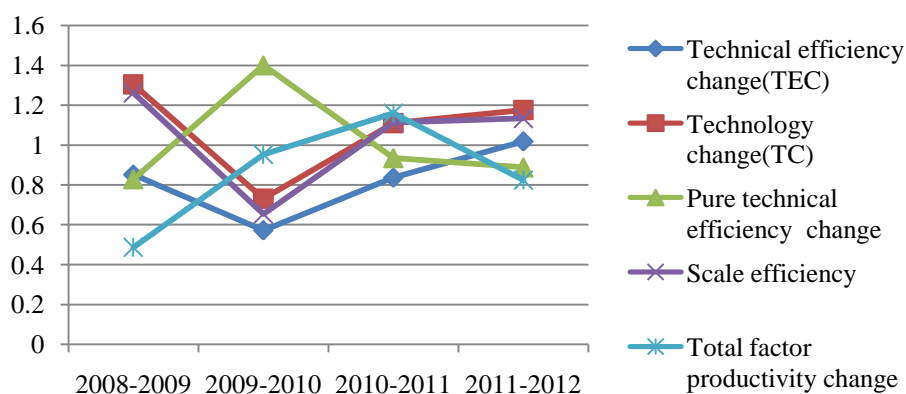**Figure 1.1: Total factor productivity change of sample MFIs**
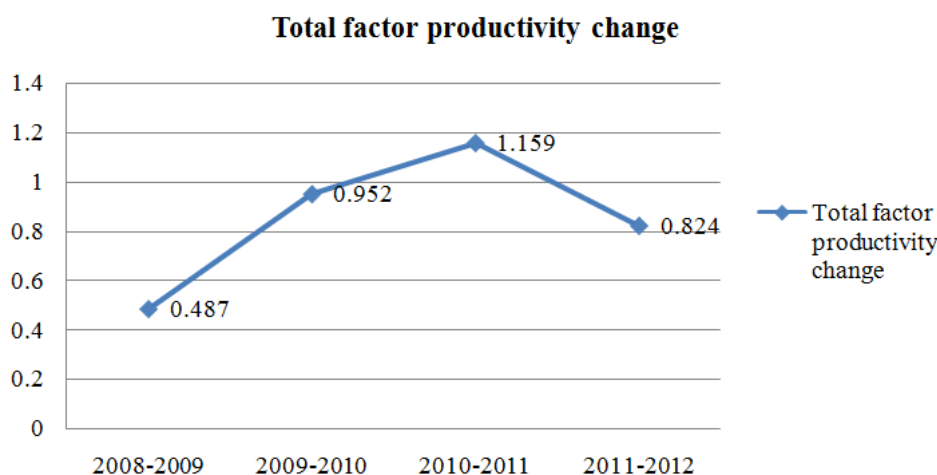
While using Malmquist total factor productivity (TFP) index to analyze differences in productivity over time the year 2008 is taken as the reference. It should be noted that the if TFP value is greater than one indicates it progress in efficiency, if it is less than one indicates regress in efficiency, if equal to one indicates no change in efficiency. In table (1.2) above, the malmquist total factor productivity values are shown. It can be observed that the malmquist total factor productivity decreased by 18.4% during the period 2008-09 to 2011-12. This signifies that selected MFIs in India have experienced a negative growth or a regress in productivity during

the period. The total factor productivity was found to be highest in 2010-2011 (i.e. 1.159) and lowest in 2008-09 (i.e. 0.487).

As it is shown in table (1.2) and figure (1.1), the results of the change in efficiencies (malmquist indices) shows that productivity growth is not constant and fluctuations in the productivity growth were observed. The period 2008-09 has registered lowest productivity i.e. 0.487 means a regress of productivity growth by 51.3%, while the year 2009-10 has recorded a productivity of 0.952, means a decline in productivity growth by 4.8%, while in the year 2010-11 there was progress in productivity growth by 15.9%(i.e. 1.159), and in the year 2011-12, a fall in productivity growth by 17.6%(i.e. 0.824) was observed.

The sources of productivity growth can be determined by decomposing the Malmquist Total Factor Productivity index. As explained, technical efficiency change (TEC) corresponds to efficiency change (i.e. movement of micro finance institutions towards the frontier-catching up) and technological change corresponds to the technological changes (frontier shift).The result of the analysis shows that the main source of decline in total factor productivity of Indian MF Industry is mainly due to technological change. It can be observed that the mean technical efficiency change is increased by 3.7% where as there is decline of 21.4% in the mean technological change. This implies that the overall regress in total factor productivity of the Microfinance industry in India is mainly due to technological change, while the MFIs overall technical efficiency is increased by 3.7%.

Figure 1.2: Malmquist Total Factor Productivity Index and its Components

As shown from table 1.2 and figure 1.2; it is apparent that the main source of Total factor productivity decline of Indian MFI s is due to the technological change (21.4% decline). To put it differently only 4 out of 36 MFIs have shown improvement in technological change (TC); while 17 out of 36 i.e. about 47% of MFIs have shown increase in technical efficiency change. This signifies that the whole MF industry showed deteriorated performance of MFIs due to lack of innovation in technology and effective implementation of technology. The increase in technical efficiency change by 3.7% in the MF industry in India was offset by the average technological change showing a decline of 21.4% and there is an overall decline in the productivity gain of the industry by 18.4%.

Further technical efficiency change i.e. 3.7% can be decomposed in to pure technical efficiency change and scale change. It can be observed from the analysis that there was a decline in pure technical efficiency change by 0.9% whereas increase in scale efficiency change by 4.7%. This implies that the management practices in MFIs during the period were not good enough to achieve efficiency; on the other hand improvement in optimum size by MFIs was registered during the study period.

Table 1.3: Malmquist Index Summary of Firm Means (output oriented)

S. No.	MFI	effch	techch	pech	Sech	Tfpch
1	Arohan Financial Services Private Ltd	0.849	0.791	0.906	0.937	0.671
2	Bandhan Financial Services Private Ltd	1.278	0.783	0.952	1.343	1
3	Basix	1.382	0.689	0.917	1.507	0.952
4	Belghoria Jankalyan Samithi (Bjs)	0.938	0.478	1	0.938	0.448
5	Cashpor Micro Credit	1.186	0.685	0.926	1.281	0.812
6	Equitas	1.778	0.696	1.109	1.604	1,238

S. No.	MFI	effch	techch	pech	Sech	Tfpch
7	Mahasemam	1.001	0.816	1	1.001	0.817
8	Madura Microfinance Ltd(Mmfl)	0.755	0.711	0.889	0.85	0.537
9	Sarala Women Welfare Society	1.201	1.043	1.103	1.088	1.252
10	Shri Kshetra Dharmasthala Rural Development Project (Skdrdp)	1.365	0.641	0.929	1.469	0.874
11	Village Financial Services Pvt Ltd (Vfs)	1.129	0.804	1.234	0.914	0.908
12	Sanghamithra Rural Financial Services	0.914	0.874	0.862	1.06	0.799
13	Asmitha Microfinance Ltd (Aml)	1.091	0.695	1.002	1.089	0.758
14	Asirvad Microfinance Private Ltd	0.866	1.051	0.948	0.914	0.91
15	Bss Microfinance Private Ltd	1.322	0.622	1.09	1.212	0.822
16	Grama Vidiyal Microfinance Ltd	1.133	0.784	1.039	1.091	0.888
17	Rashtriya Grameen Vikas Nidhi(Rgvn)	0.834	0.901	0.886	0.941	0.752
18	Sonata Finance Private Ltd	0.931	0.71	0.993	0.938	0.661
19	Swaadhar Finance Private Ltd	1.226	0.87	1.182	1.037	1.067
20	Grameen Koota Financial Services Pvt Ltd (Gfspl)	1.112	0.697	0.888	1.252	0.774
21	Network Of Entrepreneurship & Economic Development (Need)	0.874	1.096	0.99	0.883	0.959
22	Adhikar Microfinance Private Ltd	1	0.774	1	1	0.774
23	Esaf Microfinance And Investments Pvt Ltd	0.804	0.807	0.933	0.862	0.649
24	Future Financial Services Ltd (Ffsl)	0.981	0.817	0.939	1.044	0.801
25	Initiatives For Development Foundation(Idf) Financial Services Private Ltd	0.928	0.746	0.989	0.938	0.692
26	Sarvodaya Nano Finance Ltd (Snfl)	1.255	0.783	1.132	1.108	0.983
27	Satin Credit Care Network Ltd (Scnl)	0.727	0.808	0.985	0.738	0.587
28	Semam Microfinance Investment Literacy & Empower Ltd (S.M.I.L.E)	0.9	0.752	0.985	0.914	0.677
29	Spandana Sphoorty Financial Ltd (Ssfl)	0.934	0.83	0.81	1.153	0.776
30	Trident Microfinance Private Ltd	0.864	0.945	1.022	0.846	0.817
31	Ujjivan Financial Services Private Ltd	1.431	0.621	1.029	1.391	0.889
32	Uttarayan Financial Services Private Ltd (Ufspl)	1	0.86	1	1	0.86
33	Sahara Utsarga Welfare Society (Suws)	0.777	0.762	1	0.777	0.592
34	Welfare Services Ernakulum (Wse)	1.25	1.013	1	1.25	1.266
35	Asa International India Microfinance Private Ltd	1.136	0.89	1.136	1	1.011
36	Samasta Microfinance Ltd	0.98	0.838	1	0.98	0.821
	Mean	1.037	0.786	0.991	1.047	0.816

Table 1.3 provides a summary of mean values of the malmquist productivity index and its components for each MFI. Very few MFIs (i.e. about 13.8%) show positive Total Factor Productivity growth (i.e. MI>1). Equitas, Sarala, Swaadhar, WSE, ASA India have recorded a Total Factor Productivity growth of 23%, 25%, 6.7%, 26.6% and 1.1% respectively. The TFP growth of Equitas is due to the technical efficiency (TEC>1). The TFP growth of Sarala is due to both technical efficiency and technology change. The TFP growth of Swaadhar is due to technical efficiency change only. The TFP growth of WSE is due to both technical efficiency change and technology change. The TFP growth of ASA India is due to technical efficiency change only.

On the other hand 30 (83.3%) of the MFIs have malmquist indices scores of less than one (<1), indicating deterioration in productivity over time. Out of 36 MFIs, out of 30 MFIs which recorded malmquist indices scores of less than one, 4 institutions BJS, MMFL, SCNL and Sahara utsarga recorded least scores of Total Factor Productivity and regress in TFP of 55.2%, 46.3%, 41.3% and 40.8% respectively.

Out of 36 MFIs about 32 MFIs i.e. 88.8% of MFIs recorded a regress in technology change efficiency. Whereas 17 out of 36 i.e; 47% of MFIs have showed regress in technical efficiency change. This means that most of the Indian MFIs have recorded deteriorated performance due to lack of innovation in technology and effective implementation of technology. The productivity regress of Basix, Cashpor, Mahasemam, SKDRDP, VFS,AML,BSS, Gramavidiyal, GFSPL, Adhikar, Sarvodaya, Ujjivan, UFSPL is due to deterioration in technological innovation. The productivity regress of Arohan, BJS, MMFL, Sanghamitra, RGVN, Sonata, ESAF,FFSL,IDF Finance, SCNL, Smile, Spandana, Trident, Sahara, Samasta is due to decrease in both technical efficiency and technology change.

The productivity regress of Asirvad, Need is due to decrease in technical efficiency change.

Further from the table 1.3 , about 10 out of 36 MFIs i.e. 27.7% of MFIs recorded pure technical efficiency greater than one (>1). Equitas, Sarala, VFS, BSS, Gramavidiyal, Swaadhar, Sarvodaya, Trident, Ujjivan and ASA India have registered a progress in pure technical efficiency by 10.9%, 10.3%, 23.4%, 10%, 3.9%, 18.2%, 13.2%, 2.2%, 2.9% and 13.6% respectively. About 7 out of 36 MFIs i.e. 19.4% of MFIs have registered pure technical efficiency equal to one (=1) indicating no change in efficiency of those MFIs during the period. On the other hand 18 out of 36 MFIs i.e. about 50% of MFIs have registered a regress in pure technical efficiency (i.e. <1) .The average pure technical efficiency change score for the entire sample is 0.991, implying that pure technical efficiency change score decreases technical efficiency by 0.9%.

Turning to scale efficiency change(SEC), 17 out of 36 MFIs i.e about 47% of sample MFIs have registered a positive scale efficiency change score greater than one (>1) i.e. the scale of production of Bandhan, Basix, Cashpor, Equitas, Sarala, Skdrdp, Sanghamitra, AML, BSS,

Gramavidiyal, Swaadhar, GFSPL, FFSL, Sarvodaya, Spandana, Ujjivan, and WSE have contributed positively to total factor productivity by a factor of 34.3%, 50.7%, 28.1%, 60.4%, 8.8%, 46.9%, 6%, 8.9%, 21.2%, 9.1%, 3.7%, 25.2%, 4.4%, 10.8%, 15.3%, 39.1% and 25% respectively.4 MFIs Mahasemam, Adhikar, UFSPL and ASA India have scale efficiency change score equal to one (=1) i.e. these 4 MFIs does not contribute to the total factor productivity .On the other hand 15 out of 36 MFIs i.e. about 41.6% of MFIs have registered a scale efficiency change score of less than one(<1). This indicates that Arohan, BJS, MMFL,VFS, Asirvad, RGVN, Sonata, Need, ESAF,IDF Finance, SCNL, Smile, Trident, Sahara, Samasta contribute negatively to productivity change by a factor of 6.3%, 6.2%,15%, 8.6%, 8.6%, 5.9%, 6.2%, 11.7% 13.8%, 6.2%, 26.2%, 8.6%, 15.4%, 22.3% and 2% respectively. The average scale efficiency change score for the entire sample is 1.047, indicating the scale of production on an average increased efficiency change by 4.7%.

III.   SUGGESTIONS AND CONCLUSIONS

Malmquist Total Factor Productivity index was applied which is used to assess the change in efficiency of sample MFIs by time. The Malmquist Total Factor Productivity measures can be primarily divided in to two measures; one is efficiency change and the other is technical change index. The efficiency change is further subdivided in to pure technical efficiency and scale efficiency. From the study it was revealed   that the total factor productivity was decreased by 18.4% for the   selected sample of MFIs in India during the period of the study. Further it was observed that the decline in the growth of sample MFIs was mainly due to technological change only, which implies that the microfinance industry in India showed deteriorated performance due to lack of effective implementation sophisticated technology. There has been continuous deterioration in the performance of best practicing MFIs in India during the period of the study. As the technical efficiency change is further subdivided in to pure technical efficiency change and scale change, it was evident from the study that majority of sample Indian MFIs experienced decline in pure technical efficiency due to ineffective management practices. Since the decline in Total Factor Productivity during the period of the study 2008 to 2012 is due to decline in technological change, the Microfinance Institutions as well as entire Microfinance industry should engage in practices like technological innovation, enhancement of existing service delivery and the development of more technology driven and technology based systems in order to meet the objectives of increasing outreach and achieving financial sustainability.

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