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   OBJECTIVES

   HYPOTHESES

   RESEARCH METHODOLOGY

   RESULTS & DISCUSSION

   FINDINGS

   RECOMMENDATIONS/SUGGESTIONS

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- Schemenner, R.W., Huber, J.C. and Cook, R.L. (1987), "Geographic Differences and the Location of New Manufacturing Facilities," Journal of Urban Economics, Vol. 21, No. 1, pp. 83-104.

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FINANCIAL DEREGULATIONS AND PRODUCTIVITY CHANGE IN PAKISTAN BANKING INDUSTRY

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ABSTRACT
This study aims to assess productivity changes in Pakistan banking industry during post financial reforms period. Numbers of banking reforms have been implementing since 1991 in order to improve the performance of this sector. Panel data of 26 individual banks from 2004 to 2009 is used and Malmquist total factor productivity indexes are applied. For further deep understanding, these banks are also classified into small, medium and large banks groups as per their asset accumulations. It is found that progress in productivity change exits during the analysis period and efficiency change / catching-up affect is more pronounced for determining progress in productivity of Pakistan banking industry and even offsets deteriorating trend of technological change. Moreover, small and large banks enjoy progress in productivity compare to medium banks.

KEYWORDS
Pakistani banks, DEA, Productivity, Malmquist Indices.

INTRODUCTION
A sound and well-developed banking sector has pivotal status in any economy due to its significant financial intermediary role. Voluminous empirical literature posits that bank based financial intermediation exerts positive impact on economic growth and development (King & Levine 1993; Gregorio & Guidotti, 1995; Levine et al. 2000). Moreover, banking system has dominance in financial sector of developing countries. Considering this, performance evaluation of this sector is of paramount importance.

Highly regulated banking industry generally characterizes less efficient & productive, high cost and none or less competitive which ultimately impede the performance of the economy. In highly command and regulated banking sector, allocation of credit are not made on market basis rather credit rationing for some preferential sectors exists. Influence of political and other governing class can't be overruled for using the financial resources of this sector for their vested interests. Least competitiveness is one of the obstacles which hampers efficiency and productivity of this sector. Conversely, less regulated / deregulated banking industry associated with cost savings activities resultantly, productivity of the industry may increase.

During the last few decades, lot of structural changes occurs all over the globe and notable one is deregulation in banking sector so that financial resources can be optimally used on market basis. Large numbers of developed and developing countries have implemented deregulations in their banking sector in order to enhance competitiveness and performance of this sector. Pakistan also introduced numerous prudent measures in banking sector from 1990s which are still going-on. Prior to that, all Pakistani banks were nationalized in 1974 with some social objectives. But nationalization of banking sector eroded performance and competition in this sector. Dysfunctions of this sector was occurred due to excessive role of influential powers on issuance of loans which created loans recovery problem, therefore, non performing loans ratio increased. In addition to that, due to direct influence of political forces created overstaffing, over branches in this sector, hence, services quality of banks severely deteriorated. Moreover, during nationalized era real deposit rate remained negative in most of the years which discouraged banks deposits (Khan, 1996; Zaidi, 2005). All these factors affected the performance and productivity of Pakistan banking industry. Resultantly, deregulatory measures in banking industry of this country were started. Initially, private sector was allowed to open new private banks in Pakistan and considerable autonomy was given to State Bank of Pakistan[1]. Four public sector banks were privatized. Even during the recent period, some noteworthy reforms were taken place, for instance; liberalization policy for bank branches, merger and acquisition of banks, e-banking, usage of ATMs etc. (Khan & Khan 2007). Now, private domestic banks enjoy dominant share in Pakistan banking sector. Banking industry of this country is flourishing due to the banking reforms which have been implemented during the almost two decades.

Apparently, financial deregulations pave the way for competitiveness in banking industry and boost productivity of the industry but this can be validated with empirical support, therefore, productivity analysis of banking industry is an important question which needs to be addressed Voluminous empirical literature is available on this issue around the world. It is evident from literature that impact of financial liberalization on productivity of banking sector varies from country to country. Some studies claim positive contribution of deregulation on banking productivity change (see, Berg et al. 1992; Avkiran, 2000; Isik & Hassan, 2003; Kumbhakar & Wang, 2007). Whereas, some researchers unveil that there is no significant impact of banking reforms on productivity of banks (e.g., Rizvi 2001; Dogan & Fausten 2003; Moffat, et al. 2009).

The prime objective of this study is to analyze productivity change along with efficiency and technological changes in Pakistan bank industry during post financial deregulation period. Literature on productivity analysis of Pakistan banking industry is too limited and incomprehensive. To our knowledge, only Rizvi (2001) and Jaffry et al. (2005) addressed this issue for Pakistan but both these studies used data of 1990s and no study is available on this subject for recent period. The first contribution of this study is to fill this gap and analyzes the impact of financial deregulations on productivity of Pakistan banking industry by using recent data of 26 scheduled banks operating in Pakistan from 2004 to 2009. Secondly, we use Malmquist total factor productivity changes Indices based on non-parametric technique; Data Envelopment Analysis (DEA) through which productivity change is further bifurcated into efficiency change and technological change. Efficiency change is further decomposed into pure technical efficiency change and scale efficiency change. Thirdly, we classified the banks into small and medium and large banks categories in order to have deep understanding about productivity changes in these different banking groups.

The remainder of the article is organized as follows. Section 2 presents review of existing literature on productivity analysis of banking industry. In section 3 methodology and data are discussed. Section 4 contains empirical results whereas last section is devoted for some concluding remarks.

[1] State Bank of Pakistan is a central bank of this country.

LITERATURE REVIEW

Various studies assessed productivity change in banking industry around the world. Noulas (1997) found increase in productivity of Hellenic public and private banks; however, technological progress is the major channel which contributed in productivity of public banks whereas dominance of efficiency improvement unveiled for private banks' productivity. Comparison of productivity change for different European and US banking industries was the aim of Pastor, et al. (1997). This study classified bank industries into two groups as per productivity. Banks of Italy, Belgium, Austria and Germany were more productivity whereas banks of Spain, UK, France & USA were found less productive. Isik & Hassan (2003b) analyzed the impact of financial disruption 1994 on Turkish banks and claimed that productivity of Turkish banks decreased in 1994 due to deterioration in technological progress. They further found that foreign banks were the major victims of this crisis compared public sector banks. Although banks of all sizes faced productivity loss but small banks received severe impact.

A number of studies examined the effect of banking deregulations on productivity change in banking industry all over the world; however, the results of the studies vary from country to country. Varied impacts of deregulations on bank productivity are subject to specific conditions of particular banking industry, nature of reforms and research technique (Kumbhakar & Lozano-Vivas, 2005). Some studies illuminate that productivity of banking sector enhanced in response to financial reforms. For instance, Berg et al. (1992) examined productivity of Norwegian banks during pre and post deregulations. This study was among the first which used Malmquist index to meet the objective. They found deterioration in productivity prior to deregulations but progress in post-deregulation period and particularly, rapid increase in productivity of large banks was observed. Avikan (2000) analyzed productivity of Australian banks during deregulations period from 1986 to 1995 and unveiled growth in Australian banks' productivity. This study unveiled technological change was the major source of this growth instead of efficiency change. Isik & Hassan (2003) utilized Malmquist indices for productivity analysis of Turkish banks and found positive impact of deregulations as productivity of all types of banks increased during the analysis period. Moreover, efficiency change dominated over technological change in order to enhance total factor productivity whereas management efficiency was the major source of efficiency change. Kumbhakar & Lozano-Vivas (2005) found that productivity of Spanish saving and commercial banks enhanced during deregulation era and more specifically, positive impact of European deregulations was more prominent on productivity of savings banks. In order to find the impact of financial reforms on productivity of banking sectors Indian sub-continent's countries, Jaffry et al. (2005) carried out a study by taking data for the period 1993-2001. They also used Malmquist total factor productivity indexes and elucidated positive impact of banking reforms on productivity of banks operating in Pakistan, India and Bangladesh. Rezitis (2006) revealed that Greek banks gained growth in productivity during post-reforms period whereas technological progress was the major source for this growth. Kumbhakar & Wang (2007) found progress in total factor productivity of Chinese banks during post reform period. Moreover, this growth was higher for Joint-equity banks compared to complete public-owned banks.

Conversely some studies found no significant impact of deregulations on banking productivity. For instance, Rizvi (2001) analyzed total factor productivity change through Malmquist TFP index by taking data of schedule banks of Pakistan for financial deregulation period 1993-1998 and claimed no progress in productivity of banks during the period under consideration. Dogan & Fausten (2003) examined productivity change of Malaysian banks during financial deregulation period 1989-1998. They found no any impact of financial liberalization on banking productivity and further claimed that larger banks were more unproductive compared to smaller banks. Examining the effect of merger and acquisition on productivity of Greek banks was the objective of Rezitis (2008) and for this purpose, he used Generalized Malmquist index. This study illuminated no progress in productivity of Greek banks whereas technical efficiency of merged banks also deteriorated which was the main hindrance in productivity growth. Moffat, et al. (2009) analyzed total factor productivity change of Bostwana's financial institutions in post financial reform period. This study unveiled no growth in productivity of financial institutions during deregulation era whereas regressing trend in technological change was the major reason for this non-productivity.

METHODOLOGY AND DATA

Productivity change analysis is one of the ways to assess the performance of banking sector. Three types of indexes namely; Fischer, Tornqvist, and Malmquist indexes are used for productivity analysis (Pastor et al. 1997; Rebelo & Mendes, 2000). However, recently Malmquist total factor productivity changes Index has been extensively applied in financial literature. Rebelo & Mendes (2000) mentioned three advantages of Malmquist index over Fischer and tornqvist indexes. Firstly, prices of inputs and outputs are not required for this index. Secondly, it is free from cost minimization or profit maximization assumptions and lastly productivity can be decomposed into technical efficiency (catching-up effect) and technological change (shift of frontier due to advancement) provided that panel data is used. The major demerit of this index is regarding computation of distance function; however, non-parametric based Data Envelopment Analysis (DEA) approach application can solve this problem (Rebelo & Mendes 2000).

Malmquist productivity indices can be estimated either through input or output based approach. The former shows saving of inputs at given level of output whereas latter is related to attain maximum possible output at given level of input. Following, Berg et al. (1992); Pastor et al. (1997); Rebelo & Mendes (2000) and Moffat et al. (2009), this study used input oriented Malmquist productivity index.

Following Fare et al. (1994) and Coelli (1996) input based Malmquist productive change Index is specified as:

$$M_i^{t+1}(z_{t+1}, y_{t+1}, z_t, z_t) = \left[\frac{d_i^t(y_{t+1}, z_{t+1})}{d_i^t(y_t, z_t)} \times \frac{d_i^{t+1}(y_{t+1}, z_{t+1})}{d_i^{t+1}(y_t, z_t)}\right]^{1/2} \qquad (1)$$

Where,

M_i = Malmquist productivity change index whereas '*i*' represents as input based index. It shows productivity change in *t+1* time with reference the base time *t*

ds = Distance function.

y = Level of Inputs

z = Level of outputs

The solution of equation 1 provides the results of Malmquist productivity change index which are summarized at Table 1.

TABLE 1: PRODUCTIVITY CHANGES LEVEL

Malmquist index results	Interpretation
If *M* is greater than unity	Progress in productivity
If *M* is equal to unity	No change in productivity
If *M* is less than unity	Regress in productivity

This index formulation can also be decomposed in the following form.

$$M_i^{t+1}(z_{t+1}, y_{t+1}, z_t, z_t) = \frac{d_i^t(y_{t+1}, z_{t+1})}{d_i^t(y_t, z_t)} \times \left[\frac{d_i^t(y_{t+1}, z_{t+1})}{d_i^t(y_{t+1}, z_{t+1})} \times \frac{d_i^t(y_t, z_t)}{d_i^{t+1}(y_t, z_t)}\right]^{1/2} \qquad (2)$$

Where

Technical efficiency Change (TEC) $= \frac{d_i^{t+1}(y_{t+1}, z_{t+1})}{d_i^t(y_t, z_t)}$ (3)

and

Technological Change (TECHC) $= \left[\frac{d_i^t(y_{t+1}, z_{t+1})}{d_i^t(y_{t+1}, z_{t+1})} \times \frac{d_i^t(y_t, z_t)}{d_i^{t+1}(y_t, z_t)}\right]^{1/2}$ (4)

This decomposition shows that Malmquist index formulation equation 2 is a product of technical efficiency changes /catching up effect and technological changes / shift of frontier. Catching-up part shows change in efficiency at '*t+1*' from '*t*' time. Like productivity change results' interpretation, the value of catching-up component greater than unity indicates progress in efficiency change, equal to unity means stagnation in efficiency change and less than unity postulates declining trend in efficiency change. Shift in production frontier can be due to technological innovations or shocks. The value of frontier shift components greater than, equal and less than unity means progress, no change and regress in technological change respectively at period '*t+1*' compare to period '*t*'. Both technical efficiency change and technological changes fabricate productivity change of the analyzed institution(s).

The above mentioned equations are based on constant return to scale (CRS) assumptions for distance functions, however, with the application of variable return to scale (VRS) distance functions, technical efficiency change / catching-up effect can be further decomposed into pure technical efficiency change and scale efficiency change (Fare et al. 1994). Pure technical efficiency (PTEC) is known as management efficiency and scale efficiency changes (SEC) is scale operation. As elaborated by Isik & Hassan (2003) and Rezitis (2006), the decompositions of efficiency change (TEC) into pure technical efficiency change (PTEC) and scale efficiency change (SEC) are as follows.

Pure Technical Efficiency Change (PTEC) = $\frac{d_i^{t+1[VRS]}(y_{t+1}, z_{t+1})}{d_i^{t[VRS]}(y_t, z_t)}$ (5)

and

Scale Efficiency Change (SEC) = $\left[\frac{d_i^{t+1[CRS]}(y_{t+1}, z_{t+1})/d_i^{t+1[VRS]}(y_{t+1}, z_{t+1})}{d_i^{t[CRS]}(y_t, z_t)/d_i^{t[VRS]}(y_t, z_t)}\right]$ (6)

To estimate Malmquist indices, the above mentioned distance functions are to be solved and for this purpose, linear programming based DEA approach can be used as suggested by Fare et al (1994); Coelli (1996); Rebelo & Mendes (2000); among others. This study uses DEAP 2.0 computer program, devised by Coelli, (1996), for estimation of Malmquist indices through DEA technique.

The findings of these indices give variety of results regarding performance of banking industry. For example, if TECHC is greater than TEC then one can conclude that TFP growth is more influenced by technological change, however, conversely if TEC is more than TECHC, one can draw conclusion that efficiency change is more prominent for determining progress in TFP growth. Besides that, bifurcation of TEC into PTEC and SEC helps to decide that as to whether managerial efficiency change (PTEC) is more important or scale efficiency change (SEC) for TEC. For instance, one can arrive on the decision that technical efficiency progress is more likely due to managerial efficiency progress than scale efficiency change and vice versa.

DATA

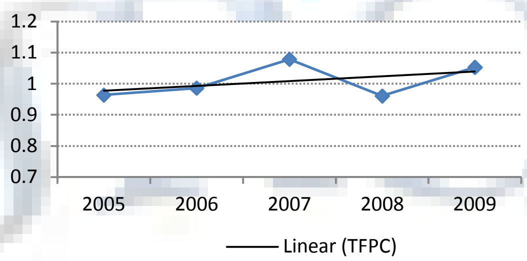
Input and output variables selection is a debatable issue in financial literature for productivity and efficiency analysis and a few approaches are available in the literature for this purpose. However, out of these, intermediation approach and production approach have been extensively used. According to former approach, banks are financial intermediaries between savers and investors whereas latter approach supposes banks as service providers for their accounts holders (Berger & Humphrey, 1997). Following Rebelo & Mendes (2000), Rizvi (2001) and Rezitis (2006), this study chooses intermediation approach for identifications of inputs and outputs. Three inputs namely; i) employees (in numbers), ii) Operating fixed assets and iii) deposits + other accounts are selected whereas i) investments and ii) advances issued by banks are chosen as outputs for analysis purpose.

For analyzing the impact of banking deregulations on productivity of Pakistan banking industry, this study selects 26 schedule banks for each year during the period from 2004 to 2009, which constitutes balanced panel data[2]. Out of these total 26 schedule banks, 16 are private commercial banks, 4 are foreign banks, 3 are public sector commercial banks and remaining 3 are specialized banks. Classifications of banks into different groups according to assets accumulations are vogue in finance literature for banking performance analysis. This type of analysis also paves the way for better understanding the performance of banking industry. In addition to productivity change analysis of all 26 banks, this study also classified these banks into three groups namely; small, medium and large banks according to each bank's assets accumulation. The banks which hold assets more Rs.250,000 (millions) are categorized as large banks whereas the banks possess assets between Rs. 50,000 - 249,000 (millions) and less than Rs. 49,000 (millions) are earmarked medium banks and small banks respectively[3]. The numbers of these three classified banks are varied from year by year. The data for these individual banks are taken from Banking Statistics of Pakistan 2009[4].

EMPIRICAL FINDINGS

Graphical analysis of Total factor productivity change (TFPC) of all banks is presented in figure 1, which shows that over the period of time, banks attain gradual progress in banking productivity as shown in linear trend line. Basically, this change is measured between two periods i.e. change in '*t+1*' period compare to '*t*' time period that is the reason, although we have selected data from 2004 but the results come from 2005. As explained earlier, TFPC is the product of technological change / change in frontier due to innovation and efficiency change / catching-up. Figure 2 and 3 postulate these two components of TFPC and these figures reveal that during the analysis period technological change (TECHC) is regressed whereas efficiency change (TEC) is considerably increased. The trends in these components show that TEC is the major contributor in progress of TFPC and also offset the regressing trend in TECHC, to some extent. Besides, the graphical analysis, the results of Malmquist indices are also given in Table 2. Mean values of TFPC, TECHC and TEC during the period also confirms that TEC played vital role in progress of TFPC whereas TECHC deteriorated. As far as two other components of TEC – pure technical efficiency change (PTEC) and scale efficiency change (SEC) are concerned, this table also reveals that both have positively contributed in TEC change which in turn influenced TFPC progress. In the year 2006, all indices regressed / decreased except TECHC. On the other hands, TEC and its components – PTEC and SEC increased during the analysis period except for the year 2006. This shows that 2006 was the turmoil year regarding the performance of Pakistan banking industry.

FIGURE 1: TOTAL FACTOR PRODUCTIVITY CHANGE INDEX OF ALL BANKS



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[2] For Malmquist TFP indices analysis, balanced panel data is required, therefore, to meet this, this study selected 26 banks as balanced panel data for six years is only available for only these banks.

[3] These amounts are in millions Pak Rupees.

[4] Bank statistics of Pakistan is a regular annual publication of State Bank of Pakistan.

FIGURE 2: TECHNOLOGICAL CHANGE INDEX OF ALL BANKS

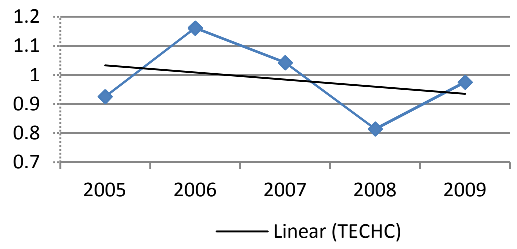

FIGURE 3: EFFICIENCY CHANGE INDEX OF ALL BANKS

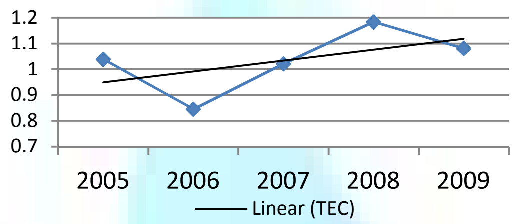

TABLE 2: ALL BANKS' RESULTS OF MALMQUIST TFP CHANGE INDEX AND ITS COMPONENTS

	2005	2006	2007	2008	2009	Mean
TFPC	0.964	0.986	1.079	0.961	1.053	**1.008**
TECHC	0.926	1.162	1.043	0.815	0.976	**0.985**
TEC	1.039	0.845	1.022	1.184	1.081	**1.034**
PTEC	1.051	0.995	1.001	1.029	1.015	**1.018**
SEC	1.027	0.847	1.025	1.161	1.067	**1.026**

TABLE 3: RESULTS OF MALMQUIST TFP CHANGE INDEX AND ITS COMPONENTS (SMALL, MEDIUM & LARGE BANKS)

	2005	2006	2007	2008	2009	Mean
Small banks						
No. of Banks	14	13	11	10	9	
TFPC	0.940	1.049	1.186	0.918	0.970	**1.012**
TECHC	0.892	1.170	1.096	0.853	0.879	**0.978**
TEC	1.048	0.883	1.052	1.077	1.100	**1.032**
PTEC	1.139	0.999	1.017	1.078	1.029	**1.052**
SEC	0.976	0.880	1.033	1.000	1.074	**0.992**
Medium banks						
No. of Banks	7	7	9	10	10	
TFPC	0.971	0.884	0.934	0.954	1.135	**0.976**
TECHC	0.996	1.107	0.990	0.802	1.035	**0.986**
TEC	0.974	0.810	0.950	1.191	1.102	**1.005**
PTEC	0.924	1.002	0.947	0.992	1.029	**0.979**
SEC	1.059	0.811	1.017	1.214	1.071	**1.035**
Large banks						
No. of Banks	5	6	6	6	7	
TFPC	1.019	0.968	1.099	1.045	1.044	**1.035**
TECHC	0.925	1.207	1.027	0.776	1.017	**0.990**
TEC	1.105	0.802	1.074	1.352	1.027	**1.072**
PTEC	0.981	0.980	1.055	1.008	0.975	**1.000**
SEC	1.124	0.819	1.022	1.342	1.054	**1.072**

Besides the productivity change analysis of all 26 banks, this study also categorizes these banks into small, medium and large banks according their assets accumulations. The numbers of these banks changed from year to year. The results for TFPC, TECHC, TEC, PTEC AND SEC for three groups along with number of banks in each group each year are given in Table: 3. This table shows that in the years 2006 and 2007 there was progress in TFPC of small banks and in the remaining years a slight regressing trend prevails, however, mean value of TFPC index unveils overall progress in productivity change of small banks. Considerable increase in catching-up (TEC) is witnessed during the analysis however, in only 2006 TEC deteriorates. On the other hand, small banks faced regressing trend in technological regress during the analysis period. Catching-up (TEC) effect of small banks is also influenced by PTEC and SEC positively. Medium banks group faced deterioration in productivity change throughout the period except for the year 2009. However, increase in SEC is observed during four out of five years which overweigh managerial efficiency (PTEC) for determining TEC. Significant progress in productivity change is materialized in large banks group and this improvement was seen throughout the period except in the year 2006. In this group, TECHC prevails during three years whereas TEC exists in four years which shows the importance of catching-up effect for determining TFPC of large banks. The findings regarding further bifurcation of TEC into PTEC and SEC elucidate that SEC is more pronounced than managerial efficiency changes for determining catching-up progress of large banks. In brief, small banks and large banks groups enjoy progress in productivity change compare to medium banks. One common feature among these groups is that technical efficiency change / catching-up effect is stronger in the progress of productivity than technological change. Moreover, increase in management efficiency change (PTEC) is more pronounced in small banks group than its other counterparts. Overall productivity change analysis illuminates that during the selected period, productivity of Pakistan banking industry increase which shows that banking deregulations policy is beneficial for better performance of this sector.

CONCLUDING REMARKS

Numerous banking reforms have been implementing in banking industry of Pakistan since 1991, even during the recent period, different banking reforms have been executed in order to enhance the performance of Pakistan banking sector. .This study examines productivity changes in banking industry during post financial reforms period. To meet the objective, 26 individual banks' panel data from 2004 to 2009 is used and Malmquist indices are applied for productivity analysis. In addition to that, these banks are categorized into small, medium and large banks groups according to assets accumulations of individual banks. This study finds progressive trend in productivity change of the Pakistan banking industry during the period. Technological change deteriorates during the analysis period, however, considerable progress in efficiency change is observed. Efficiency change / catch-up effect played pronounced role in progress of productivity change in banking industry and also offsets negative effect of deteriorated trend in technological change. Moreover, progress in total factor productivity changes is observed in small and medium banks compare to medium banks.

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