Efficiency Analysis of Conventional vs. Islamic Microfinance: An Appraisal for Sustainability in Pakistan

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Abstract

Microfinance has emerged as an impressive tool for poverty alleviation in global developing economies of all of the continents. Critiques have questioned some of the features of conventional system of microfinance which gave room to Islamic mod of micro-financing (IMF) to the poor. But sustainability of Islamic microfinance is questioned by pyramids of microfinance proponents. Therefore, this study has been devised to compare the efficiency of the conventional vs IMF institutions in Pakistan. A non-parametric approach i.e. Data Envelopment Analysis was rendered to gauge the efficiency of the target institutions. In this regard, panel data of 9 Conventional microfinance institutions and 3 IMF institutions were used spanning over a period of 4 years i.e. 2008 to 2011. The results revealed that 2 out of 3 IMF institution and 2 out of 9 conventional MFIs were found on efficient frontier. Therefore, the sustainability of IMF institutions can be rated as high in Pakistan and this mod of financing should be encouraged by policy makers.

Key Words: Microfinance, Islamic Microfinance, Microfinance Efficiency, Technical Efficiency, Scale efficiency, Productivity, Pakistan.

1. Introduction

Microfinance institutions focus on providing credit to the poor who have no access to commercial banks or in other words, they are neglected by conventional commercial banks owing to their less capability to repay the loan as well as provide sufficient collateral. On the other hand, they work to establish their strong footing (i.e. sustainability)in financial system (Hartarska, Caudill, & Gropper, 2006). Almost same stance with dual objectives (i.e.outreach and sustainability) of MFIs is explained by Molinero et. al., (2007).Furthermore, MFIs are of paramount importance in third world countries like Pakistan as they considerably contribute in poverty alleviation in such countries. The sector has experienced an immense average asset growth up to 39% per annum from the year 2004 to 2008 and accumulated total assets worth $60 billion (Chen, Rasmussen, & Reille, 2010).

Hunger and deprivations are developing countries' phenomenon beyond the boundaries of belief. Approximately 44% of conventional MFI clients are living in Muslim countries (Zubair Mughal, M., 2011). Although, the role of conventional microfinance institutions cannot be negated but due to certain conflicts with Islamic teachings this mod is not acceptable by devout Muslims.

Majority of Pakistani population is Muslim and Islamic economic system is strongly, demanded by them. According to a survey conducted by Alhuda Centre of Islmic Banking and Finance (ACIBF) in 4 districts of Pakistan, 99 % of their respondents preferred to Islamic IMF products. Moreover, another survey conducted by Asian development BANK (2009) across 21 districts of the country, concluded the highest intense demand for Islamic IMFIs in Mardan followed by Charsadda, Peshawar, Abbotabad, Lahore and Gujranwala. Therefore, Islamic Financial Institutions are rapidly growing. Furthermore, the aforementioned

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information catered by ACIBF and ADB were confirmed by Government of Pakistan (2009) by revealing the market size (i.e. 5.6 million) IMF products in Pakistan.

Despite the high demand and popularity of IMF products in the masses their sustainability is questioned by pyramids of its critiques. Therefore, this study has, specifically, been devised to observe and compare the sustainability of the Islamic Microfinance Institutions with conventional MFIs working in Lahore, Pakistan. Moreover, this paper has been tailored in the following manner i.e. Literature review, Methodology and Results and Discussions are followed by introduction.

2. Literature Review

Efficiency is deriving maximum output from given level of inputs (Haron et. al., 2009). A production firm is efficient if it is unable to improve any of its inputs or outputs without deteriorating its others inputs or outputs. Comprehensively, it can be said that efficiency is the maximization of output by using minimum inputs at minimum cost.

The concept economic efficiency enables us to make comparative analysis among different economic units having same features. Guerrero and Negrín (2005) described that economic efficiency has two further branches i.e. technical efficiency and allocative efficiency. The literature explains that allocative efficiency is combining the available inputs in optimal way for a given level of output or it is the ability of the decision making units (DMU) to equate the marginal cost with economic benefit (Guerrero & Negrín, 2005).

The financial efficiency of MFIs is taken in two broad categories by the researchers i.e. a) cost efficiencies by using input variables and b) outputs efficiencies by using output indicators. Some of the researchers consider the MFI as a producer of financial services and lenders' for its poor clients. This approach is called production approach (Nghiem et al, 2006, Bassem 2008, Haq et al, 2010, Molinero et. al., 2007). Contrarily, some suggest that an MFI is an intermediary that receives the funds from savers and disburse those funds to financially weak people or borrowers. This approach is called intermediation approach (Kipesha, 2012).

The Efficiency of an MFI is judged by observing how adequately it has utilized its inputs to derive maximum output. An efficient MFI or the best practicing MFI is the one that reduces the poverty and achieves the financial sustainability both simultaneously (Brau & Woller, 2004,Nghiem et al., 2006).

Literature on Islamic MFIs lacks the measurement of efficiency using DEA. Most of the work found is theoretical or descriptive. Ahmed (2002) has recommended the Islamic MFI as an alternative to conventional MFIs due to its in-built characteristics that support Islamic MFI against conventional. The author took three Islamic MFIs as example from Bangladesh. He further made comparative analysis between Islamic MFIs and conventional MFIs with respect to their sources of funds, modes of financing (i.e. interest based and interest free), targeting women clients, social development programs, financing the poorest and dealing with default etc. The author has pointed out some problems faced by IMFIs also like lack of funds. Nonetheless, he concludes that there is sufficient potential for IMFIs for growth stipulating need of external funds and efficient operations. These IMFIs have even performed better than conventional MFIs seeking profit.

Rahman and Rahim (2007) described the IMFI as a missing component in Islamic banking. They gave the example of success of Grameen bank that led Muhammad Yunus (the founder) to Nobel Prize in 2006 and attracted the attention of the world towards MFIs. Though Grameen is not an Islamic MFI, but still it does not charge compound interest rather it charges simple interest on loans (Wilson, 2007).

Wilson (2007) further added that the demanders of Islamic MFIs are focusing on giving strength to Islamic society compliant with Shariah laws instead of value addition that conflicts with Shariah. Rahman & Rahim (2007) has suggested that an Islamic bank should take funds from savers and provide these funds to micro-entrepreneurs. This way the Islamic bank may perform an MFIs role by becoming an intermediary between the saver and micro-entrepreneur. They suggested the wakalah model for Islamic banks and

concluded that Islamic microfinance is also an area of Islamic banking in broader perspective. The authors, further, recommended need of study on wakalah model, governance models and risk mitigation techniques.

Ahmad (2011), studied the efficiency of 19 MFIs, randomly, from Pakistan using DEA by taking gross loan portfolio and number of active borrowers as inputs and number of personnel and total assets as outputs. He concluded that most of MFIs were at the stage of decreasing returns to scale, however, 33% of them are at the increasing returns to scale under input oriented method. Moreover, 4 MFIs were found efficient while operating in constant returns to scale (CRS) and 9 working in variable returns to scale (VRS) had also been observed as efficient, in 2007. Furthermore, for 2003, they found that 3 out of 12 MFIs on efficient frontier under both VRS and CRS. The researcher recommended that inefficiencies can be reduced by improving technology and training. He further argued that training might help improve managerial skills and ultimately the efficiency level.

The literature lacks the empirical investigation on comparative analysis of conventional MFIs and Islamic MFIs in particular. But such comparison was made in banking sector by Alpay and Hassan (2007) using DEA technique (Malmquist productivity index) to measure the efficiency of conventional and Interest Free Finance Institutions (IFFIs) in Turkey for the period 1990-2000.

3. Methodology

It is evident from the objectives of the study that it has been devised to observe and compare the efficiencies of Pakistani based Islamic vs. conventional microfinance nongovernmental organizations. In this regard, panel data set (2008-2011) of 9 Conventional MFIs namely BRAC Pakistan, Buksh Foundation, Community Support Centre (CSC), Development Action for Mobilization and Emancipation (DAMEN), Jinnah Welfare Society (JWS), Kashf Foundation, Orangi, Sungi and Rural Community Development Society (RCDS) and 3 Islamic MFIs namely Akhuwat, Asasah and Centre for Women Cooperative Development (CWCD) across Pakistan was taken from "MIX Market"(http://www.mixmarket.org/), the largest microfinance database that provides social and financial information of about 2000 MFIs across the globe. Moreover, another source of data i.e. Pakistan Microfinance Network (http://pmronline.info/) was used to collect the missing values in data taken from MIX Market, for the year 2011.
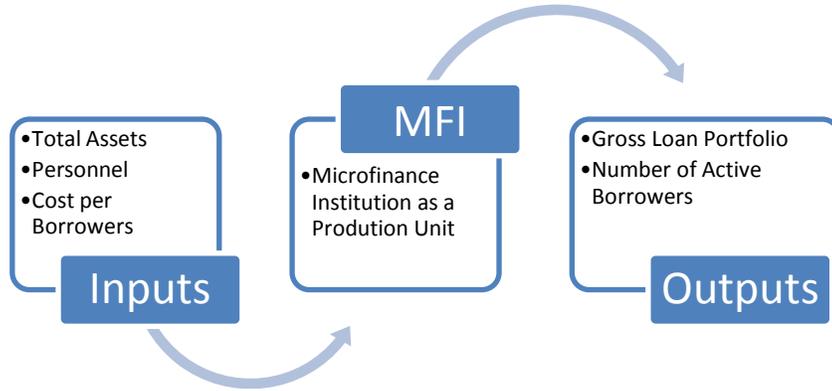
Data Analysis

Our study takes the MFIs as the production units hence we have adopted the production approach. Considering MFI as a production unit, the variables were classified in two broader groups i.e. inputs and outputs.

Input variables consist of namely personnel, assets and cost per borrower. Where "Personnel" mean the whole number of staff or human resource employed by MFIs in their operations, "Assets" were designated as total physical resources employed in MFIs operations while their monetary values were taken in US Dollars and "costs per Borrower were derived by dividing the operating expenses of MFIs on number of active borrowers of MFIs.

Contrarily, two output variables had been selected for analysis i.e. gross loan portfolio (GLP) and number of active borrowers (NAB).The amount of "gross loan portfolio" signifies the total amount lent by MFIs to their clients. This was the total outstanding amount of the principals lent to the clients but did not include the amount of loans written off. GLP was considered as an indicator of outreach of microfinance services. Moreover, "number of active borrowers" was selected as another indicator of outreach and had been earmarked as output in this study. It was hypothesized that greater is the number of active borrowers, the greater will be the outreach of microfinance services.

Figure 1- The Production Approach (Conceptual Framework)

Data Envelopment Analysis

DEA is very useful tool to estimate the efficiency of those organizations (i.e. non-profit private and public sector organizations whose primary objective is not optimization of inputs or output resources. It has been commonly used by the researchers for efficiency estimation (Ahmad, 2011, Bassem, 2008, Molinero et. al., 2007, Pathan et. al., 2010) and many others in literature.

We also incorporated non-parametric Data Envelopment Analysis (DEA) technique to measure efficiency. It is a well-known non-parametric approach based on linear programming estimations. Under DEA, a Decision Making Unit (DMU) having efficiency score 1 is deemed efficient while having score lesser than one is thought under-efficient (Wagner & Shimshak, 2007). Furthermore, this technique allows the researchers to use either input oriented method or output oriented method to gauge efficiencies of the organizations. A DMU strives to reduce the inputs at a given level of outputs while employing input oriented approach. However, in output oriented approach, the DMU tries to augment the outputs at a given level of inputs. We opted Output Oriented method to measure efficiency of MFIs under study. A "Malmquist Productivity Index" was estimated by using DEA to determine the efficiency of *a DMU* which uses 'n' inputs to produce 'm' outputs.

- **Malmquist Productivity Index**

Under DEA, Malmquist Productivity index (MPI) is a technique that helps measure efficiency change in two or more periods. Several studies have used Malmquist Productivity Index to measure total factor productivity (Kortelainen, 2008).

Technical and allocative efficiencies are two prominent types of production efficiencies. Technical efficiency shows the DMUs' potential to attain the maximum output at a certain level of inputs. On the other hand, the allocative efficiency of a DMU equates its marginal product with its marginal cost.

Mathematically, the output Malmquist Productivity Index can be expressed in following way:

$$M_o(x^{t+1}, y^{t+1}, x^t, y^t) = \frac{D_o^{t+1}(x^{t+1}, y^{t+1})}{D_o^t(x^t, y^t)} \left[\frac{D_o^t(x^{t+1}, y^{t+1})}{D_o^{t+1}(x^{t+1}, y^{t+1})} \frac{D_o^t(x^t, y^t)}{D_o^{t+1}(x^t, y^t)} \right]^{\frac{1}{2}} ....i$$

The term outside the brackets is showing the change in technical efficiency, however, the geometric mean of the two ratios inside the brackets measures the shift in technology between the two period's *t* and *t + 1;* We can consider it progress in technology. So:

$$\text{Efficiency change} = \frac{D_o^{t+1}(x^{t+1}, y^{t+1})}{D_o^t(x^t, y^t)} \text{...ii}$$

$$\text{Technical change} = \left[\frac{D_o^t(x^{t+1}, y^{t+1})}{D_o^{t+1}(x^{t+1}, y^{t+1})} \frac{D_o^t(x^t, y^t)}{D_o^{t+1}(x^t, y^t)} \right]^{\frac{1}{2}} \dots\dots\dots\dots\dots\text{iii}$$

Where, x^t = input vector in period of time t, y^t = output vector in period of time t, D^t = distance function at period of time t, D^{t+1} = distance function at period of time t+1, x^{t+1} = input vector at period of time t+1, y^{t+1} = output vector at period of time t+1, To avoid arbitrarily selecting one frontier to compute the index, the geometric mean could be applied as follows:

$$M(x^{t+1}, y^{t+1}, x^t, y^t) = \sqrt{\frac{D^t(x^{t+1}, y^{t+1})}{D^t(x^t, y^t)} \times \frac{D^{t+1}(x^{t+1}, y^{t+1})}{D^{t+1}(x^t, y^t)}} \dots\dots\dots\dots\dots\text{iv}$$

Malmquist productivity index has been adopted for efficiency analysis of MFIs. Under DEA, Malmquist Index is a technique that helps us measure changes in Technical efficiencies (TE) of two periods. Malmquist index helps us measure the relative productivity of the decision making units (MFIs in our case) at production point (X_{t+1}, Y_{t+1}) with production points (X_t, Y_t). Malmquist index giving a result > 1 shows a gain in productivity , while a result < 1 depicts a loss in productivity and if the index results = 1 then it shows no change in productivity from time period t to t+1. Scale efficiency is also a component affecting productivity change as depicted in following equation (Färe, Grosskopf, Norris, & Zhang, 1994).

Productivity Change = Scale Efficiency Change × Technical Efficiency Change × Technical Change

Malmquist Index does not demand the information pertaining prices of inputs or outputs. Furthermore, it also needs no assumption of profit maximization or cost minimization (Balk, 1993; Färe, Grosskopf, Lindgren, & Roos, 1992).

The productivity change has been analysed under Constant Returns to Scale (CRS) and Variable Returns to Scale(VRS). CRS means that each additional unit of input variable applied in production will result the same output produced. This approach is extensively used in literature introduced by Rhodes et. al., (1978). VRS means that an additional unit of input will cause increase in outputs. This VRS approach was introduced by Banker, Charnes and Cooper (1984).

4. Results and Discussion

This part of the paper results of the data analysis rendered to achieve the objectives of the study. It includes comparisons of conventional vs Islamic microfinance institutions with respect to their efficiency measures.

- **Comparative Technical Efficiency Scores of Conventional and Islamic MFIs under CRS and VRS**

Table 1 gives the technical efficiency estimates for both of the groups i.e. conventional and Islamic MFIs under assumptions of constant and variable returns to scale, respectively. It is evident from the table 1 that on average, conventional MFIs remained inefficient under both assumptions of CRS and VRS while Islamic MFIs remained on efficient frontier under VRS but slightly inefficient on CRS. Overall efficiency scores of Islamic MFIs were found better than conventional MFIs. As far as individual performance of conventional and Islamic MFIs area concerned, it was observed that only 2 institutions i.e. Orangi and Kashaf foundation were found on efficient frontier while rest of the other organizations in this category were found inefficient in case of CRS (table 1). However, 2 out of 3 Islamic MFIs were observed as on efficient frontier in the category of CRS.

Moreover, in the category of overall results of VRS Islamic MFIs were found far better performer as compared to conventional MFIs where average efficiency score of IMFs were found on efficient frontier while conventional MFIs were found inefficient. As far as individual performance of both types of

organizations is concerned, all of the three Islamic MFIs were found on efficient frontier while only 4 organizations were observed on efficient scale in case of conventional MFIs.

As far as scale efficiency of the microfinance institutions is concerned, though both types of organizations under study were found inefficient but efficiency scores of Islamic MFIs were found higher as compared to conventional MFIs. However, individual efficiency scores of the Islamic MFIs, in this category, were found better with 2/3 organizations on efficient scale as compared to 2/9 organizations on efficient scale.

Therefore, it can be concluded that Islamic MFIs had an edge over Conventional MFIs regarding their efficiencies in all of the frontiers (i.e. CRS, VRS and Scale efficiency)

Table 1: Comparative Technical Efficiency Scores of Conventional and Islamic MFIs under CRS and VRS

CON.MFIs	CRS	VRS	Scale Efficiency	Islamic MFIs	CRS	VRS	Scale Efficiency
BRAC - PK	0.759	0.845	0.897	**Akhuwat**	1.00	1.00	1.00
Buksh Foundation	0.450	1.000	0.449	**Asasah**	0.988	1.00	0.988
CSC	0.866	0.867	0.998	**CWCD**	1.00	1.00	1.00
DAMEN	0.956	0.986	0.968				
JWS	0.907	0.910	0.996				
Kashf Foundation	1.000	1.000	1				
Orangi	1.000	1.000	1				
RCDS	0.877	0.903	0.971				
Sungi	0.770	1.000	0.77				
Mean	0.842	0.945	**0.895**	**Mean**	0.996	1.00	0.996

- **Malmquist Index: Summary of Mean Annual Efficiency Growth Scores**

Table 2 exhibits the average efficiency growth scores of Islamic vs conventional MFIs over the years (2009-2011) across the firms. The table corroborates detailed comparative analysis of Islamic and conventional MFIs by exclaiming various measures i.e. overall technical efficiency change, technological change, pure efficiency change, scale efficiency change and total factor productivity change.

As far as Pure Technical Efficiency of Islamic MFIs is concerned, it does not show any change over time while conventional MFIs' Pure Technical Efficiency has declined in the year 2011, though it shows increasing trend in the previous couple of years. However, Technological Change in Islamic MFIs has shown decline on average while it remained growing in Conventional MFIs on average despite a decline in Technological change in early two years. Moreover, in case of average Technical and Scale Efficiency Changes Islamic MFIs' growth remained stagnant while the Conventional MFIs' kept on improving (Table 2). Furthermore, highest TFP growth was observed in 2009 while it was found least in 2010 and once again it rose again in 2011, in case of conventional MFIs.

Moreover, table 2 also shows that TFP declined in both in 2009 and 2010 while it got higher in 2011 as compared to its early years. In the same category of organizations scale efficiency was improved in 2010 and 2011.

By and large, results revealed that the conventional MFIs remained growing in 2009 and 2011 with an overall average growth in TFP, while the Islamic MFIs showed an improvement in their TFP in 2011. These results trigger the demand for further improvement in TFP growth of Islamic MFIs despite the fact that they are more technically efficient in terms of number of MFIs when observed as a whole.

Table 2: Malmquist Index Summary of Annual Averages of Islamic MFIs and Conventional MFIs

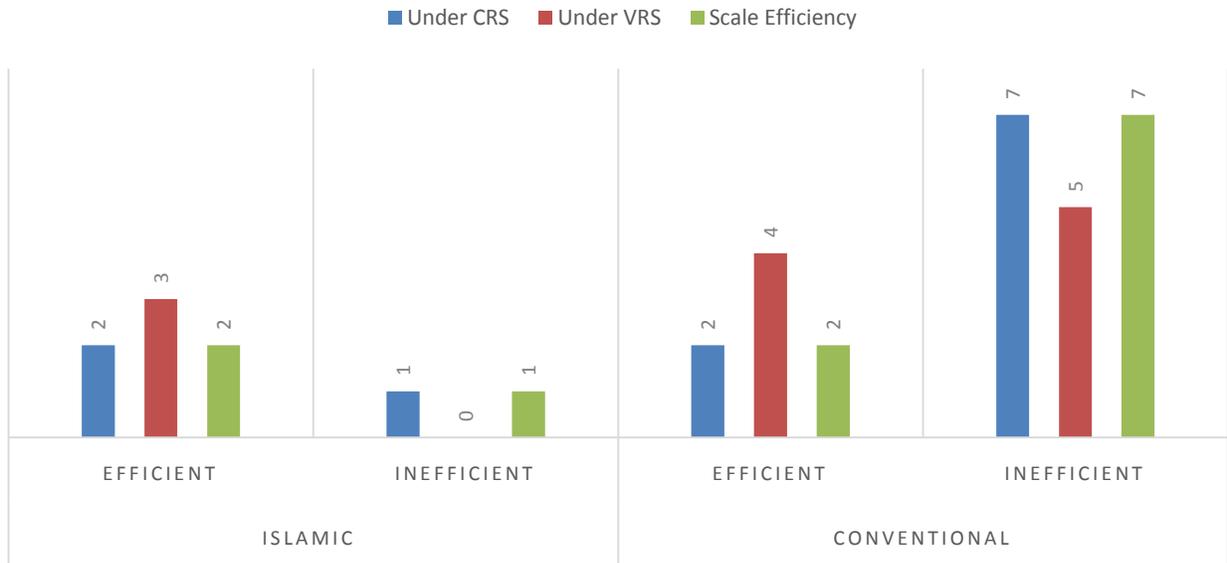| MFIs	Conventional					Islamic				
Scores	EFFCH	TECHCH	PECH	SECH	TFPCH	EFFCH	TECHCH	PECH	SECH	TFPCH
2009	1.88	0.95	1.04	1.86	1.79	0.97	1.01	1	0.97	0.97
2010	1.03	0.96	1.05	0.98	0.99	1.02	0.90	1	1.02	0.92
2011	1.00	1.11	0.98	1.03	1.12	1.03	1.05	1	1.03	1.08
Mean	1.31	1.01	1.02	1.29	1.30	1.00	0.99	1	1.00	0.99
Note: EFFCH= Technical Efficiency Change, **TECHCH**=Technological Change, **PECH**=Pure Efficiency Change, **SECH**= Scale Efficiency Change, **TFPCH**=Total Factor Productivity Change. **Source:** As above										

- **Comparative Summary of Efficiency Aggregates of Islamic and Conventional MFIs**

Figure 1 depicts the comparative summary of efficiency aggregates of Islamic vs conventional MFIs. As per information available in the said figure (1) it is revealed that all three Islamic MFIs have remained on efficient frontier under Variable Returns to Scale, while two out of three Islamic MFIs have remained on efficient frontier under Constant Returns to Scale assumption. On the other hand, four out of nine Conventional MFIs have remained on efficient frontier under Variable Returns to Scale assumption, while only two out of seven Conventional MFIs have remained on efficient frontier under Constant Returns to Scale. The results exhibit that the percentage of efficient Islamic MFIs are considerably higher than that of Conventional MFIs.

Describing the results in percentage format, we may say that 100% Islamic MFIs have been observed on efficient frontier under VRS and 66% of them are found efficient under VRS and Scale Efficiency measure. Contrarily, only 44% Conventional MFIs were found on efficient frontier under VRS and 22% of them had been found on efficient frontier under CRS.

Figure 2.Comparative Summary of Number of Efficient/Inefficient Islamic and Conventional MFIs

- **Comparative TFP Scores of Conventional and Islamic MFIs over time**

This part of the paper exclaims individual Total Factor Productivity Scores analysis of Islamic vs conventional MFIs. In the group of Conventional MFIs Sungi and Bukhsh foundation showed a considerable factor productivity change over time (2008-2011). Sungi shows positive results on all efficiency frontiers. While Bukhsh foundation needs improvements in managerial efficiency as it lacks in pure efficiency. It

performs well on technical and technological frontiers. Overall results do not show a positive productivity change for this sector due to social contribution objective. Pure and technological efficiency needs improvement by this sector. MFIs may increase their factor productivity by achieving managerial efficiency and technological advancements.

Table 3: Comparative TFP Scores of Conventional and Islamic MFIs over time

Conventional MFIs	TFP	Islamic MFIs	TFP
BRAC – PAK	1.108	Akhuwat	1.087
Buksh Foundation	1.883	Asasah	0.937
CSC	1.02	CWCD	0.947
DAMEN	1.019		
JWS	1.025		
Kashf Foundation	0.983		
Orangi	1.009		
RCDS	0.929		
Sungi	1.543		
Mean	1.168	**Mean**	0.988

On the other hand, only Akhuwat revealed positive TFP score over the years. On average, Conventional MFIs are showing positive TFP scores while the Islamic MFIs have slightly declined in terms of TFP growth. In brief, we may conclude that Conventional MFIs have shown better Total Factor Productivity as compared to Islamic MFIs over the years.

In table 3, only two out of nine Conventional MFIs are showing a decline in their factor productivity. Similarly, two out of three Islamic MFIs are showing an overall decline in their factor productivity.

5. Conclusion

In this study, we may conclude our results in two dimension i.e. Technical Efficiency scores and Total Factor Productivity of both MFI groups. Technical Efficiency of Conventional and Islamic NGO MFIs gives us the best performing DMUs among all MFIs over the years. In this comparison, we found that 2 out of 3 Islamic MFIs working on efficient frontiers. On the other hand, only 2 out of 9 Conventional NGO MFIs were found working on efficient frontier. However, overall comparison of efficiency of these both type institutions gives an overwhelming edge to Islamic MFIs over Conventional NGO MFIs.

Secondly, the Total factor productivity scores have shown that Islamic MFIs have not shown noticeable growth in their total factor productivity over the years, despite the fact, they are technically efficient among all MFIs. Moreover, Conventional NGO MFIs have also shown growth in their factor productivity as compared to previous years but those are once again surpassed by Islamic MFIs in this regard, too.

In the light of above results, we conclude that the Islamic MFIs have been more efficient as compared to Conventional NGO MFIs. But there is a need to concentrate on further growth in terms of their factor productivity. This also reveals that there is ample appetite for Islamic MFIs as a microfinance service provider in Pakistan.

In the years to come, further research can be conducted by having a larger data set of Islamic MFIs to measure their efficiency in comparison to Conventional NGO MFIs.

References

Ahmad, U. (2011). Efficiency Analysis of Micro-finance Institutions in Pakistan (No. 34215). University Library of Munich, Germany.

Ahmed, H. (2002). Financing micro enterprises: an analytical study of Islamic microfinance institutions. Islamic Economic Studies, 9(2), 27-64.

Alpay, S., & Hassan, M. K. (2007). A comparative efficiency analysis of interest free financial institutions and conventional banks: A case study on Turkey. Paper presented at the Economic Research Forum Working Papers.

Balk, B. M. (1993). Malmquist productivity indexes and Fisher ideal indexes: comment. The Economic Journal, 103(418), 680-682.

Banker, R. D., Charnes, A., & Cooper, W. W. (1984). Some models for estimating technical and scale inefficiencies in data envelopment analysis.Management science, 30(9), 1078-1092.

Bassem, B. S. (2008). Efficiency of microfinance institutions in the Mediterranean: an application of DEA. Transition Studies Review, 15(2), 343-354.

Brau, J. C., & Woller, G. M. (2004). Microfinance: A comprehensive review of the existing literature. Journal of Entrepreneurial Finance, JEF, 9(1), 1-27.

Caudill, S. B., Gropper, D. M., & Hartarska, V. (2009). Which microfinance institutions are becoming more cost effective with time? Evidence from a mixture model. Journal of Money, Credit and Banking, 41(4), 651-672.

Charnes, A., Cooper, W. W., & Rhodes, E. (1978). Measuring the efficiency of decision making units. European journal of operational research, 2(6), 429-444.

Chen, G., Rasmussen, S., & Reille, X. (2010). Growth and vulnerabilities in microfinance. Focus Note, 61.

Dusuki, A. W. (2008). Banking for the poor: the role of Islamic banking in microfinance initiatives. Humanomics, 24(1), 49-66.

Färe, R., Grosskopf, S., Lindgren, B., & Roos, P. (1992). Productivity changes in Swedish pharamacies 1980–1989: A non-parametric Malmquist approach. Journal of Productivity Analysis, 3(1-2), 85-101.

Färe, R., Grosskopf, S., Norris, M., & Zhang, Z. (1994). Productivity growth, technical progress, and efficiency change in industrialized countries. The American Economic Review, 66-83.

Guerrero, R., & Negrín, J. L. (2005). Efficiency of the Mexican banking system 1997-2004: A dynamic estimation. Bank of Mexico.

Gutierrez-Nieto, B., Serrano-Cinca, C., & Mar Molinero, C. (2007). Microfinance institutions and efficiency. Omega, 35(2), 131-142.

Haq, M., Skully, M., & Pathan, S. (2010). Efficiency of microfinance institutions: A Data Envelopment Analysis. Asia-Pacific Financial Markets, 17(1), 63-97.

Hartarska, V., Caudill, S. B., & Gropper, D. M. (2006). The cost structure of microfinance institutions in eastern Europe and central Asia. William Davidson Institute, The University of Michigan, Working Paper(809).

Kipesha, E. F. (2012). Efficiency of Microfinance Institutions in East Africa: A Data Envelopment Analysis. European Journal of Business and Management, 4(17), 77-88.

Kortelainen, M. (2008). Dynamic environmental performance analysis: a Malmquist index approach. Ecological Economics, 64(4), 701-715.

Ministry of Finance, Government of Pakistan (2009). Islamic Republic of Pakistan: Improving Access to Financial Services-Main Report. (Volume I) TA No. 4894-ADB. Published byFINCON Services Inc.

Nghiem, H. S., Coelli, T., & Rao, P. (2006). The efficiency of microfinance in Vietnam: Evidence from NGO schemes in the north and the central regions. International Journal of Environmental, Cultural, Economic and Social Sustainability, 25, 71-78.

1

Rahman, A. R. A., & Rahim, A. (2007). Islamic microfinance: a missing component in Islamic banking. Kyoto Bulletin of Islamic Area Studies, 1(2), 38-53.

Tahir, I. M., Abu Bakar, N., & Haron, S. (2009). Estimating technical and scale efficiency of Malaysian commercial banks: A non-parametric approach. International Review of Business Research Papers, 5(1), 113-123.

Wagner, J. M., & Shimshak, D. G. (2007). Stepwise selection of variables in Data Envelopment Analysis: Procedures and managerial perspectives. European Journal of Operational Research, 180(1), 57-67.

Wilson, R. (2007). Making development assistance sustainable through Islamic microfinance. IIUM Journal of Economics and Management, 15(2), 197-217.

Zubair Mughal, M. (2011), International Seminar on Financial Inclusionfor Central Asia, the Caucasus, and South Asia.retrieved from http://www.scribd.com/doc/65178409/Islamic-Micro-Finance-by-Muhammad-Zubair-Mughal-ADBI-International-Seminar