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Efficiency Change in Pakistan Commercial Banking Sector: A Pre and Post Digital-Restructuring Analysis

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Abstract

In this study we examine the technical efficiency of commercial banking sector of Pakistan. In recent past Pakistan's commercial banking is making substantial investment and up-gradation in information and communication technology (ICT) in order to keep pace with global banking industry. Due to financial linearization the entry of the foreign banks with advance technology in the commercial banking sector has been increased that inclines other banks to adopt the new technology in order to earn more of market share. To justify the huge investments in computers and related technologies many question arises about the efficiency & productivity growth of the banks due to ICT. Accordingly, this study analyzes the efficiency of a sample of 11 commercial banks for the period 1998 to 2012. Using data envelopment analysis (DEA) we measure the Malmquist productivity index (MPI) to measure total factor productivity (TFP). In this study the time period (1998-2012) has been decomposed into pre-digital reforms (1998-2005) & post-digital reforms (2006-2012) period, in order to compare the efficiency change after the adaptation of IT by commercial banking sector. The variables are selected under intermediation approach. The results show that technical efficiency has been significantly increased in post-digital reform era and as a result TFP has also been boosted. The results show that MCB has consistently scored the highest efficiency & Malmquist TFP scores.

Keywords:Information and Communcation Technology, Data Envelopment Analysis, Total Factor Productivity, Malmquist Index.

1. Introduction

A strong, stable and efficient financial sector acts as lifeblood for the economy. As, Joseph Stiglitz (1998) stated that a healthy, efficient & competitive financial sector as 'brain' of the economy. So the analysis of efficiency and productivity of financial sector is very important. Over the last decade, Pakistan's banking sector has experienced the significant technological restructuring. The objectives of these digital reforms are to strengthen the banking sector of Pakistan, in order to make them internationally competitive and encourage them to play an effective role in accelerating the process of growth. The reforms process also initiated procedures for improving the efficiency and profitability of the banking system.

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During 1950s, a computer processing system was executed at Stanford Research Institution, which was called as The Electronic Recording Method of Accounting (ERMA). This system, ERMA was initially started as a program for Bank of America, as an attempt to go for the computerized banking industry. ATM is the natural descendant of 40 years old project (ERMA); Stanford Research Institution. E-banking was first conceptualized in mid 1970s. Some American banks start offering e-banking services in 1980s. However till late 1990s people turn out to be more at ease with making the transactions over the web. By 2000, 80% of US banks were offering E-banking services. However, Pakistan being a developing country banks start introducing E-banking services from 2005 onward and with the passage of time people are adapting new technology.

1.1 Objectives

This study has been conducted in order to quantify and analyze the efficiency of commercial banks in Pakistan using non-parametric approach (DEA). To analyze the relationship between digital restructuring, productivity growth and the efficiency of Pakistan's commercial banking industry.

2. Literature Review

Since 1990, Pakistan's banking industry had gone through diverse reforms that include liberalization, privatization and institutional strengthening of the central bank as an authentic managing authority.

Camanho and Dyson (1999)illustrated the use of data envelopment analysis (DEA) technique for the Portuguese bank branches' performance estimation. This study showed that DEA can complement the profitability measure currently used at the bank. The use of an efficiency-profitability matrix enabled the characterization of the branches' performance profile. The study focused on the relation between branch size and performance. The results show that branches' efficiency makes a positive impact on profits of banking firms, though higher profitability scores may not essentially directly related to higher efficiency scores. This study investigates two alternative objective setting policies. One of the policies ignores pure technical inefficiencies by centering on the selection of best practice units. The other strategy gains the units' most productive size of scale by the omission of scale inefficiencies, with least alteration to scale size of unit; Inputs used by them were number of external ATMs, floor space of the each bank branch, number of employees in the each bank branch and operational costs (costs of supplies & other services. The outputs used in this study for the analysis were number of transactions in external ATMs, amount of savings, number of all types of accounts at the branch, number of general service transactions performed by branch staff and the amount of loans.

Akhtar (2002)analyzed the Pakistan's banking sector to compute efficiency aggregates and findings of the study show that the overall efficiency of the banks was 0.80 for the year 1998, which was greater than the results of Indian banking industry & Croatian banking sector gained by Mukherjee (2002) and Jemric and Vujcic (2002) respectively. Though, the overall efficiency aggregates for Pakistan's banks industry are much lesser than the worldwide mean of efficiency that is explored to be 0.86 by Berger and Humphrey (1997). Comparatively lower efficiency aggregates of Pakistani banking sector specify that these banks supposed to elevate their efficiency to be at par with the world best practice.The technical efficiency, which reflects the productivity of inputs, of Pakistani banks is found to be lower than the allocative one. It proposed that banks in Pakistan should improve their inputs productivity e.g. deposits and capital.

Janki (2002) analyzed the effect of technology on the productivity of employees. The author narrate that there was no doubt there is utmost need in public owned banks to exercise the usage of new

technology in order to perk up the performance, operating efficiency and customer services and the most important to face the intense competitive environment. The author suggests that the focus on new technology would expectedly increase like never before to add value to evaluate new products, strengthen risk handling, minimization and management and to improve customer services provision process, etc. DEA was used and period taken for study was 1986-91. The authors found that public owned banks had the premier efficiency scores chased by foreign owned banks. The private sector banks' efficiency scores were found to be the minimum. The author also found out a temporal development in the efficiency scores of foreign banks.

Burki&Niazi (2006) used data of 40 commercial Banks for time period 1991 to 2000, with an aim to examine the overall effect of financial reforms on efficiency of state-owned, private owned and foreign owned banks of Pakistan. Cost, allocative, technical, pure technical and scale efficiencies of state-owned, private and foreign banks relative to their pooled and separate frontiers have been computed in this study by the help of DEA approach. The variables are selected under the intermediation approach as interest costs contribute more than 70% of the total costs in Pakistan's banking sector. To permit inefficiency to fluctuate over time, efficiency frontiers for every year's cross sectional data of all banks are constructed in this study rather than constructing one multi-year efficiency frontier. This study investigates the time period in 3 groups, which are; pre-reform (1991 to 1992), first-reform period (1993 to 1996) and second reform period (1997 to 2000).

Qayyum& Khan (2007) empirically investigates the economies of scale, x-efficiency, and technical advancement of commercial banking sector of Pakistan by the help of balanced panel data for twenty nine banks for time period 2000 to 2005. This analysis builds efficiency distinction between the foreign and domestic banks. The empirical findings of this study specify that the domestic banks functioning in Pakistan are comparatively less efficient rather than their foreign counterparts for the period 2000-05. The economies of scale for small sized banks and foreign owned banks are elevated. Consequences also illustrate the technical advancement for all groups of banks for the year 2000 and onwards. The scores for economies of scale were lowest for big banks in 2000 and maximum for foreign owned banks in 2005. Yet again, technical advancement is lower for domestic banks as compare to foreign banks. The empirical findings also describe that the market share of large 5 banks are decreasing over the time period but average interest spread demonstrate fluctuations. The key conclusions that could be arranged from the outcome of this study are that mergers are probable to be happen, particularly in small sized banks. So, the results narrated that if the mergers probably would take place among foreign banks and small sized domestic banks, this phenomenon will likely decrease the cost of operations due to economies of scale in addition to x-efficiencies (since foreign banks are more x-efficient comparative to small sized domestic banks). Even though cost will reduce without conferring any monopolistic power to these banks those go for mergers of small and big banks. The empirical findings of the analysis propose that the best fit policy choice for central bank (SBP) is to support mergers; as a result the benefits from decline in cost of operations owing to mergers are ultimately deceased to general borrowers and depositors.

Akmal&Saleem (2008) used a 2 stage approach, data envelopment analysis (DEA) on the sample of 30 banks of Pakistan, i.e. 4 public banks, 18 domestic private banks and 8 foreign banks in order to inspect the overall effect of macroeconomic factors and the factors specified by banks on the efficiency aggregates of banking sector. The analysis applied data envelopment analysis (DEA) in order to compute scale and technical efficiencies of banks and afterward applied tobit regression to approximate the effect of numerous macroeconomic and bank-specified factors on efficiency of sample banks. The empirical results of this analysis demonstrate that efficiency of banking industry of Pakistan has been significantly enhanced since year 2000 and on the other hand the efficiency of foreign owned banks is much higher than local domestic banks and state owned banks. The empirical results also presents the total factor productivity growths and technological progress throughout the time period 1995 to 2005. The study also

find out the DEA efficiency aggregates under 2 models, i.e. variable returns to scale model (VRS) and constant returns to scale model (CRS). In 2nd level of this analysis, DEA efficiency aggregates, under VRS model, are computed on macroeconomic and bank-specific variables to inspect their effects respectively. On the whole, empirical results of the technical efficiency in the study are same as observed by Burki and Niazi (2006). The study narrated that in Pakistan's banking sector the foreign banks were more efficient, while public banks were relatively inefficient and the analysis also concluded that overall there were 21 inefficient under CRS model and 17 inefficient banks under VRS model. Outputs used by Akmeel&Saleem were net loan, liquid assets & Deposits, while Inputs were operating expense, interest expense and fixed assets. Acc to the study 20 banks were scale inefficient, which showed that the Pakistani banks have the potential to amplify their scale and technical efficiencies. In this study CRS model proposed that the commercial banking sector on average can amplify their efficiency scores up to almost 12%. The VRS model's findings specified that thirteen among thirty Pakistani banks had perfect 100% efficiency aggregates. The twelve efficient banks in DEA CRS model were efficient under the VRS assumption as well. However, the remaining four banks, which were a little inefficient under the CRS model, were efficient in the VRS model. The reason behind was that VRS compared firms within same sample sizes and was much lesser restrictive.

Ahmed, Farooq &Jalil(2009) observed that because of issues, like higher intermediary cost, low level of productivity, giant expenditures & investment on establishment to face the competitive environment, hiring staff in excess, loss creating branches in excess Pakistani banking sector was undergoing the crisis of low level of profitability & productivity. Due to this reason, Pakistan's banking sector was under the pressure to maintain their profitability. The study narrated that to fight out these problems, Pakistan's regulatory authorities carry out reforms in financial sector in near the beginning of 1990s with help & financial assistance of Japanese government and World Bank against the banking sector adjustment loan program (BSAL). The fundamental goals of these undertook reforms were to develop the Total Factor Productivity (TFP) of whole financial system, management and strengthening the accountability mechanism &through separating ownership. This paper used sample data of 20 domestic commercial banks of Pakistan, in order to calculate the efficiency of banking sector through data envelopment analysis (DEA) &Malmquist Index of total factor productivity (TFP) from time period 1990 to 2005 to inspect the effect of financial reforms in banking sector of Pakistan.

3. Dataset and Methodology

3.1 Data Sources

Data for 13 years (1998-2012) of 11 banks has been used to measure technical efficiency, scale efficiency and total factor productivity. However to have the balanced data convenient sample is used, form the data we have disqualified the banks that were absent in year 1998. In the same way the banks that do not survive now days but were in market in 1998 have not been included & some banks are excluded due to unavailability of required data. Data on the variables used in this paper are attained from 'Banking Statistics of Pakistan' published yearly by central bank State Bank of Pakistan (SBP) and the financial statements and notes to the financial statements of commercial banks (various issues).

3.2 Output Input Selection

Selection of bank inputs and outputs is an important matter. The collection of financial variables in this study is mostly directed by the aims of the banking sector of Pakistan, where the basic role of commercial banking sector acts as an intermediary party with the purpose of gathering deposits from the clients and extending the credits to the borrowers. Each bank perform its functions & activities for the following goals: (i) provision of services and provision of utility, (ii) minimization, handling and management of risk, (iii) possible maximization of profit, (iv) as an intermediary between borrower & lender; Bergen et al (1998). To define input-output mix of banks under DEA there are five different approaches categorized

according to the basic functions performed by the banks, i.e. production approach, intermediation approach (IA), modern approach (value added approach), operating approach (OA), asset approach (AP). In this study intermediation approach (IA) has been used and this approach consider banks as a financial intermediary which accepts deposits from lender at a lower rate of interest & lend these deposits to the borrowers at a higher rate of interest. Under intermediation approach banks gather deposits and grant loans with the purpose to earn profit; Athnassoupoulos (1997) &Camanho& Dyson (2005). So in this study input output variables are selected by keeping in mind this specific function of the commercial banks. This approach has also been used by Berger &Mester (1997), Mukherjee et al. (2002), Burki and Niazi (2006), Pattiy& Hardy (2005), Kwan (2006), Havrylchyk (2006), Chansan (2008), Debnath (2008), Moffat&Valadkani (2009) and Sufian&Habibulah (2009) among others. Following these studies, the variables used in our study are as following:

Table 1: Variable Definitions

Variable	Definition
Advances	Loans and advances for all time periods, customer loans (loan loss reserves deducted).
Deposits	Demand, savings and time deposits.
Total Operating Expenses	General and administrative expenses, remuneration, social security costs and pensions.
Investment	Investment in open ended mutual funds + Investment in Term Finance Certificates, Bonds etc. (Unlisted & listed) + Investment in shares-Listed Companies + Investment in Federal Government Securities + Investment in Available-for-sale securities.
Total Income	Interest on (Loans + Securities Portfolio + Deposits in other Banks + Interbank Funds Sold) + Other Interest Income.
IT Related Variables	
Intangible Assets	Computer software*
Equipment	Computer equipment*

Note:* data collected from the notes to financial statements for all banks (various issues).

DEA is a suitable technique in this case since it allows efficiency of DMUs determining an envelopment surface analysis for multiple inputs and outputs. Using 'm' different outputs and 'n' inputs, the ratio of weighted output to weighted input is calculated to define efficiency scores of the units (Charnes et al. 1978; Cooper et al. 2007; Duzakin and Duzakin, 2007; Podinovski, 2007). Decision Making Unit (DMU) that lies on envelopment surface has the value 1 and is considered as efficient whereas the one lying below the surface is assigned value less than 1 and is considered as inefficient (Wagner and Shimshak, 2007).

DEA does not require information about prices of either inputs or outputs (Jhones and Yu, 2008). In DEA there are two assumptions i.e. constant returns to scale (CRS) and variable returns to scale (VRS). Efficiency estimations obtained using variable returns to scale assumption are usually higher than those obtained using constant returns to scale.

The DEA model used in this paper calculates Malmquist Productivity Indices (MPI). MPI is used to measure changes in output relative to inputs in production process. Growth in productivity is usually defined as increase in technical efficiency and technological change through which inputs are converted into outputs. Production efficiencies are of two types; namely technical efficiency (TE) and allocative

efficiency (AE). TE represents a firm's capability to achieve maximum outputs through given set of inputs.† Productivity change over successive period of times is given as:

Productivity Change = Technical Efficiency Change × Technological Change

The MPI with respect to time period t is $\boldsymbol{M^t = \frac{D^t(x^t,y^t)}{D^t(x^{t+1},y^{t+1})}}$ and for time period t+1 it is $\boldsymbol{M^{t+1} = \frac{D^t(x^t,y^t)}{D^t(x^{t+1},y^{t+1})}}$.

Where

x_t = input vector in time period t

y_t = output vector in time period t

D_t = distance function at time period t

D_{t+1} = distance function at time period t+1

x_{t+1} = input vector at time period t+1

y_{t+1} = output vector at time period t+1

The geometric mean of the above two equations is $\boldsymbol{M(x^{t+1}, y^{t+1}, x^t, y^t) = \sqrt{\frac{D^t(x^{t+1},y^{t+1})}{D^t(x^t,y^t)} \times \frac{D^{t+1}(x^{t+1},y^{t+1})}{D^{t+1}(x^t,y^t)}}}$.

Following Caves et al. (1982) and Fare et al. (1992) interpreted MPI > 1 as productivity gain, MPI < 1 as productivity loss and MPI = 1 as no change in productivity from time period t to t+1. Neither MPI require price information nor does it require any assumption based on profit maximization or cost minimization (Fare et al., 1992). Fare et al. (1994) improved productivity equation including scale efficiency and enhanced the equation as:

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

4. Results and Interpretation

4.1 Efficiency Scores

The DEA Efficiency results are measured for the period 1998 to 2012. Table 2 contains the summary of average efficiency results of the sample banks. It shows that 4 commercial banks are efficient under CRS and 7 sample commercial banks are efficient under VRS. While, overall 4 banks are scale efficient. As, the minimum efficiency scored by the banks is greater than 70% and less than 75%, which indicates a potential that banks can increase their efficiency. When efficiency score is < 1, it shows the inefficiency of the banks and when efficiency score is ≥ 1, it shows that banks are efficient.

Table 2: Summary of Efficiency Aggregates

	Return to Scale		Scale Efficiency (SE)
	Constant (CRS)	Variable (VRS)	
Efficient Banks	4	7	4
Inefficient Banks	5	2	5
Max. Efficiency	100%	100%	100%
Min. Efficiency	72.4%	74.9%	89%
Avg. Efficiency	94.2%	97.1%	97%

Source: Authors' estimates

4.2 Efficiency Scores of Firm Average

For the Average data of the sample banks of commercial banking sector of Pakistan for the period 1998-2012 technical efficiency scores under constant return to scale (CRS), variable return to scale (VRS) and

† Allocative efficiency is the efficiency in which producers produce only that type of goods and services that are more desirable in the society and are also in high demand (Caves *et al.*, 1982). AE is not required in the objective of current paper.

scale efficiency (SE) is calculated.According to results technical efficiency on constant return to scale is 94.2% while, considering variable return to scale it moves to 97.1% while Firm average efficiency summary commercial banking industry of Pakistan's scale efficiency is 97%.

Table 3: Efficiency Summary Commercial Banks of Pakistan (1998-2012)

	(Technical Efficiency)$_{CRS}$	**(Technical Efficiency)$_{VRS}$**	**Scale Efficiency**
MCB	1.000	1.000	1.000
HBL	0.950	1.000	0.950
NBP	0.890	1.000	0.890
ABL	1.000	1.000	1.000
UBL	0.948	0.989	0.959
Bank Al-Habib	1.000	1.000	1.000
Bank Al-Falah	0.724	0.749	0.967
Faysal Bank	1.000	1.000	1.000
Soneri Bank	0.962	1.000	0.962
Mean	**0.942**	**0.971**	**0.970**

Source: Authors' estimates

4.3 Malmquist Index Summary of Annual Means

On average TFP change is 0.918 for years 1999-2005 (which is lesser then 1) and it shows an 8% deterioration. While TFP change is 1.156 for years 2006-2012 (which is greater than 1), it shows 15% growth rate over 5 years. Since 2006 bank are intensively getting into the IT so technical efficiency is 1.15 (it is higher than 1 and indicates 15% growth rate, while technical efficiency for year 1999-2005 is 0.917 (which is lesser than 1) and shows a 7% deterioration. According to the above results technical efficiency is greater than scale efficiency for the period 2006-2012. It present that technical efficiency is adding more to TFP then scale efficiency, while for the period 1999-2005 scale efficiency, obtained by the banks due to managerial efficiency is greater than technical efficiency. Pure efficiency is 0.99% for period 1999-2005 which indicates 1% deterioration and pure efficiency is 1.01 for period 2006-2012, 1% growth rate for 5 years.

Moreover, an overall review of the pre and post digital reform scores gives evidence that all five efficiency scores have improved after the digital reform. This affirms our expect results of improvement in efficiency after digital reforms. This improvement is not specific to individual scores, rather it is observable in overall (mean) scores. Only one mean score out of three during pre-digital reforms period is efficient while rest of four show inefficiency. Contrarily, four out five scores show efficiency during post-digital reforms period while only one score shows inefficiency.

Table 4: Malmquist Index Summary of Commercial Banks Industry Over Time (1999-2012)

Year	**effch**	**techch**	**pech**	**sech**	**tfpch**
			Pre Digital Reforms		
1999	0.969 (inefficient)	0.912 (inefficient)	0.990 (inefficient)	0.979 (inefficient)	0.884 (inefficient)
2000	0.969 (inefficient)	0.914 (inefficient)	0.981 (inefficient)	0.988 (inefficient)	0.886 (inefficient)
2001	1.007 (efficient)	0.624 (inefficient)	1.027 (efficient)	1.066 (inefficient)	0.683 (inefficient)
2003	0.964 (inefficient)	1.077 (efficient)	0.985 (inefficient)	0.978 (inefficient)	1.038 (efficient)
2004	1.062 (efficient)	0.858 (inefficient)	1.019 (efficient)	1.043 (efficient)	0.911 (inefficient)

2005	0.956 (inefficient)	1.239 (efficient)	0.964 (inefficient)	0.992 (inefficient)	1.184 (efficient)
Mean	**0.987 (inefficient)**	**0.917 (inefficient)**	**0.994 (inefficient)**	**1.007 (efficient)**	**0.918 (inefficient)**
Post Digital Reforms					
2006	1.012 (efficient)	1.261 (efficient)	1.033 (efficient)	0.979 (inefficient)	1.276 (efficient)
2007	1.055 (efficient)	0.858 (inefficient)	1.011 (efficient)	1.044 (efficient)	0.905 (inefficient)
2008	0.937 (inefficient)	1.425 (efficient)	0.985 (inefficient)	0.952 (inefficient)	1.336 (efficient)
2009	1.033 (efficient)	0.858 (inefficient)	1.034 (efficient)	1.000 (efficient)	0.887 (inefficient)
2010	0.986 (inefficient)	1.534 (efficient)	1.000 (efficient)	0.986 (inefficient)	1.513 (efficient)
2011	0.982 (inefficient)	1.351 (efficient)	1.000 (efficient)	0.983 (inefficient)	1.320 efficient)
2012	0.975 (inefficient)	1.406 (efficient)	0.995 (inefficient)	0.980 (inefficient)	1.366 (efficient)
Mean	**1.004 (efficient)**	**1.152 (efficient)**	**1.012 (efficient)**	**0.992 (inefficient)**	**1.157 (efficient)**
effch = efficiency change, **techch** = for technical efficiency change, **pech** = pure efficiency change, **sech** = scale efficiency change, **tfpch** = total factor productivity change.					
Source: Authors' estimates					

4.4 Malmquist Index Summary of Banks' Means

Table 4 presents the Malmquist summary of banks' means. It indicates that in pre-reforms period (1998-2005) Bank Al-Habib (MCB) &Faysal Bank scores the highest TFP growth. As, for pre-reform period technical efficiency is lesser than scale efficiency, so scale efficiency is adding more to TFP. While, for post reform period technical efficiency is greater than scale efficiency and adding up more to the TFP.

Moreover, an overall review of the pre and post digital reform scores gives evidence that all five efficiency scores have improved after the digital reform. This affirms our expect results of improvement in efficiency after digital reforms. This improvement is not specific to individual scores, rather it is observable in overall (mean) scores. Two mean scores out of three during pre-digital reforms are efficient while rest of three show inefficiency. Contrarily, four out five scores show efficiency during post-digital reforms while only one score shows inefficiency.

Table 5: Malmquist Index Means Across Banks of Commercial Banks (1999-2012)

	effch	**techch**	**pech**	**sech**	**tfpch**
Pre Digital Reforms					
MCB	1.009 (efficient)	0.950 (inefficient)	1.000 (efficient)	1.009 (efficient)	0.958 (inefficient)
HBL	1.005 (efficient)	0.959 (inefficient)	1.000 (efficient)	1.005 (efficient)	0.963 (inefficient)
NBP	1.019 (efficient)	0.911 (inefficient)	1.000 (efficient)	1.019 (efficient)	0.928 (inefficient)
ABL	1.010 (efficient)	0.941 (inefficient)	1.002 (efficient)	1.008 (efficient)	0.951 (inefficient)

Table 5: Malmquist Index Means Across Banks of Commercial Banks (1999-2012)					
	effch	**techch**	**pech**	**sech**	**tfpch**
Pre Digital Reforms					
UBL	1.000 (efficient)	0.918 (inefficient)	1.000 (efficient)	1.000 (efficient)	0.918 (inefficient)
Bank Al-Habib	1.000 (efficient)	1.014 (efficient)	1.000 (efficient)	1.000 (efficient)	1.014 (efficient)
Bank Al-Falah	0.987 (inefficient)	0.977 (inefficient)	0.988 (inefficient)	0.999 (inefficient)	0.964 (inefficient)
Faysal Bank	1.004 (efficient)	1.014 (efficient)	1.000 (efficient)	1.004 (efficient)	1.017 (efficient)
Soneri Bank	1.000 (efficient)	0.970 (inefficient)	1.000 (efficient)	1.000 (efficient)	0.970 (inefficient)
Mean	**1.004(efficient)**	**0.961(inefficient)**	**0.999(inefficient)**	**1.005(efficient)**	**0.964(inefficient)**
Post Digital Reforms					
MCB	0.986 (inefficient)	1.053 (efficient)	1.000 (efficient)	0.986 (inefficient)	1.038 (efficient)
HBL	0.968 (inefficient)	1.125 (efficient)	1.000 (efficient)	0.968 (inefficient)	1.09 (efficient)
NBP	0.977 (inefficient)	1.017 (efficient)	1.000 (efficient)	0.977 (inefficient)	0.993 (inefficient)
ABL	1.035 (efficient)	1.040 (efficient)	1.050 (efficient)	0.986 (inefficient)	1.076 (efficient)
UBL	1.025 (efficient)	2.056 (efficient)	1.000 (efficient)	1.025 (efficient)	2.107 (efficient)
Bank Al-Habib	0.973 (inefficient)	1.046 (efficient)	1.000 (efficient)	0.973 (inefficient)	1.018 (efficient)
Bank Al-Falah	1.000 (efficient)	1.165 (efficient)	1.000 (efficient)	1.000 (efficient)	1.165 (efficient)
Faysal Bank	1.077 (efficient)	1.188 (efficient)	1.064 (efficient)	1.013 (efficient)	1.280 (efficient)
Soneri Bank	1.000 (efficient)	0.957 (inefficient)	1.000 (efficient)	1.000 (efficient)	0.957 (inefficient)
Mean	**1.004 (efficient)**	**1.152 (efficient)**	**1.012 (efficient)**	**0.992 (inefficient)**	**1.157 (efficient)**
effch = efficiency change, **techch** = for technical efficiency change, **pech** = pure efficiency change, **sech** = scale efficiency change, **tfpch** = total factor productivity change.					
Source: Authors' estimates					

The results are presenting that technical restructuring have made a good impact on efficiency (overall and its components) of selected banks.

5. Conclusion and Suggestions

The study quantified and examined the technical efficiency of commercial banks of Pakistan by considering the impact of digital restructuring of commercial banking industry. The Malmquist productivity index shows that on average TFP change is 0.918 for period 1999-2005 and so sample commercial banks show deterioration of 8%, but for the post-restructuring period TFP change is 1.156

and sample commercial banks are showing a significant productivity growth of 15.6% for the post-restructuring period. In the same way sample banks are showing a 15% growth in technical efficiency for the post-restructuring period (2006-2012) and showing a deterioration of 7% for pre-restructuring period. Pure technical efficiency is goes side by side with TFP and technical efficiency as, our sample banks are showing 1% growth for post-restructuring period and are indicating a deterioration of 1% for pre-restructuring years (1998-2005).

More banks showing constant return to scale and Increasing return to scale as compare to lesser banks with decreasing return to scale indicates a healthy sign that technical restructuring is helping banks to be more scale efficient. In a developing country like Pakistan, commercial banks started adopting IT for banking services hardly a decade ago so, the banks are still making intensify investment for the purpose of technical restructuring. That is why it is expected that in near future commercial banking sector will experiences even more scale & technical efficiencies. Future research for Pakistan banking industry can be focused on pre and post-merger efficiency analysis.

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