Testing Technical and Cost Efficiency of Pakistani Islamic Banking System

Nazima Ellahi[1]

Naveed Azim Khattak, Khashif-Ur-Rehman, Neelofar Jamil[2]

Financial sector is a key component which contributes to the output growth of a country. It is fastest growing sector after the globalization period. With the advent of advances in commercial banking system, a change in behaviors of people has been observed. People changed their, saving behaviour, investment decisions. The innovations brought in banking sector caused welfare maximization. This empirical study has been conducted to evaluate the technical and cost efficiency of the Islamic and conventional banking system in the Pakistan financial market. Data Envelope Analysis programme (DEAP) has been used for empirical purpose. Furthermore, this study has also applied Analysis of Variance (ANOVA) to test the existence or non-existence of null hypothesis as there is significance difference between the Technical Efficiency (TE) and Cost efficiency (CE) of different conventional banks, the conclusion stated that this type of banking system has an impact on the efficiency of the banking system.

Key words: *Technical Effeciency, Cost Efficiency, Islamic Banking*

1. Introduction

The benefits of globalization have been experienced by financial sector. As it is the most influential and progressive sector, it changed the behaviors of people about their savings and affected positively their investment decisions. The overall growth dynamics has shown a positive trend due to the share banking sector performance. Islamic Financial System (IFS) has been introduced with new rules and regulations, with the foundation of Islamic principles. The banking system is shariah compliant. (Beong 2004) argued that IFS experienced a tremendous growth in practical field since its inception during early 1970s. A record of annual growth rates showed that Islamic banking system is growing with a rate of 10% to 15%.

Organizations are established with a vision and mission statement, it includes a few objectives, one of these foremost objectives developed along with the organization include that it never lets its stakeholders and want to strengthen them. A strong organization enhances the performance level. For the evaluation and measurement of organizational performance a number of indicators and tools are used, they predict the development introduced, banking sector achieved the attention during the 199s when financial reforms measures were introduced in order to increase the efficiency of banking sector. These reforms were implemented with the assistance of international funding agencies like International Monetary Fund (IMF), World Bank (WB) etc. the multilateral funding agencies provided the technical as well as financial assistance to the banking sector of developing countries (Ellahi and Khan, 2010). The efficiency literature got

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[1] Lecturer, Department of Economics, Foundation University, Islamabad, Pakistan. E: nazimaellahi@yahoo.com

[2] Email: neelofarjamil@yahoo.com

popularity during the same period. The Islamic banking system was introduced later after the liberalization period, still there is a need of literature built up and support to promote it. a number of studies has been conducted to measure the efficiency of islamic banking system across the world. This efficiency was technical efficiency, cost efficiency or the organizational efficiency at some places.

To conduct an analysis and providing theoretical support, there is a need of understanding the concept of efficiency. The efficiency analysis of a production or service unit(s) refers to the output and input used in the process for producing the product or service (Hamim Syahrum *etal*. (2005). A firm's performance is measured by its efficiency, it is decomposed into two components firstly the 'technical efficiency' and secondly 'allocative efficiency'. Technical efficiency is obtained when the firm maximize output from given input or it minimize input for the production of output. The allocative efficiency always tries to obtain the optimal combination of input and output at a given price (Kumbhakar & Lovell, 2003). Regarding the economic concept according to Berger and Mester (1997) efficiency can be observed by two concepts these are cost efficiency and profit efficiency. Empirical dimensions of the concept of efficiency were first explored by Farrell (1957). The study conducted by Farrell argued that concept of efficiency can be divided into two component, technical efficiency (TE) and allocative efficiency (AE), and suggested that overall efficiency is the product of TE and AE. As in conventional banking industry we have a lot of research work, but in Islamic sector this work is lacking.

The practical application of Islamic banking practices started since 1970. Afterwards the tremendous growth rates have been observed by this banking system across the world. A vast acceptance of this concept worldwide raised the asset size. As a consequence size of assets rose from hundreds of thousand dollars to hundreds of billions of dollars. The establishment of Islamic banking system is followed by first phase which took place in 1963s when "The Mit Ghamr Saving bank" started its operation in Egypt which was in fact, first Islamic financial system experimented (Haroon and Ahmed, 1998). As it was introduced due to a certain factor this concept was flopped, and this bank was not able to grow longer. After that in 1970's a strong campaign of Islamic banking system was started and in this Malaysia has taken the initiative, remain successful in their aim.

Pakistan started the experience of Islamic banking system during 1980 with the introduction of new rules and regulations by state bank of Pakistan (SBP) in banking ordinance. With regard to this from 1st July 1985, all commercial banks were made interest free by introducing profit and loss sharing (PLS) system. Like the case of Egypt, it was not a successful experiment. Afterwards, in December 2001, Meezan Investment Bank (MBL) was issued with first certificate of Islamic banking. It was given an edge of being the first Islamic bank in Pakistan. Now with the blessing of Almighty Allah Pakistan is characterized by the presence of six full Islamic banks[i] by the end of year 2008 (SBP report, 2009). The trends of growth showed that overall performance of Islamic banking system has been good during the last seven years. To empirically analyze the efficiency statistics of Pakistani Islamic banking system, no studies has been conducted.

A few of the studies conducted for the efficiency of conventional banking systems in Pakistan includes Barki and Niazi in (2003). They empirically tested the efficiency of conventional banks

because it has been the old player in the financial sector of Pakistan. The present study is an effort to find the technical and cost efficiency of Pakistani Islamic banking system. Both these are found to calculate the performance of this banking system. The objective of the study is to explore whether the institutions are producing their services with cost efficient techniques or not. On the other hand it is also intended to find that whether their technical performance is satisfactory enough to compete the commercial banks practicing the conventional techniques. In sum we explored how much the IBS in Pakistan is technically efficient? How much the IBS is cost efficient? For this, we have developed a hypothesis:

H_0: There is not a significant difference in the technical and cost efficiency for at least two different types of banks.

2. Literature Review

Stochastic Frontier analysis (SFA) was used to conduct an empirical analysis for Malaysian Islamic banking system in 2006, the analysis found that overall operations of Islamic banks expanded during the period of study. The study also found stable trends in conventional banking system efficiency. A comparison showed that performance of conventional banking system has remained better than the Islamic banking systems there. Furthermore, the study found that two types of Islamic banking exists, firstly conventional banks with departments of shariah compliant tools and secondly, full-fledged Islamic banking. The performance of full-fledged Islamic banks found to be high as compared to partial Islamic banks.

As far as the concept of technical efficiency is concerned, an organization is technically efficient when it produces higher maximum output with the given inputs, as suggested by Koopmans (1951) "a producer is considered technically efficient if, and only if, it is impossible to produce more of any output without producing less of some other output or using more of some inputs". On the other hand the allocative efficiency of the firm is a state where the firm or organization considers the optimal combination of the input and output at a specific price level. Kumbhakar and Lovell (2003) states that efficiency is a performance measure, it measures how much a sector is efficient in its activities. Efficiency is also measured, how much output is produced by the firm, either this output is maximum or not, either the cost of production is reduced or not, either the overall size of assets is increasing over the time causing the overall expansion of the organization.

Hamim, *etal.* (2006) stated that overall performance of an organization either banking or other industry is measured using the concept of efficiency. It tells us the dimensions of its success. Farrell (1957) is regarded as the pioneers of efficiency studies. He was the first to conduct the studies based on efficiency. Afterwards a strong literature support was provided to this concept in both either a general firm or banking industry. An empirical analysis conducted by Berger and Humphery (1997) stated that financial industry is an important components of industrial sector, hence the efficiency in this sector started to develop a literature. As the banking reforms were introduced to enhance the competition among banks, it is also measured by technical efficiency of an organization or industry. In a competitive environment, firms are confronted with dual objective of output expansion on one hand and minimization of cost on other hand. (Nickel, 1996).

Hassan (2003) conducted another study for exploring the efficiency of Islamic banking system in Pakistan, Iran and Sudan. The study found that Islamic banking system is relatively more cost efficient as compared to conventional banking practices, while the same is inefficient in general profit generation. Furthermore the study found that Islamic banks which are large in size and reaping high profits are more efficient. On the same lines another study was carried out by Brown and Skully (2003), who found that in comparison banking system in Iran is more established than Sudan. The analysis was conducted for 35 banks of both the countries. The reasons behind the well performance of Irani banks were identified to be the large size of its banking industry. This reason is attributed to the cost efficiency of Irani banking. The reason of least cost efficient banks in Sudanese bank was the financing practices in primary sectors of agriculture.

Nickel (1996) analyzed that cost efficiency is affected by size of firms and their assets. More cost efficiency is achieved by increasing the size of firms, while least efficiency is the outcome of small size of firms.

3.   Methodology, Sample and Variable Description

3.1   Sample
the present study is conducted for all the Islamic banks in Pakistan which started their operations after 2004. The other part of sample consists of private conventional banks operating during the same time period. The analysis used data taken from two Islamic banks of Meezan Bank Limited (MBL), and Bank Islami Pakistan. The private banks consisted of Muslim Commercial Bank (MCB), United Bank Limited (UBL), and Habib Bank Limited (HBL).

Efficiency is measured by two ways. Firstly by parametric approach and second by non-parametric approach. Parametric approach consisted of three different measures including stochastic frontier approach (SFA), Thick frontier approach (TFA) and Distribution Free approach (DFA). Out of these approaches most commonly used approach is Stochastic Frontier Analysis (SFA). On the other hand non-parametric consist of two approaches including Free Disposal Hull analysis (FDH) and Data envelopment analysis (DEA). Out of these two, Data Envelope analysis (DEA) is most widely used. In a research study Berger and Humphrey (1997) get that there are about 130 different applications are used for the analysis of a firm efficiency, and in these all about 60 have adopted parametric approach for the analysis, which shows that there is no, one approach is strong in its adoption for the analysis.

The DEA is preferred over other approaches because of a number of reasons: (i) compared to parametric approach it is more flexible approach. (ii) It is more suitable for the cases where more inputs and outputs are involved. This study also applied the same approach because an analysis of literature shows that, it is used by many researchers including Aly *etal*. (1990), Elyasiani & Mehdian (1992), Zaim (1995), Resti (1997), Bauer *etal.* (1998), Casu & Molyneux (2000), Hamim S. *etal.* (2008).

3.2   Variables Selection

As far as the selection of variables is concerned, there are two approaches in this regard firstly, **Production Approach** states that production of goods and services are considered, implies that

how firms utilize their inputs to get the efficient and optimal output. Secondly, **Intermediation Approach** which is related to measure the overall efficiency of the banking industry. Former is preferred because most of the researchers are interested to find the efficiency of different branches of banking system it is used by Kwan (2002). While the latter is characterized by the overall performance measurement as used by Berger and Humphery (1997). Present analysis conducted for Pakistan Islamic banking system used two variables; input variables and output variable. The input variables are the total deposit that Islamic banking system of banks under consideration while, the other is total overhead expenses. The only input variable is the total earning assets.

3.3   Data Set:

Literature including the studies on efficiency analysis suggested that there is no general agreement on the definition of input and output variables. (Sealey and Lindley, 1977) stated that the intermediation approach is considered to be the most appropriate for the banks because in the banking sector the most activates are consist of turning large deposits and funds purchased from other financial institutions into loan are financing activities. According to banking efficiency researcher Kwan (2002) the intermediation approach is most frequently used technique to understand or measure the efficiency. Berger and Humphrey(1997) says about the intermediation approach that it is one of the best approach for the evaluation of the entire banking system because it includes everything like the income expense, other all expenses etc.

So by the above literature suggestion we apply the intermediation approach for the analysis. Because of the certain important reasons like, the intermediation approach will evaluate the bank efficiency as a whole. Secondly, this approach is used more frequently and widely by different researchers. Finally, as the Islamic financial system is equity based system where the business may end with profit or loss. This implies the importance of intermediary activities.

Now the variables; in this study we have done two analysis one is technical efficiency analysis and the second is cost efficiency. For the technical efficiency we have adopted three variables, two are input variables and one is an output variable. The input variables are denoted by X1 and X2. X1 is the total deposits of the bank.(that include all types of deposits with the bank) secondly we have X2 which stand for total overhead expenses of the bank which includes personal and other operating expenses. On the other hand we have one output variable that is denoted by Y, is total earning assets of the bank which include financing, dealing securities, investment securities and placement with other banks. Now for the calculation of cost efficiency analysis the study requires two other input variables and these are the prices. These are the prices of the deposits P1 and the prices of labor and capital denoted by P2. P1 is calculated by the following formula income paid to depositors divided by the total deposits. Statistically, we can denote this as follow:

P1= I.P. /T.D.

Where I.P. is income paid to depositors, and T.D. is total deposits. On the other hand P2 is calculated by dividing the overhead expenses by total assets.

P2= P.O.Exp/T.A. where P.O.Exp is personal and other overhead expenses, while T.A. is total assets.

4. Discussion on Results

Before going for the empirical analysis, we describe the actual situation of the Islamic and conventional banks that were selected for present study. Table 1and Table 2 below show the average deposits, overhead expenses, earnings, price of the deposits and the price of labor for respective Islamic and conventional banking system. This indicates that the conventional banking system has average deposits, earning assets and the overhead expenses are much higher than that of Islamic banking system. That may be due to certain reasons like, the conventional banking system has been introduced in the market much earlier, and it has a big operating network compared to the Islamic banking system and so on. Now, according to the average price of labor and deposits it shows that the price of deposits of the Islamic banking is higher than that of the conventional banking system which suggests that the Islamic banking system may attaining the costly deposits either they are paying much to their depositors then that of the conventional banking system.

Now if we compare these results with the Islamic banking system of the Malaysia (Ahmed, S. *etal*, 2008) where the query was explored, we can come to know that the deposit, overhead expenses and the earning have the same ratio as that of the Pakistani, but the deposit price scenario is bit different in Malaysia (Ahmed, S. *etal*, 2008) we have the deposit price is bit lower than that of conventional banking system. Also the labor price is too lower than that of conventional banking system, but in Pakistan we have labor price and the deposits price is bit higher than that of conventional banking system. This may suggest that the Islamic banking system is in a growing stage, it is investing more in their labors according to its size then that of conventional banking system.

Table: 1 (variables of Islamic banking system)

Variables	Description	Mean(Rs Millions)
X1	Total deposits	21999
X2	Total overhead exp	842
Y1	Total earning assets	13709
P1	price of deposits	4.09
P2	Price of labor and capital	2.92

Table: 2 (variables of conventional banking system)

Variables	Description	Mean(Rs Millions)
X1	Total deposits	363577
X2	Total overhead exp	11126
Y1	Total earning assets	358721
P1	price of deposits	2.89
P2	Price of labor and capital	2.40

The DEAP analysis is carried out by using the DEAP version 2.1. This computer software is developed by Coelli in 1996.

The TE (technical efficiency) measure the degree to which the bank can minimize the quantity of its input to produce the given output and that also consider as input oriented approach. The value (of TE) 1 or 100% indicates that the firm is efficient and is on the production frontier. And the value less than 1 indicates that the operations that are taking places are below the frontier. And the cost efficiency measure the distance of the bank's cost from the best practice bank's cost, if both were to produce the same output bundle under the same market conditions. If the measure of CE indicates 0.80 it means that the bank is 80% cost efficient or it has wasted 20% of its cost relative to best practice bank. In such case the bank has to reduce this cost by making its input efficient, in order to compete the best practice bank.

Now, analysis has been provided in table#3, this table indicates that the mean of TE of Islamic banking system for the last 5 years is the range from 0.41 to 0.51, which indicts a good progress in the imprudent of Islamic banking system in the market of Pakistan. But if we consider the TE mean of conventional banking system then we come to the point it ranges from 0.73 to 0.84 which is much higher than that of Islamic banking system, but if we consider the growth ratio as the range improvement of Islamic banking system is 0.10 and that of the conventional banking is 0.11, which indicates that the both banking system are progressing about in the same way, in a sense of technical efficiency. Now if we consider the cost efficiency of the Islamic banking and conventional banking system we come to know that, the Islamic banking system CE is the range from 0.34 to 0. 49 (34% to49%), it suggests that the Islamic banking system is not efficient with respect to its cost. By considering the CE mean of conventional banking system we got that it ranges from 0.68 t 0.75 (68% to 75%), which indicates that the conventional banking system is more efficient according to cost than that of Islamic banking system.

Table: 3 (results of technical and cost efficiency of both Islamic and conventional bank system)

BANKING SYSTEM	YEARS	TE Mean	CE Mean
Islamic banking	2004	.41	.34
	2005	.43	.41
	2006	.47	.43
	2007	.49	.45
	2008	.51	.49
Conventional banking	2004	.73	.68
	2005	.77	.69
	2006	.79	.71
	2007	.81	.73
	2008	.84	.75

Now. in order to study our hypothesis that the bank type has effect on the performance of the banking system, we applied ANOVA, with two bank category types, full-fledged Islamic banks

and the private conventional bank, and we come with the results as shown in table #4, which indicates that there is significance difference in the TE of bank types, having F value 70.92 and significance level 0.0001, and the CE level also indicates high significance level between bank different categories, with F value 246.654, and having high significance level 0.0001.

Table: 4 (results of difference between Islamic and conventional banking system)

BANKING SYSTEM	YEARS	TE Mean	CE Mean
Islamic banking	2004	.41	.34
	2005	.43	.41
	2006	.47	.43
	2007	.49	.45
	2008	.51	.49
Conventional banking	2004	.73	.68
	2005	.77	.69
	2006	.79	.71
	2007	.81	.73
	2008	.84	.75

For the above finding, we come to the conclusion that our derived null hypothesis has been rejected and we get that there is the significance in Technical and cost efficiency difference between the two different types of the banking system. The result that we have come with is same as when research studies that were conducted in Malaysia by Katib in 1999 and by Ahmed, S. *etal* in (2008).

5. **Conclusion and suggestion:**

Finally, with the results of the research we come to the conclusion that the Islamic banking system performing currently in the Pakistan financial market is not as much efficient as its competitor conventional banking system and the results seems to be like that because the Islamic banking that is introduced in the Pakistani market not more than a decay. The conventional banking system is performing with the begging of Pakistan. Secondly the results suggest that the Islamic banking system is getting the deposits bit costly which also has an impact in the efficiency of it. Their results suggests that the Islamic bank is not much cost efficient than that of conventional banking. And as considering the technical efficiency, the Islamic bank is not as much efficient as that of conventional banking system, so if the Islamic banking system if wants to be efficient then it must have to consider their input efficiency. Means how much they are generating from its inputs, as compared to conventional banking system. The conventional banking system is generating much more than that of Islamic banking system with the given input. And we also come to the conclusion that the banking type to have effect on the bank efficiency, as the results of ANOVA suggests that there is significance difference between the Technical efficiency and cost efficiency of the different banking system.

REFERENCES:

Ahmed, S. *etal. (*2008*)* "Efficiency and competition of Islamic banking in Malaysia", Human Economics, Vol. 24 No. 1, Pp. 28-48.

Aly, H.Y, *etal.* (1990), ''Technical, scale, allocative efficiency in US banking: an empirical investigation'', The Review of Economics and Statistics, Vol. 72.

Brown, M. & Skully, K. (2003). A Cross-Country Analysis of Islamic Bank Performance. Paper presented at the International Banking Conference 2003 "From Money Lender to Banker: Evolutions of Islamic Banking in Relation to Judeo-Christian and Oriental Traditions, Prato, Italy.

Elyasiani, E., & Mehdian, S. (1992). Productive efficiency performance of minority and non minority owned banks: A nonparametric approach. Journal of Banking and Finance, 16, 933-948. Ellahi, N., & Khan, A. (2010). Testing Finance-Growth Nexus for Selectd SAARC Counteries, Vol18, No 2.

Hamim, S. etal(2008). "Efficiency and competition of Islamic banking in Malaysia" . Vol. 24 No. 1, 2008 pp. 28-48

Hasan, Zubair (2004) Measuring efficiency of Islamic banks: criteria, methods, and social priorities.reveiw of Islamic economics, vol.8, no.2.

Hassan, M.Kabir (2003). Cost, profit and x-efficiency of Islamic Banks in Pakistan, Iran and Sudan. Paper presented at International Conference on Islamic Banking: Risk Management, Regulation and Supervision, Indonesia.

Kwan, S.H. (2002), ''The X-efficiency of commercial banks in Hong Kong'', Federal Reserve Bank of San FranciscoWorking Paper Series, No. 02-14, pp. 1-30.

Nickell, S.J. (1996), ''Competition and corporate performance'', Journal of Political Economy, Vol. 104 No. 4, pp. 724-46

Resti, A. (1997). Evaluating the cost efficiency of the Italian Banking system: What can be learned from the joint application of parametric and non-parametric techniques. Journal of banking and Finance, 21, 221-250.

Sealey, C.W. and Lindley, J.T. (1977), ''Inputs, outputs and theory of production cost at depository financial institutions'', Journal of Finance, Vol. 32, pp. 1251-66.

Zaim, O. (1995). The effect of financial liberalisation on the efficiency of Turkish commercial bank. Applied Financial Economics, 5, 257-264.

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[i] Including Meezan Bank Limited (MBL), (Meezan Bank, Albarka Islamic Bank, Dubai Islamic Bank, Dawood Islamic Bank, Global Emirate Islamic Bank, Bank Islami Pakistan).