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Cost Efficiency and Total Factor Productivity of Islamic and Conventional Banks in Pakistan

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Abstract
Purpose – The purpose of the study is to compare the Cost Efficiency and Total Factor Productivity growth rate of Islamic, Conventional and Conventional Islamic Windows banks in Pakistan from 2007-2011.**Design/methodology/approach** – a sample of fifteen banks has been selected from the whole of population. Five banks from each of the banking sector have been chosen by random sampling technique. Secondary data for the subject study has been taken from the banks statistics of Pakistan, annual statements of the respective banks and periodical reports of State Bank of Pakistan. For the comparison of cost efficiency Data Envelopment Analysis (DEA) is used. To find out the total factor productivity growth rate, we used Malmquist productivity indices (MPI). Tobit Regression Analysis was used to determine the bank specific factors on cost efficiency.**Findings** – The findings of the study suggest that the cost efficiency of Islamic banks is lower than its comparing counterparts. But on the other side the total factor productivity growth rate of the Islamic banks is on the boom as compared to its peers. The factors like SIZE and DEPOSITS indicate an inverse association with the cost efficiency of banks. While checking for the factors i.e. ROE and DEBT, both have a positive significant relationship with the cost efficiency of banks.
Keywords: Cost efficiency, DEA, MPI, Islamic banks, Conventional banks,

I- INTRODUCTION

1.1 Background of the Study

Financial sector and economic development are closely related to each other. If the financial position of a country is strong then it must have the capabilities of better utilization of its key resources efficiently and will result in the improved economic development. (Shahid *et al*., 2010) Without the economic success and stability the survival of a country is impossible, as the factors of production are the identification of the nations in this global world. The role of banks as financial intermediation cannot be ignored which leads to a stable economic growth and development. (Sufian, 2006). The banks for the subject study have been considered to be the *intermediation approach. The mechanism of the working of banks highlight the investment of borrowers funds in the most profitable projects at a high interest rates and payments of a portion to the customers in shape of profits on their investments, but in the cases of high losses like the bankruptcy the whole loss is on the shoulders of the depositors. (Ahmad *et al.,* 2010)

Pakistan being a Muslim country having strong reservations on the element of interest being prohibited in Islam. There was a dire need to the establishment of such a banking system which is allowed in Islam and having full conformity to the needs of Muslims. Islamic banking and finance began to be on track in 1963 with the opening of mitt chamber saving bank in Egypt. The Islamic banking has been incorporated in Pakistan in with to the instructions of Islamic summit of Lahore in 1974. The Meezan bank the ever first Islamic bank in Pakistan started (to work in accordance with the Islamic Sharia) in 2002. (Islamic banking review, SBP 200-2007). The imperative attribute of Islamic banking is the sharing of profit and loss between the investor and the entrepreneur which make it in accordance with the Islamic Sharia principles. (Frooq, 2006)According to the Islamic banking bulletin (IBB, 2012) Islamic banks have shown tremendous growth in all sectors of the industry. The possessions of the Islamic banking industry amplified from 742 billion to 837 billion from the previous quarter and with the same pace the deposits also shown positive growth. Similarly the investments of the Islamic banking industry have increased with 5.5% from the previous quarter.

The globalization of financial markets and institutions, financial innovations, the advance communication and technological changes have drastically changed the banks environments by creating a competition to perform more efficiently in terms of cost and profit. (Shahid *et al.,* 2010) Economic growth can best be obtained by utilizing the existing resources in an efficient way. The subsistence of hefty number of banks in the financial market and the ingress of foreign banks has created a rivalry among banks. (Bader *et al.,* 2008) in such a situation every financial institution desire to perform efficiently and to deliver good products and services. Every organization wants to control their costs and earn more and more profits for their stakeholders. In the very same way the Islamic as well as conventional banks want to operate efficiently in terms of cost and profit.

Cost efficiency on the other hand is also critical. Because every organization desires to achieve cost affectivity by incorporating of cost efficiency in its operations. Cost efficiency is basically a comparison of the efficiency level of the best performing (best practicing) bank with the rest of the banks. It refers to the total cost which is incurred for the production of a certain set of outputs by using the same quality and quantity of inputs.

Cost efficiency is the actually the comparison of a low performing bank with the best practiced bank. (Bader *et al.,* 2008). Those organizations or banks which can produce the long run beneficial assets and manage the productive liabilities. Banks are good at utilizing their resources as in regards to their capability to create revenues and profits. Technology have great impacts on cost efficiency levels of the decision making units or in simple words we can conclude that by the introduction of new and improved technology the cost of operations of these DMU'S have been decreased to a great extent. Still there are banks operating under the diseconomies of scale and there is great room for the management to increase their cost efficiency. The amount of inputs which do not account for changes in outputs is known as Total Factor Productivity. As such it is the measurement of management efforts in the utilization of inputs. If all of the inputs are responsible for changes in total factor productivity growth rate, then TFP is a real indicator of the economy's long term technological dynamism. TFPC is the leading contributor for the growth of the economy of a country.

In today's dynamic world, the markets are becoming globalized by the financial innovations, entrance of new competitors and adoption of advanced communication and technological changes have drastically changed the banks environments. This has created a competition among the banks to operate efficiently both in terms of cost and profit. In the financial sector the banking industry is playing a very vital role and also a good indicator of the economy. As the ideology of our country is based on Islamic rules and principles, therefore Islamic banking system was introduced to get rid of interest in the financial transactions. The financial markets are fully saturated with a number of banking systems i.e. Islamic banks, conventional banks and the conventional banks with Islamic windows.

The aim of this study is to find out whether a bank with high cost efficiency score is also having high total factor productivity growth or otherwise? Both the banking sectors are important for the growth of an economy of a country. It will provide information to the academia as little work has been carried out on the comparison of efficiencies of the two banking systems. Moreover, this is the first study of its nature in Pakistan which compares cost efficiency and total factor productivity of both the banking streams.

Hypothesis of the study:

$\mathbf{H_O}$ = There is no significant difference in cost efficiency between Islamic and Conventional Banks.
$\mathbf{H_1}$= There is significant difference in cost efficiency between Islamic and conventional Banks.
$\mathbf{H_O}$ = There is no significant difference in total factor productivity of Islamic and Conventional banks.
$\mathbf{H_1}$= There is significant difference in total factor productivity between Islamic and Conventional banks.

III- RESEARCH METHODOLOGY

3.1 Data and Sources

This research study is conducted mainly on the comparison of Islamic, conventional and conventional Islamic windows banks in Pakistan. The population of the study includes thirty-six banks (36) in all the banking systems. A random sampling technique was used in the selection of overall five (05) banks from each of the banking systems. The Data Has Been Taken From The Annual Financial Statements Available At The Banks Websites, Bank Statistics Of Pakistan, And Annual Balance Sheets Published By The State Bank Of Pakistan From 2006 To 2011. The Data Consists Of 15 Commercial Banks (05 Islamic Banks, 05 Conventional Banks and 05 Conventional Banks with Islamic Windows) In Pakistan, As Follows;

A variety of procedures/methods are available for the computation and evaluation of efficiency levels of the banks. Some of them are financial ratio analysis method, parametric method and non parametric method. The comparison of efficiencies of the decision making units can be evaluated by the use of financial ratios. But ratio method have some disadvantages when the DMU`S (The banks) are operating in different environments and countries (Shah et al., 2012). Moreover this ratio measures the short term productivity of banks and has no concern with the long term performance and productivity. This ratio uses the benchmarking technique which is also not an appropriate standard and is affected by the exogenous factor. DEA model has an advantage on over the regression analysis because regression analysis shows the average performance of banks and is also affected by high values. The use of DEA model enables us to create the efficient frontiers between 0-1. In this study we used DEA model for cost efficiency, Malmquist productivity index (MPI) for total factor productivity and TOBIT regression model.

Specification of Inputs and Outputs

Table 2: SPECIFICATION OF INPUTS AND OUTPUTS

Outputs	Inputs	Prices of inputs
Y1: Total loans	X1: No. Of employees	P1
Y2: Other income	X2: fixed assets	P2
Y3: Investments	X3: total deposits	P3

X1(No. Of employees) will be measured by dividing total salaries by No. of employees. X2 will be measured by dividing noninterest expenses by total fixed assets and X3 will be measured by dividing interest on

deposits by total deposits.

Data envelopment analysis (DEA)

To find out the efficiency of particular decision making units Charnes introduced a liner model called the data envelopment analysis (DEA). This model was first used for the nonprofit organizations. Later on Sherman and gold (1985) used this model for the banking sector. This modal actually examines a particular bank operation as compared to other banks in the sample. Efficient banks are being taken as base with a certain standard efficiency score and the rest are compared accordingly. For n DMU`S (Decision Making Units) in the banking industry, all of the sample outputs and inputs are characterized by the m and n, correspondingly. The efficiency of each bank is computed as follows:

$$\textbf{Maximize} \quad es = \sum_{i=1}^{m} ui Yis$$

$$\textbf{Subject to} \sum_{I=1}^{M} u\, iYis - \sum_{J=1}^{M} vj\ x\,ir \leq 0, r = 1, \ldots N;$$

$$\sum_{j=1}^{m} uj\ xjs = 1 \text{ and } Ui \text{ and } Vj \geq 0.$$

Similarly, the program can be converted into the dual problem:

$$\textbf{Minimize } \varepsilon s$$

$$\textbf{Subject to} \quad \sum_{r=1}^{N} \varphi r Yir \geq Yis,\ i=1\ldots,\ m;$$

$$\varepsilon s\ xjs - \quad \sum_{r=1}^{N} \varphi r xir \geq 0,\ j=1\ldots N;\ \varphi r \geq 0,$$

$$\textbf{And } 0 \leq \varepsilon s \leq 1$$

Where εs is the overall technical efficiency score of sth bank, where the value of 1 indicates the point on the frontier. M and n represent the all the inputs and outputs. Yis indicates the outputs and ui represent the relative weights assigned to the output variables. Again xjs shows the inputs variables and vj represents the relative weights.

Malmquist productivity Index

The Malmquist productivity Index (MPI) is a two sided index so as to be used to consider the technology in producing the outputs of two different economies. The basics for this modal was provided and developed by Professor Sten Malmquist.

$$\boldsymbol{m_0^t(w_s, x_s, w_t, x_t)} = \frac{d_o^t(w_t x_t)}{d_o^t(w_t x_t)}$$

The symbol s is the point for reference technology while t point shows base technology.

Collie et al (2005) remove the restriction in selection of one technology in these two technology Malmquist index for total factor productivity become as follows;

$$\boldsymbol{m_o(w_s, x_s, w_t, x_t)} = \sqrt{\frac{d_o^s(w_t,x_t)}{d_o^s(w_s,x_s)} \times \frac{d_o^t(w_t,x_t)}{d_o^t(w_s,x_s)}}$$

The value of $\boldsymbol{m_o}$=1 indicates the positive total factor productivity growth. And value of $\boldsymbol{m_o}$< 1 shows deteriorating total factor productivity. This means that either positive growth occurs between base period and reference period or it becomes worse

Tfpch= Effch × Tch

The above equation shows the two basic components of total factor productivity change namely average efficiency change and technological change. So it is the constant return to scale. Further, to see more insight the sources of efficiency change we impose variable return to scale assumption. According to this assumption efficiency change is further decomposed into pure efficiency change and scale efficiency change. The pure efficiency change is as follows.

$$\text{PTECH} = \frac{d_{ov}^t(w_t,x_t)}{d_{ov}^s(w_s,x_s)}$$

The scale efficiency change is as follows.

$$\text{SECH} = \left[\frac{d_{ov}^t(w_t,x_t)/d_{oc}^t(w_t,x_t)}{d_{ov}^t(w_s,x_s)/d_{oc}^t(w_s,x_s)} \times \frac{d_{ov}^s(w_t,x_t)/d_{oc}^t(w_t,x_t)}{d_{ov}^s(w_s,x_s)/d_{oc}^s(w_s,x_s)}\right]^{1/2}$$

In the above equations and to represent the change periods where s is the base period and t represents the change period. Where **V** reveals the variable returns to scale and C is used for constant returns to scale. If the overall value of SECH is greater than 1 then it represent positive scale efficiency change and if the value of SECH is

less than 1 then it indicates the deteriorating behavior.

Tobit Regression

Tobit regression model was first introduced by Tobin (1958), which is suitable when the dependent variable is in percentage form or between the two limits. As this study is regarding the cost efficiency which will either be 1 or 0, means that cost efficiency exists or not.

The general equation form is as follows,

$$Y_i = \beta 0 + \beta i\ (Xi) + \mathcal{E}$$

Where it represents cost efficiency, βo shows the intercept form, βi represent the slope of the equation, Xi is the control variable and E is the error term.

RESULTS AND DISCUSSIONS

Before applying the usual analysis of variance (ANOVA) technique for comparing the performance of three selected banks, first of all two possible assumptions i.e. normality of data and homogeneity of population variances were tested. The Kolmogorov-Smirnov and Shapiro-Wilk tests were applied for checking whether the data is normal or not. While applying these tests, the null hypothesis assumes that the data is normal. The results of both the test are displayed in Table-4.1

Table 4.1: Results 0f Data Normality and Homogeneity Tests

		Kolmogorov-Smirnov		Shapiro-Wilk		Bartlett's test
Variable	**BBanks**	**Statistic**	**P-value**	**Statistic**	**P-value**	**Chi-square (P-value)**
TE	1	0.205	0.200	0.975	0.908	9.140 (0.010)
	2	0.191	0.200	0.949	0.732	
	3	0.176	0.200	0.965	0.842	
AE	1	0.300	0.160	0.888	0.345	8.244 (0.016)
	2	0.194	0.200	0.94	0.662	
	3	0.173	0.200	0.989	0.974	
CE	1	0.200	0.200	0.93	0.593	4.557 (0.102)
	2	0.235	0.200	0.927	0.577	
	3	0.251	0.200	0.869	0.264	

TE = technical efficiency; AE = allocative efficiency; CE = cost efficiency

It is evident that each of the variables (TE, AE and CE) under each of the selected banks follow a normal distribution because the P-value for each variable (under each bank) of both the tests are greater than 5% and 1% level of significance suggesting that the variables are normal. On the other hand, to test the homogeneity of population variances (variation among the banks), Bartlett's test was applied and the results are provided in Table-4.1. Bartlett's test under the null hypothesis assumes that the variances are homogenous. It is evident that the P-value of Chi-square statistics for technical efficiency (TE) and allocative efficiency (AE) (considering banks as samples from population of banks) are less than 5% level of probability indicating that the variances of banks are not homogenous. However, if the level of significance is decreased from 5% to 1% then the null hypothesis of equal variances is accepted and it is concluded that the variances are homogenous at 1% level of probability, for TE and AE. Similarly, the P-value of Bartlett's test (Chi-square value) for cost efficiency is greater than 0.05 indicating that variances of all the banks regarding cost efficiency are homogenous.

In order to provide the basics to the compare the efficiencies of Islamic, conventional and conventional banks with Islamic windows, we first compute the efficiencies of the three banking systems from 2007 to 2011. The results are presented in table 1, (see appendix)

Table 4.2: Extraction of Overall Means and Standard errors from ANOVA

Banks	**Technical efficiency**	**Allocative efficiency**	**Cost efficiency**
	Mean± SE	**Mean± SE**	**Mean± SE**
Islamic banks	0.754±0.037	0.726 ±0.043	0.554±0.042
Conventional banks	0.973±0.009	0.933±0.008	0.910±0.893
Conventional windows banks	0.950 ±0.009	0.988±0.019	0.893±0.021

Means within each column followed by letters are significantly different at the 5 % level of probability.

ANNOVA Table (see appendix) shows that P value =0.000<0.05 rejecting the null hypothesis indicating that the test is significant (P<0.05) and it is concluded that there exists a significant difference among the three styles/systems of banking regarding the technical efficiency on the average. The findings of the table reveal that p value for allocative efficiency of the three banking systems is less than 0.05 indicating that the subject test is significant by rejecting the null hypothesis. The test further indicates that there is a significant

difference among the banking systems regarding the allocative efficiency. Table further shows that p-value =0.000<0.05, hence H0 will be rejected which indicates that the test is significant. The test further reveals that there exists a significant difference between the banking systems regarding the cost efficiency.

The findings of the study show that Islamic banks have low cost efficiency than their counterparts which supports the results of the study of (Bader et al., 2008). The low performance of the cost efficiency of Islamic banks I.e.0.5541 as compared to the conventional banks i.e. 0.9098(35% less than), is due to the technical efficiency and allocative efficiency. The findings further indicate that the overall means of technical and allocative efficiencies of Islamic banks is 0.7543 and 0.7257 as compared to the overall means of conventional banks and conventional banks with Islamic windows which is 0.9730 and 0.9334 respectively, show that Islamic banks are technically inefficient as compared to conventional banks and are more inefficient in terms of allocative efficiency.

One of the reasons for the cost inefficiencies of Islamic banks is the fact that it still is in infancy as compared to conventional banks. It is further argued that the high technical efficiency score of conventional banks is due the improvement of technologies with time to time. Further, the cost inefficiency of Islamic banks is due the regulatory environment of its operations which is not very helpful to their system as pointed out by Yudistira, 2004. It is further argued that the branches of Islamic banks are very limited and hence can't be able to penetrate into the new markets. Moreover it is suggested that the Islamic banks have almost failed to attract the new customers i.e. accounts holders. The results show that the technical, allocative and cost efficiency of the Islamic banks, conventional banks and Islamic windows banks for 2007 are 0.6398, 0.6296, 0.0411 and 0.9442, 0.907, 0.8612 and 0.9218, 0.9334 and 0.8604 respectively using the CRS approach. The low cost efficiency of Islamic banks was due to the low technical and allocative efficiency because they have not manage the suitable mix of input and output variables and have failed to maintain a good input –output ratio as compared to their rivals. In 2008 TE, AE and CE of the three banking sectors are 0.8672, 0.7132, 0.63 and 0.9658, 0.9482, 0.917 and 0.9364, 0.955, 0.899 respectively. In 2008, Islamic banks improved well in terms of cost efficiency in comparison to the year 2007 i.e. from 0.04 to 0.63, which showed an increase of 59%. But on the other hand, if we look at the conventional banks and Islamic windows banks which displays a score of 0.91 and 0.89, which are the best performers of the current dynamic markets in terms of cost efficiency. Conventional and Islamic windows banks also shown growth from the previous year i.e. 2007.

Similarly TE, AE and CE of Islamic banks, conventional banks and Islamic windows banks for the year 2009 are 0.7792, 0.6758, 0.53 and 0.9954, 0.9274, 0.9236 and 0.9512, 0.9238, 0.8824 percent respectively. Here the technical efficiency showed a decrease from 0.867 to 0.779 i.e. 9%, and an increase of 14% from the year 2007. If we look at the allocative efficiency there also exist decrease of 8% from 2008 and an increase of 5% when compared with year 2007. But again we can conclude that their counterparts are far away in terms of cost efficiency.

In 2010 TE, AE and CE of the three baking systems are 0.7506, 0.7256, 0.5492 and 0.9702, 0.9326, 0.9048 and 0.9662, 0.8794, 0.8518 respectively. If we analyze the cost efficiency of Islamic banks it reveals that the technical efficiency is at a decreasing trend because of a poor combination of input –output ratio. However the allocative efficiency is increasing as compared with the scores of 2007, 2008 and 2009. Again if we look at the scores of conventional and Islamic windows banks it shows that their efficiency has decreased as compared to the previous years. Similarly in 2011 TE, AE and CE of Islamic banks, conventional banks and Islamic windows banks are 0.7346, 0.8842, 0.6502 and 0.9896, 0.952, 0.9424 and 0.9742, 0.9976, 0.9722 percent respectively. If we analyze the data of Islamic banks within the period of study it shows sudden fluctuations in its operations. In 2011, the banking industry showed overall tremendous growth in terms of cost efficiency. 2011 was a boom period for the industry in which the conventional and Islamic windows banks are almost touching the standard line. The cost efficiency of Islamic banks is 0.65 which the again very high as compared to the previous years. Here the high cost efficiency is due to the allocative efficiency which 0.88, the highest ever achieved in the period of study.

The concept of Islamic banking is very new as compared to conventional banking system. The comparison tables show that the Islamic banking system is growing with the passage of time. The low performance of cost efficiency scores is due to the fact that size of Islamic banks is usually low as compared to the conventional counterparts. Again if we look to the Islamic windows banks it reveals that they already have the benefits of size and large spread branches and are having more assets than pure Islamic banks.

Tobit Regression

To check the impact of major determinants on cost efficiency Tobit regression model was used.

Tobit CE ROE DEBT SIZE DEPOSITS.

Ce	Coef.	Std. Err	T	P>|t|
ROE	0.11	0.044	2.53	0.01
Debt	1.43	0.672	2.13	0.04
Size	-0.10	0.04	-2.50	0.01
Deposits	-1.41	0.64	-2.22	0.03
Cons	2.51	0.50	4.98	0.00

Tobit regression Model	
Number of obs =	75
F (4, 71) =	4.74
Probe > F =	0.0019
Pseudo R^2 =	0.1554

The above table shows the determinants of cost efficiency (dependent variable). The value of R2 shows 15.54% variation of determinants of cost efficiency, while the P value of F statistics lies in the region which shows that overall modal is significant and also the P value of T statistics also lies in the region which also confirms the literature i.e. individual determinants of cost efficiency are also significant. While the size and deposits show the negative relationship with the cost efficiency. The results of the productivity changes of Islamic, pure conventional and conventional banks with Islamic windows banks, measured by Malmquist total factor productivity indices and assign the changes to the technological change and efficiency change. Average efficiency change is further classified into the pure efficiency change and scale efficiency changes to know which of the factor is more responsible for changes in the total factor productivity of various banking sectors.

Table: 4.4. TOTAL FACTOR PRODUCTIVITY

Banks	Years	Effch	Tech ch	Pech	Sech	Tfpch
IBS	2008	2.128	0.831	1.543	1.299	1.688
	2009	0.871	0.944	0.899	0.961	0.808
	2010	1.043	0.997	1.064	0.967	1.040
	2011	1.024	1.085	1.002	1.016	1.118
	Mean	**1.26665**	**0.049086**	**1.12715**	**3.48295**	**1.16385**
CBS	2008	1.024	0.842	1.0252	1.0016	0.8656
	2009	1.036	0.964	1	1.0358	0.9954
	2010	0.975	1.722	0.9736	1.0008	1.7062
	2011	1.025	0.752	1.0304	0.9936	0.7792
	Mean	**1.01495**	**1.0699**	**1.0073**	**1.00795**	**1.0866**
CWB	2008	1.0178	0.729	1.0008	1.0164	0.7472
	2009	1.0192	0.8882	0.9902	1.03	0.906
	2010	1.0176	0.7308	1.0254	0.992	0.7226
	2011	1.0114	1.0228	1.0072	1.003	1.0572
	Mean	**1.0165**	**0.8427**	**1.0059**	**1.01035**	**0.85825**

IBS stands for Islamic banks, **CBS** stands for conventional banks and **CWB** stands for conventional windows banks.

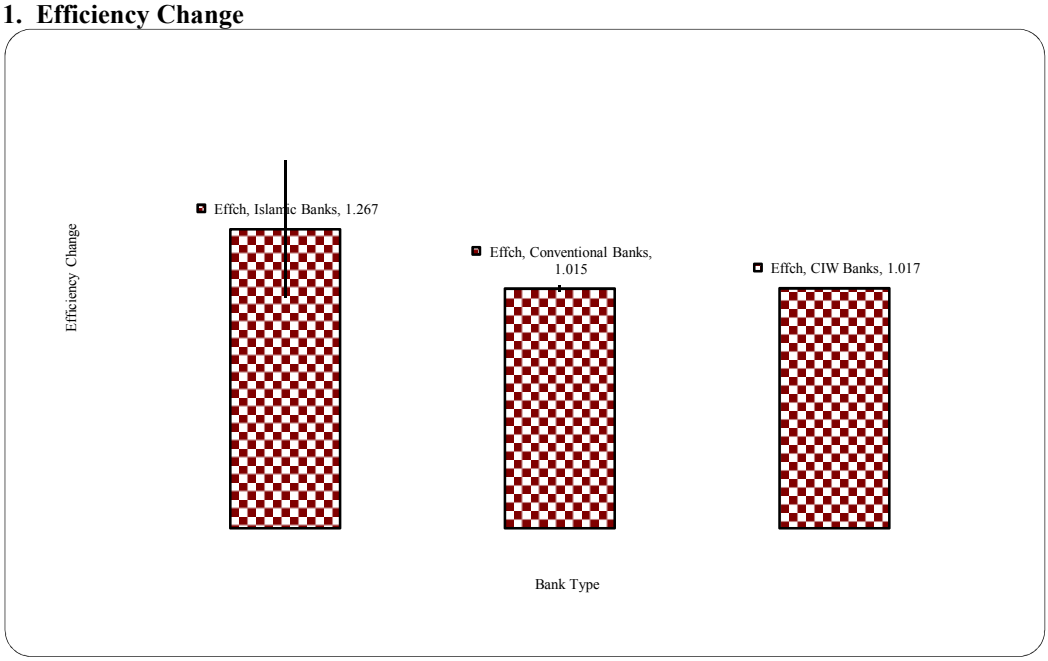
The above table shows the overall means of the three banking streams. In 2008 the Islamic banks showed a highest productivity change of 1.688 than its counterparts i.e. 0.865 and 0.747 respectively. This high productivity change is due to the high average efficiency change. Technological efficiency is less than average efficiency change. In the year 2009, the productivity change of Islamic banks decreased from 1.688 to 0.809 as compared to conventional banks which increased from 0.865 to 0.995 and conventional banks with Islamic windows increased from 0.747 to 0.906. The decreased in productivity of Islamic banks occurred due to low average efficiency change, however the technological efficiency showed positive trend which was increased from 0.831 to 0.942. The reason of low productivity growth is due to efficiency change which was reduced from 2.134 to 0.871 from the previous year.

In 2010, the Islamic banks once again improved its productivity change from 0.809 to 1.041 showing that all of the three efficiency components improved well from previous year result. The efficiency of Islamic banks showed a positive growth but on the other hand the conventional banks lead the results of productivity growth with the best score of 1.706 as compared to its previous year record of 0.995. If we look upon the results we can sum up that the high productivity growth is due the technological efficiency change. In the year 2011, the

productivity growth of Islamic banks increased tremendously from the preceding two years record i.e. showing 1.119 score in comparison to the conventional banks and conventional banks with Islamic windows i.e. 0.779 and 1.057 respectively. Here again the high performance of productivity growth is due to the technological efficiency change. In 2011 the technical efficiency increased by both the pure technical efficiency and scale efficiency change. The results of this research study is supported by the previous studies of (Viverita *et al.,*2007) and (Sardar *et al.,* 2013).The results can be best explained with the help of diagrams drawn for various components of total factor productivity changes for the three different banking systems.

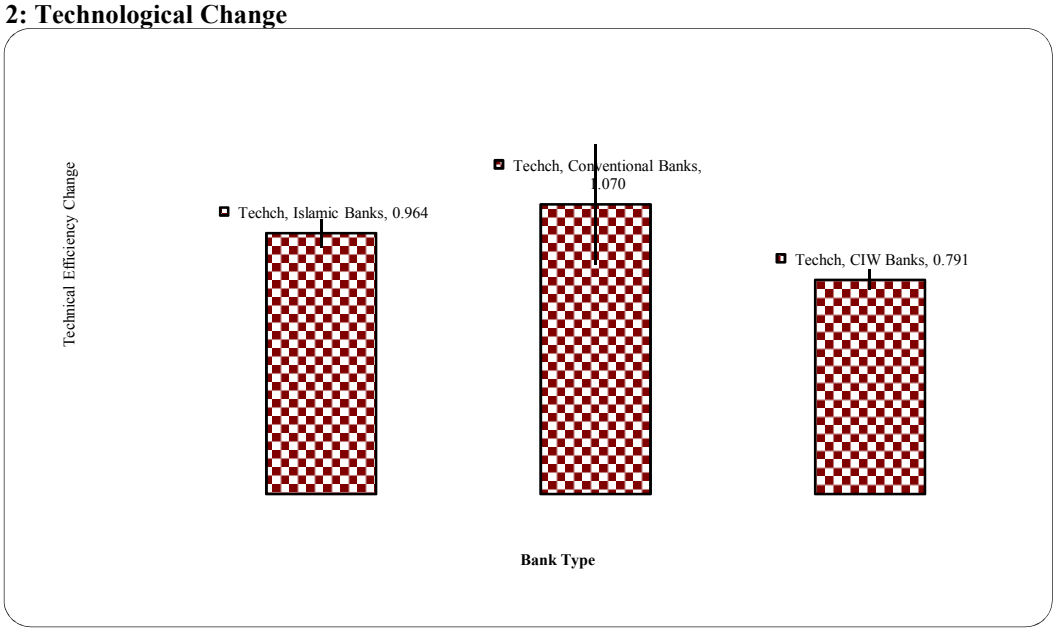
Overall means of total factor productivity of the various banking sectors.

Graph 1. Efficiency Change



Total factor productivity changes are shown via simple bar diagrams. Figure 1.1 shows that efficiency change for Islamic banks is higher than conventional banks and conventional banks with Islamic windows banks. The results indicate that Islamic banks are more efficient than their counterparts in terms of average efficiency change.

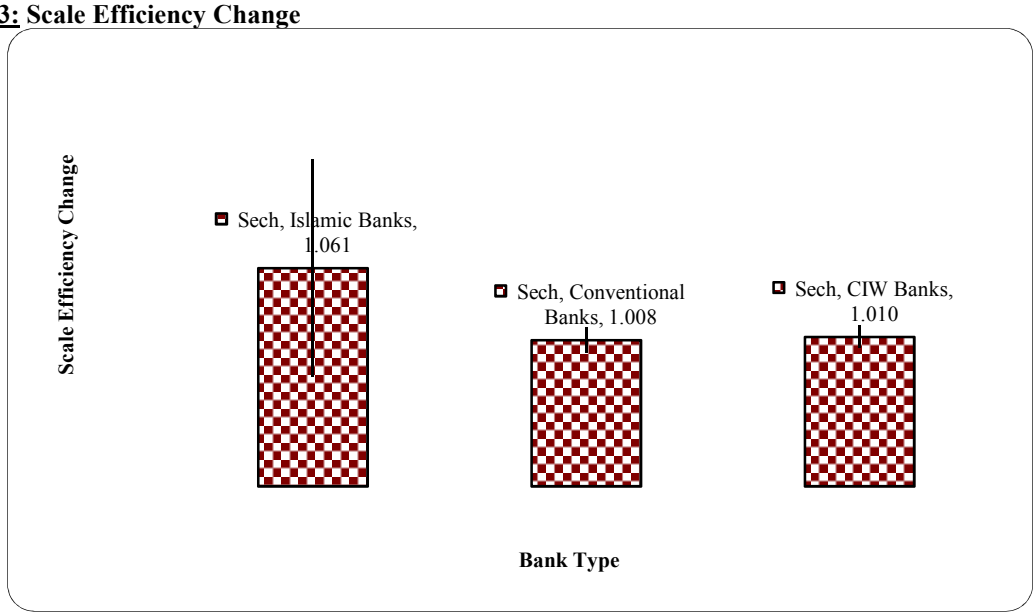
Graph 2: Technological Change



The results of the technical efficiency of these banking streams suggest that the conventional banks are more technical efficient than its competing sector banks. Conventional banks are having a long history and having the benefits of size. The results suggest that the size of banks and technical efficiency are positively

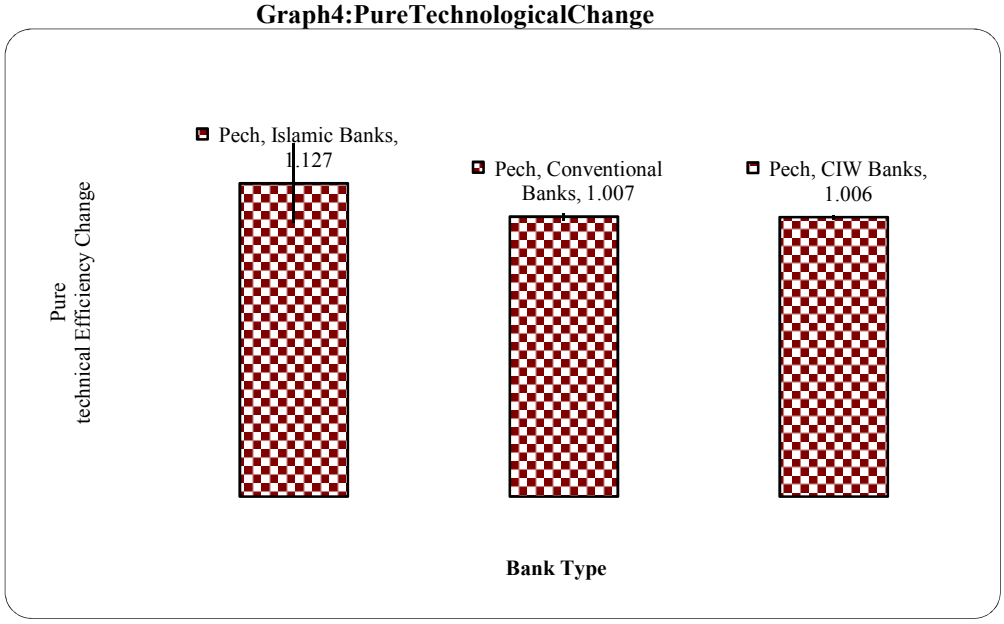
correlated to each other, which also supports the study of (Sufian, 2007).

Graph 3: Scale Efficiency Change



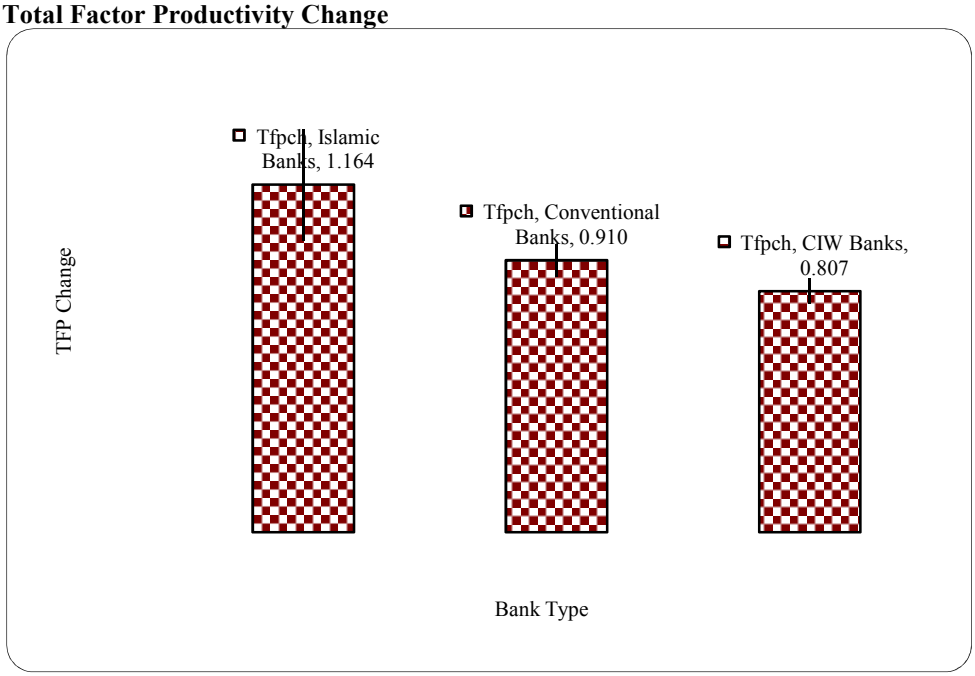
Scale efficiency of various banks has been shown via above diagram. Here again the Islamic banking sector is leading the results by achieving the highest scale efficiency of 1.061 as compared to their counterparts with a score of 1.008 and 1.010. It is also worth mentioning that the scale efficiency is mainly associated with the optimal size of banks. There is not that much difference between the scale efficiencies of the various banks.

Graph4:PureTechnologicalChange



Technical efficiency is decomposed into pure efficiency change and scale efficiency change. The above diagram shows that the productivity of Islamic banks is due pure technical efficiency. the findings of the given study indicate that the Islamic banks are more efficient in terms of technology.

Graph 5: Total Factor Productivity Change



If we look to the final results it is obvious that the Islamic banks have shown more productivity growth with a score of 1.164 than its counterparts with a score of 0.910 And 0.807 respectively.

SUMMARY, CONCLUSION AND RECOMMENDATIONS

Summary

The financial sector is playing an essential part in the economy of a country. Banks are contributing a handsome part to the GDP growth as it is considered one of the important pillars of the financial stability of a country. The subject study has been conducted by comparing the cost efficiency and total factor productivity of Islamic, conventional and conventional Islamic windows banks in Pakistan. There are two main objectives of the subject study, one is to evaluate the cost efficiency of the three mentioned banking systems and the other one is to establish a relationship between the cost efficiency and total factor productivity of Islamic and conventional banks. A sample of fifteen (15) banks have been selected by random sampling technique by taking five (05) banks from each of the three (03) banking sectors. DEA (Data Envelopment Analysis) has been used for calculating the cost efficiency scores of the various banking systems. For the calculations of total factor productivity growth rate Malmquist Productivity Indices have been calculated and to know the impact of major determinants on cost efficiency of the banks Tobit regressions analysis was used.

Data envelopment analysis approach has been used to calculate the technical, allocative and cost efficiencies of the various banking streams under the CRS approach. Afterwards descriptive statics have been used and one way ANNOVA Model applied to measure and calculate the overall means and p values of the variables used The empirical result show that the P values of cost efficiency are less than 0.05 indicating that the test is significant hence rejecting the null hypothesis. The overall results show that Islamic banks are less cost efficient than conventional and conventional Islamic windows banks. Bank specific factors have been taken which might affect the cost efficiency of the various banking streams. The results of the Tobit regression applied show that the factors like roe and debt have significant impacts on cost efficiency and indicating positive relationships with cost efficiency. If we look on the other side, the total deposits and size of the banks is considered it reveals that these are having negative relationships with the efficiency of banking sector especially the cost efficiency.

To know the productivity of these banking sectors, Malmquist productivity indices have been calculated whether the change occurrence is due to technological change or average efficiency change. The results of the study suggest that the total factor productivity change of Islamic banks is higher than its counterparts. The high performance of total factor productivity is due to the average efficiency change. The findings of the subject study indicate that Islamic banking is growing with the passage of time by acquiring the new and advanced technology and by bringing innovations in the practices of management in utilizing the resources of the country in the best interest of its people.

Conclusion

The study reveals that there is significant difference between the cost efficiencies of the three banking sectors.

The overall results show that Islamic banks are less cost efficient than conventional and conventional Islamic windows banks. The results of the study suggest that the total factor productivity change of Islamic banks is higher than its counterparts. The results of the Tobit regression applied show that the factors like roe and debt have significant impacts on cost efficiency and indicating positive relationships with cost efficiency. On the other hand if total deposits and size of the banks is considered it reveals that these are having negative relationships with the efficiency of banking sector especially the cost efficiency.

Recommendations

i. Islamic banks should increase their Technical efficiency as well as Allocative efficiency to achieve Cost efficiency.
ii. Banks should focus on its profitability because it has significant and positive relationship with Cost efficiency.
iii. Islamic banks should focus on the Technological change because it is responsible for low TFP change.

Future Research

Future research in this area could proceed in a number of directions.

i. Future research could compare cost efficiency as well profitability efficiency between developed and developing economies banks.
ii. Future studies are required to calculate the productivity changes between the developed and developing economies banks.

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