Does Growing Economy And Better Governance Impede Banking Efficiency? A DEA Analysis

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ABSTRACT

The paper estimates the efficiencies of Pakistani banking sector from 1998-2009. The analysis is further extended and regressed estimated banking efficiencies by using Data Envelopment Analysis (DEA), with macro-economic indicators and corporate governance variables of the banking sector. The purpose of this analysis is to determine the impact of overall economic conditions of a country and corporate governance practices on banking efficiencies. The results suggest that the corporate governance practices, like, board size, board independence have positive impact on overall banking sector efficiencies of Pakistan. Also, the GPD growth and interest rates have positive and negative impact on banking efficiencies respectively. The study has not found any significant difference in banking efficiencies of state-owned, private and foreign banks of Pakistan.

INTRODUCTION

*B*anks are considered to be one of the dominant suppliers of external finances in emerging economies. The capital is channeled from savers to investors through this source. That is the very reason banks play an important role in the development of emerging market economy. The role of banks in economic growth of an emerging economy has been well established e.g. The Banking system all over the world had gone through phenomenon changes and revolutions over the past few decades. Particularly in Pakistan over the past two decades, the banking sector witnessed a number of significant changes. Started with financial sectors reforms in early 1990's, privatization and Liberalization policies were introduced. Number of private and foreign banks were established and offered a wide range of products and services. The role of financial sector in GDP increased from 24 to 52% during this decade. Banking scripts became the blue scripts for the investors, with high profits and returns. These significant changes of banking sector in Pakistan attracted the academicians and researchers to evaluate the performance of this segment of economy with different ways. The most common practice among the researchers for evaluating the performance of banking sector has been estimating the efficiency of this sector.

The term "Efficiency" refers to the maximizing of outputs in such a way as the input resources are less utilized. The efficiency of banks, relates to the efficiency of banking sector which further relates to efficiency of intermediation process and the efficiency by which monetary policy passes through to bank lending. Banking efficiency is defined as difference between observed quantity of input and output variables with respect to optimal quantity of input and output variables. The efficient bank can achieve a maximum value of **one** in comparison to inefficient bank can reduce to level of **zero**.

For emerging markets, it is important that under stable economic conditions financial sectors should be an efficient segment of the economy with good corporate governance practices. Does this phenomenon true for Pakistani banking sector? The Pakistani banking sector is considered to be an emergent banking sector of the world. So it is important to examine the role of corporate governance practices in the emerging country's banking sector.

For this we computed the banking efficiencies of Pakistani banking sector from 1998-2009 and then, examined the impact of corporate governance practices on banking efficiencies. The analysis is conducted in two steps, in step one, banking efficiencies are estimated over the sample period for all types of banks using Data Envelopment Analysis (DEA), then in step two, the estimated banking efficiencies of all types of banks are regressed with macro-economic indicators and corporate governance variables, to determine the impact of overall economic conditions of a country and corporate governance practices on banking efficiencies. The results suggest that there is no significant difference in banking efficiencies of state-owned, private and foreign banks of Pakistan. But, the corporate governance practices, like, board size, board independence have positive impact on overall banking sector efficiencies of Pakistan. Also, the GPD growth and interest rates have positive and negative impact on banking efficiencies.

In Pakistan context, no one has explored the impact of corporate governance on banking efficiency under specific economic conditions. There are few studies available who explored significant relationship between corporate governance and firm performance. Richard Bozec et al (2010) made an investigation on Canadian non-financial firms and found that better governed firms are most efficient. The role of corporate governance practices and its impact on firm performance has extensively studied in literature. There is a general consensus among Lipton and Lorsch (1992) and Vafeas and Theodorou, (1998) that smaller boards are more efficient and effective as they are cohesive and faster in decision making. Various studies found a negative relationship among board size and firm performance such as Dahya et al (2008), Haniffa and Hudaib(2006) and Yermack (2006). But on the other hand, Adams and Ferreira (2007) and Dalton et al (1999) thought that a larger board may bring some additional support to CEO in difficult economic and crisis situation in term of more experience, knowledge and quality advice. Coles et al (2008) and Linck et al (2008) investigated that in complex environment a firm may require a larger board because they need a quality advisory need.

Apart from board size, independent director (non-executive directors) has also act significant in determining the performance of a firm. Several studies have been conducted which established the role of non-executive directors in firm performance. Dahya et al (2008), Fama and Jensen (1983) and Weir et al (2002) found that NED's can increase the value of a firm by protecting shareholder's interests against managerial opportunism. Empirically, there is a mixed trend in establishing the relationship between independent directors and firm performance. Agarwal and Knoeber (1996), Coles et al(2008) and Yermack (1996) found a negative relationship between NED's and firm performance. While ,Ho and Willaims (2003), Klein (1998) and Ramdani and Van Witterloostuijn (2010) found a positive relationship and Haniffa and Hudaib (2006), Weir et al (2002) yet to establish any relationship. For Pakistani banking sector efficiency analysis, there are few studies available, but no conclusive study is available which examined the impact of macro-economic indicators and corporate governance practice on banking efficiency. Rizivi (2001) conducted an early study to analyze the productivity of banking sector in Pakistan during 1993-1998. He found during the period of initial reform that the total factor productivity remained stagnant. However, the domestic banks performed better than the foreign banks during that period. Akhtar (2002) implemented Data Envelopment Analysis (DEA) to compute the banking efficiencies of Pakistan banking sector. The result showed overall efficiency score of Pakistani banks was 0.80 in 1998. This score was higher than the result obtained by Mukherjee (2002) for Indian banks and Jemric et al (2002) for Croatian banks. But this score was less than the world average banking efficiency of 0.86 by Berger and Humphrey (1997). The results also supported the ongoing financial reforms and liberalization of banking sector in Pakistan.

The impact of financial reforms on banking efficiency of state, private and foreign owned banks in Pakistan was observed by Burki and Niazi (2006). They found first phase of financial reforms was not very effective. In fact, first phase financial reforms failed to covert cost inefficient bank into efficient bank during the period of 1993-1996. Qayyum et al (2006) conducted a study on X-efficiency, economies of scale, technological progress and competition of Pakistani banks using Stochastic Frontier Analysis, a parametric approach to construct a Fourier flexible cost function with component error. Akmal and Saleem (2008) estimated the technical efficiency of the banking sector in Pakistan. The results indicated that the state owned banks were less efficient than the private and foreign banks.

Usman et al (2009) conducted a study on banking efficiency dynamics with financial sector reforms effect. The results supported the hypothesis that the financial reforms improved the banking efficiency of Pakistan banking sectors. Rehman et al (2010) investigate the comparison between the efficiency of Conventional and Islamic Banks

of Pakistan. The results showed that there is no significant difference in mean efficiencies scores of conventional and Islamic banks except in year 2008.

Hypotheses

Following hypotheses to be tested for this study

a-

1- Board size has positive effect on the overall banking efficiencies
2- Ownership concentration has negative effect on overall banking efficiencies.
3- Board Independence has positive effect on overall banking efficiencies.

b-

1- Board size has more positive effect on foreign banks efficiency than public and private banks efficiencies.
2- Ownership Concentration has more negative effect on foreign banks efficiency than public and private banks efficiencies.
3- Board Independence has more positive effect on foreign banks efficiency than public and private banks efficiencies.

The most significant part of this study is to examine the impact of macroeconomic and corporate governance variable on the efficiencies of conventional banks of Pakistan. No study has yet been conducted on these issues. This is the first effort in this regard.

Methodology and Variables Construction

This paper explores the different ways to measure the performance of banks in Pakistan covering a longer period from 1998-2009. A sample of all listed commercial banks in Karachi Stock Exchange is selected for the period of 1998-2009. The data is collected from State Bank of Pakistan .The sample is further categorized in three categories with respect to their ownership style, as state owned commercial banks, privately owned commercial banks and foreign banks. The analysis is conducted in two steps, in step one, banking efficiencies are estimated over the sample period for all types of banks using Data Envelopment Analysis (DEA), then in step two, the estimated banking efficiencies of all types of banks are regressed with macro-economic indicators and corporate governance variables, to determine the impact of overall economic conditions of a country and corporate governance practices on banking efficiencies.

Data Envelopment Analysis (DEA)

In Step 1, the efficiencies of all the banks are estimated by applying Data Envelopment Analysis (DEA) a non-parametric approach. As there are two approaches used by the researchers in past, one is parametric approach i.e., Stochastic Frontier Approach (SFA) and other is non-parametric approach Data Envelopment Analysis (DEA). Both approaches have been criticized by the researcher due their limitations. In spite of that DEA was used more frequently than Stochastic Frontier approach due to its simplicity of assumptions. We also estimated banking efficiencies using DAE approach under constant return to scale. There are two techniques one is estimation of banking efficiencies under constant return to scale (CRS) and other is variable return to scale (VRS). Berger et al (1991) suggested that VRS is biased toward larger banks. This DAE technique was originally introduced by Farrell's which latterly, extended by Charnes et al (1978), Fare et al (1983), Banker et al (1984).

Though DEA is a non-parametric approach hence does not require any assumptions and any distributional form for the error term. Worthington (2000) mentioned it's inability to handle non-stationary data in satisfactory manner. Qayyum and Ahmed (2006) suggested that DEA's frontier is sensitive to extreme observations and measurement error. The Data Envelopment Analysis (DEA) approach is based on linear mathematical programming. It uses the observed values of inputs and outputs and attempts to find which of the firms in the sample determine an envelopment surface. Firms lying on the surface are deemed to be efficient and receive a value of unity. Firms that do not fall the frontier are deemed to be inefficient and capture a value of less than unity. Hence, all deviations from

the estimated frontier represent inefficiency. Banks under the DEA approach are referred to a decision making unit (DMUs). Data Envelopment Analysis (DEA) is used to estimate output frontier. Distance functions can be estimated under constant return to scale (CRS) and variable return to scale (VRS) assumptions. The overall bank efficiency can be decomposed into scale efficiency and pure technical efficiency. An output-oriented model implies that the efficiency is estimated by the output of the firm relative to the best practice level for a given level of inputs. In order to specify the mathematical formulation of the output oriented, let us assume we have K decision-making units (DMU) using N inputs to produce M outputs. Inputs are denoted by xjk (j = 1,……..,n) and the outputs are represented by yik (i=1,…….,m) for each bank k (k=1,…….,K). The efficiency of DMU can be measured as (Coelli, 1996; Worthington, 1999; Shiu, 2002).

$$TE_k = \frac{\sum_{i=1}^{m} U_i \ y_{ik}}{\sum_{j=1}^{n} v_j \ x_{jk}}$$

Where yik is the quantity of the ith output (i.e. Loan & Advances and Investment) produced by the kth DMU firm, xjs is the quantity of jth input (i.e. Deposits, Labor and Capital) used by the sth firm, and ui and vj are the output and input weights respectively. The DMU maximizes the efficiency ratio, TEk, subject to

$$\frac{\sum_{i=1}^{m} U_i \ y_{ik}}{\sum_{j=1}^{n} v_j \ x_{jk}} \leq 1 \ \ Where \ v_{j\geq} 1$$

This constraint implies that efficiency measures of a bank cannot exceed one and the input and output weights are positive. The weights are selected in such a way that the firm maximizes its own efficiency. To select optimal weights the following mathematical programming (output-oriented) is specified (Coelli, 1998; Wrothington, 1999; Shiu, 2002)

Max TE$_k$

Subject to $\qquad \sum_{i=1}^{m} u_i \ y_{ir} - x_{jr} + w \leq 0 \qquad$ r= 1……k

$$v_j \ x_{jr} - \sum_{j=1}^{n} u_j \ x_{jk} \qquad u_i \ and \ v_j \geq 0$$

Min TE$_k$
Subject to $\qquad \sum_{i=1}^{m} u_i \ y_{ir} - x_{jr} + w \geq 0 \qquad$ r= 1……k

$$x_{jr} - \sum_{j=1}^{n} u_j \ x_{jk} \qquad u_i \ and \ v_j \geq 0$$

Input oriented linear programming methods is used in order to obtain the minimize inputs. Therefore the following mathematical programming model is specified (Banker , 1988; Coelli, 1998; Worthington, 1999; Shiu, 2002; Topuz et al, 2005).

The above model shows CRS if w = 0 and it changed into variable return to scale (VRS) if w is used unconstrained (Qayyum and Ahmed, 2006).

The efficiency of banks can be measured either by using operating approach or intermediation approach. Under the operating approach, the bank is perceived to be the producer of services for its account holders and known as the cost/revenue management perspective. The intermediation approach considers banks as entities, which covert the transfer financial assets between surplus units and deficit units acting as an intermediary better called a mechanical perspective (Hanif.,2002). This study uses the intermediation approach as it enables financial institution like bank to be perceived as a manufacturing unit, converting inputs into outputs. Deposits and net capital are taken

as input variables and Loans and Advances and Investments as output variables for this study. The choice of input and output variable is influenced by extensive literature on data envelopment analysis and its application in banking industry.

The sample size of this study is relatively large enough to satisfy the limitation of applying DEA technique, as suggested by Nunamaker (1985) that sample size should be atleast three times larger than the sum of numbers of inputs and outputs.

In order to the test the suggested hypotheses following econometric models are used for overall and segment wise banking sector of Pakistan.

$$TE = \alpha_1 + \delta_1 BS + \theta_1 OS + \vartheta_1 BI + \beta_1 \Delta GDP + \gamma_1 \Delta INT \rho_1 Size + \tau_1 Debt + \sum_{j=1}^{m} Year\ dummy\ + \epsilon$$

$$AE = \alpha_1 + \delta_1 BS + \theta_1 OS + \vartheta_1 BI + \beta_1 \Delta GDP + \gamma_1 \Delta INT \rho_1 Size + \tau_1 Debt + \sum_{j=1}^{m} Year\ dummy\ + \epsilon$$

$$CE = \alpha_1 + \delta_1 BS + \theta_1 OS + \vartheta_1 BI + \beta_1 \Delta GDP + \gamma_1 \Delta INT \rho_1 Size + \tau_1 Debt + \sum_{j=1}^{m} Year\ dummy\ + \epsilon$$

Table 1. Definition of variables included in the regression models

Variable	Definition
Efficiency Measures	
TE	Technical efficiency of banks, computed by DEA
AE	Allocative efficiency of banks, computed by DEA
CE	Cost efficiency of banks, computed by DEA
Corporate Governance Structure variables	
BS	Board size Total number of board members at the beginning of the financial year,.
OC	Measured as equity shareholding of 10% or more
BI	Proportion of independent directors on board
Control Variables	
Change in GDP	% change in gross annual GDP
Size	Assets Firm size, measured as the natural log of total assets at the beginning of the financial year extracted from the previous year's annual reports
Debt	measured as total debt at the beginning of the financial year scaled by total assets at that date
Change in INT	% Change in nominal annual interest rate
Dummy variable	
Year	Dummy variable, scored 1 if year is 1998 ,0 otherwise

Results and Discussion

In the first part of the analysis, banking efficiencies of all commercial banks are computed by using Data Envelopment Analysis over the period of 1998-2009. The banking sector is divided into three categories, State Owned Banks, Private and Foreign Banks. The results show that the overall average technical efficiency of Pakistan banking sector is 0.80, in which state owned banks is having 0.88, private banks 0.85 and foreign banks 0.78. Similarly, the average allocative efficiency of overall banking sector is 0.68. Whereas, the allocative efficiency of state owned, private and foreign is attributing 0.77, .73 and 0.63 respectively. At the same point of time, cost efficiency of overall Pakistan banking sector is 0.54, in which state owned, private and foreign banks are attributing 0.68, 0.62 and 0.49 respectively. There is no significant difference among the average technical, allocative and cost efficiencies of all segments of Pakistan banking sector.

Table 2. Banking Efficiency Scores (using DEA)

Years	No of Banks	All Banks			Foreign Banks			Private Banks			State Owned banks		
		TE	AE	CE	TE	AE	CE	TE	AE	CE	TE	AE	CE
1998	40	0.82	0.75	0.62	0.89	0.80	0.71	0.92	0.86	0.79	0.87	0.81	0.70
1999	38	0.74	0.70	0.52	0.81	0.59	0.48	0.80	0.57	0.46	0.78	0.64	0.50
2000	37	0.79	0.76	0.60	0.78	0.60	0.47	0.87	0.82	0.71	0.90	0.71	0.64
2001	36	0.78	0.71	0.55	0.76	0.65	0.49	0.77	0.66	0.51	0.86	0.81	0.70
2002	30	0.87	0.81	0.70	0.80	0.72	0.58	0.93	0.88	0.82	0.81	0.80	0.65
2003	30	0.84	0.73	0.61	0.77	0.68	0.52	0.90	0.82	0.74	0.91	0.79	0.72
2004	31	0.78	0.60	0.47	0.74	0.61	0.45	0.83	0.70	0.58	0.82	0.74	0.61
2005	31	0.88	0.84	0.74	0.87	0.82	0.71	0.96	0.88	0.84	0.86	0.83	0.71
2006	29	0.78	0.62	0.48	0.76	0.50	0.38	0.81	0.73	0.59	0.92	0.84	0.77
2007	20	0.72	0.53	0.38	0.70	0.51	0.36	0.77	0.60	0.46	0.94	0.77	0.72
2008	22	0.78	0.55	0.43	0.71	0.50	0.36	0.80	0.61	0.49	0.93	0.76	0.71
2009	26	0.76	0.52	0.40	0.72	0.53	0.38	0.84	0.59	0.50	0.94	0.77	0.72
Mean		0.80	0.68	0.54	0.78	0.63	0.49	0.85	0.73	0.62	0.88	0.77	0.68
SD		0.05	0.11	0.12	0.06	0.11	0.12	0.06	0.12	0.15	0.05	0.06	0.07

In the second part of the analysis, generalized least square models are applied to determine the impact of corporate governance practices on the technical efficiencies of commercial banks in Pakistan over a period of 1998 to 2009 under different economic conditions. The data set includes an unbalanced panel due to structural changes in the banks during the sample period. The overall banks-years observations are 340 which meet the requirement for panel data analysis. The four control variables are also used in the analysis such as change in interest rate, change in GDP growth rate, size of bank and their debt ratio. Year dummy is used to determine the time effect.

Table 3. Overall Banks Efficiencies Results

	TE			AE			CE		
	1	2	3	1	2	3	1	2	3
Constant	0.41*** (3.39)	0.50*** (4.09)	0.44*** (3.60)	0.04 (0.22)	0.17 (0.89)	0.11 (0.56)	-0.2 (-0.84)	-0.26 (-0.11)	-0.122 (-0.51)
BS	0.003 (1.11)		0.004 (1.39)	0.002 (0.42)		0.004 (0.94)	0.005 (0.59)		0.005 (1.06)
BI	0.01** (2.93)		0.05** (2.81)	0.02** (2.32)		0.02** (2.55)	0.04** (2.71)		0.01* (1.62)
OC	-0.03** (-2.33)		-0.04** (-2.59)	-0.05** (-2.05)		-0.06** (-2.50)	-0.06** (-2.07)		-0.08** (-2.49)
G	2.64*** (4.37)	1.57** (2.16)	1.74** (2.37)	5.10*** (5.25)	2.47** (2.12)	2.82** (2.39)	5.97*** (5.00)	2.98** (2.09)	3.33** (2.30)
INT	1.74*** (4.27)	1.77*** (4.32)	1.70*** (4.18)	2.99*** (4.51)	2.99*** (4.57)	2.88*** (4.42)	3.69*** (4.58)	3.69*** (4.62)	3.56*** (4.48)
LOGA	0.004	0.002	0.003	0.003	-0.002	-0.004	0.003	-0.003	0.001
DE	0.005	0.001	0.002	0.002	0.002	0.005	0.001	0.002	0.003
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No of observations	345	345	345	345	345	345	345	345	345
F-stat	3.38***	3.60***	3.57***	4.41***	6.01***	5.00***	4.37***	5.47***	4.74***
R-sq	32%	29%	38%	39%	45%	43%	37%	40%	42%

*, ** and *** showing the significance level of models and coefficients at 1% 5% and 1% level of significance respectively. SEs are in parenthesis. There are no significance impact of years except 2007,2008 and 2009 where efficiencies are declined significantly as compared to 1999

Table 3 is showing the results of generalized least square models. The impact of corporate governance practices on technical, allocative and cost efficiencies of overall banking sector is tested by using nine different models, three models each for each type of efficiency. The result shows that all six models are significant with

strong predicting power. Board independence and ownership concentration are significantly influenced all types of efficiencies positively and negatively respectively. It is in line with hypotheses a2 and a3. Board size has no significant effect on all type of efficiencies thus rejected hypothesis a1. There is no effect of bank size and its capital structure on all types of banking efficiencies. While change in interest rate and GDP growth have strong positive and significant impact on technical , allocative and cost efficiencies of overall banking sector of the country.

Table 4. Foreign Banks Efficiencies Results

	TE			AE			CE		
	1	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
Constant	0.62*** (3.02)	0.67*** (3.33)	0.65*** (3.15)	0.37 (1.21)	0.47 (1.57)	0.44 (1.42)	0.29 (0.62)	0.33 (0.92)	0.31 (0.83)
BS	0.0006 (0.13)		0.002 (0.40)	0.001 (0.20)		0.0047 (0.59)	0.00009 (0.01)		0.0034 (0.36)
BI	0.011 (0.40)		0.024 (0.79)	0.018 (0.41)		0.04 (0.99)	0.011 (0.22)		0.042 (0.77)
OC	-0.037 (-1.24)		-0.038 (-1.30)	-0.042 (-0.94)		-0.046 (-1.03)	-0.051 (-0.93)		-0.055 (-1.02)
G	1.53 (1.35)	0.17 (0.12)	0.16 (0.11)	4.25** (2.47)	0.799 (0.38)	1.26 (0.59)	4.33** (2.05)	0.34 (0.13)	0.85 (0.33)
INT	1.68** (2.51)	1.67** (2.48)	1.62** (2.40)	2.78*** (2.74)	2.71*** (2.71)	2.64** (2.62)	3.41*** (2.74)	3.34*** (2.72)	3.26** (2.64)
LOGA	0.008	0.01	0.009	-0.009	-0.0167	-0.011	0.013	0.02	0.01
DE	0.001	0.0009	0.001	0.003	0.0035	0.004	0.0027	0.003	0.0045
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No of observations	122	122	122	122	122	122	122	122	122
F-stat	1.86*	1.89*	1.93*	1.91*	2.57**	1.97*	1.79*	2.53**	1.89*
R-sq	10%	11%	12%	21%	23%	25%	20%	24%	25%

*, ** and *** showing the significance level of models and coefficients at 1% 5% and 1% level of significance respectively. SEs are in parenthesis. There are no significance impact of years except 2007,2008 and 2009 where efficiencies are declined significantly as compared to 1999

In Table 4 same models are estimated for foreign banks only. The results show that there is no effect of board size, board independence and ownership concentration on foreign banks efficiency. Overall models have low predicting power and but are significant at 10%. Change of interest rate is positively and significantly impact on foreign banks efficiencies but change of GDP growth rate has significant and positive impact on allocative and cost efficiencies of foreign banks. In case of private banks, results show that all nine models are highly significant with high predicting power. Board independence has positive and significant impact on all types of banking efficiencies while ownership concentration has negative and significant impact on banking efficiencies. Board size has no impact on banking efficiencies of private banks. Both economic variables, change of interest rate and change of GDP growth, have positive and significant impact on all types of private sector banking efficiencies. There is no effect of bank size but capital structure has positive and significant effect on technical and cost efficiencies at 10% level of significance for model 1 and 5% level of significance for model 2 and 3 of technical efficiencies. Therefore hypotheses b1, b2 and b3 are rejected.

Table 5. Private Banks Efficiencies Results

	TE			AE			CE		
	1	2	3	1	2	3	1	2	3
Constant	0.28* (1.80)	0.44*** (2.83)	0.39** (2.47)	-0.36 (-1.35)	-0.19 (-0.78)	-0.16 (-0.61)	-0.65** (-2.04)	-0.39 (-1.27)	-0.4 (-1.28)
BS	0.0028 (0.82)		0.0037 (1.11)	0.0037 (0.64)		0.001 (0.35)	0.0009 (0.13)		0.001 (0.19)
BI	0.05** (2.88)		0.097** (2.61)	0.047** (2.45)		0.037** (2.61)	0.0257* (1.91)		0.014* (1.82)
OC	-0.033** (-2.53)		-0.041* (-1.75)	-0.07** (-1.89)		-0.089** (-2.32)	-0.082* (-1.73)		-0.10** (-2.18)
G	3.91*** (4.83)	2.77*** (2.86)	2.66** (2.74)	8.04*** (5.95)	5.51*** (3.48)	5.79*** (3.62)	9.34*** (5.75)	6.38*** (3.35)	6.44*** (3.36)
INT	2.33*** (3.75)	2.33*** (3.77)	2.31*** (3.80)	4.83*** (4.65)	4.94*** (4.92)	4.80*** (4.81)	5.73*** (4.59)	5.79*** (4.79)	5.68*** (4.74)
LOGA	-0.0002	-0.008	-0.01	-0.005	-0.015	-0.015	-0.001	-0.022	-0.024
DE	0.011*	0.012**	0.015**	0.009	0.013	0.016	0.013*	0.018	0.022*
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No of observations	152	152	152	152	152	152	152	152	152
F-stat	4.09***	5.09***	4.49***	5.01***	7.25***	5.80***	4.78***	7.03***	5.74***
R-sq	38%	40%	44%	42%	46%	49%	41%	45%	48%

*, ** and *** showing the significance level of models and coefficients at 1% 5% and 1% level of significance respectively. SEs are in parenthesis. There are no significance impact of years except 2007,2008 and 2009 where efficiencies are declined significantly as compared to 1999

For public sector banking efficiencies board independence has positive and significant impact at 5% level of significance. Board size and ownership concentration have no impact on all types of banking efficiencies. Overall models are significant with slightly low explanatory power. Interest rate, GDP growth rate bank size and capital structure have no impact on banking efficiencies.

Table 6. State Owned Banks Efficiencies Results

	TE			AE			CE		
	1	**2**	**3**	**1**	**2**	**3**	**1**	**2**	**3**
Constant	0.68*** (3.14)	0.71*** (3.12)	0.69*** (3.08)	0.23 (0.57)	0.31 (0.74)	0.22 (0.55)	0.071 (0.15)	0.16 (0.32)	0.07 (0.15)
BS	0.007 (1.05)		0.007 (1.05)	0.018 (1.45)		0.022 (1.74)	0.022 (1.45)		0.026 (1.64)
BI	-0.084** (-2.04)		-0.08* (-1.94)	0.15* (1.96)		0.15* (1.93)	-0.198** (-2.14)		-0.193** (-2.07)
OC	0.014 (0.31)		0.012 (0.26)	-0.05 (-0.53)		0.04 (0.52)	0.054 (0.52)		0.05 (0.49)
G	1.08 (0.79)	1.23 (0.77)	0.65 (0.39)	1.04 (0.41)	0.01 (0.15)	-1.32 (-0.44)	1.4 (0.47)	0.75 (0.21)	0.89 (0.25)
INT	0.93 (1.11)	1.08 (1.25)	0.93 (1.09)	0.77 (0.50)	1.1 (0.70)	0.7 (0.46)	1.13 (0.61)	1.54 (0.80)	1.07 (0.58)
LOGA	-0.022	-0.026	-0.023	-0.0039	-0.0031	-0.001	-0.005	-0.014	-0.01
DE	-0.0042	-0.005	-0.004	0.004	0.007	0.006	0.00001	0.003	0.002
Year Dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
No of observations	71	71	71	71	71	71	71	71	71
F-stat	1.91*	1.87*	2.11*	1.86*	1.85*	1.81*	1.93*	1.77*	1.84*
R-sq	25%	22%	30%	23%	14%	24%	22%	15%	26%

*, ** and *** showing the significance level of models and coefficients at 1% 5% and 1% level of significance respectively. SE are in parenthesis. There are no significance impact of years except 2007,2008 and2009 where efficiencies are declined significantly as compared to 1999

CONCLUSION

The objective of this paper is to explore the relationship between corporate governance practices and banking sector efficiencies under different economic conditions. For this purpose two fold analyses has been conducted. In first part, the data of all commercial banks from Pakistan over a period of 1998-2009 are used to estimate the banking efficiencies for different banking tiers of Pakistan using Data Envelopment Analysis (DEA) technique. In second part, using the estimated efficiency scores, run a multivariate analysis and study the impact of macroeconomic changes and corporate governance practices on banking efficiencies. The second part of the paper makes this study different and unique from the previous literature on banking efficiencies in Pakistani scenario. Many studies have been conducted on banking sector efficiencies estimation for Pakistan market but no one has studied and identified the factor influencing banking efficiencies. This is the first effort in this regard with some limitations.

This paper explored some interesting and useful results. If efficiency scores are used as a proxy of performance rather than the conventional proxies like tobin q and others, then the corporate governance practices have significant impact on firm performance (Richard, 2010). This paper also finds results in line with the literature i.e., corporate governance practices have significant impact on banking performance. Board size and its independence in banks can influence positively on their efficiencies. At a same time, good economic conditions, like economic growth and low interest rates can also boost the banking efficiencies. It is also found in this study that Pakistani state owned banks are more efficient than private and foreign banks which are very unlikely. The reason may be a small chunk of state owned banks in Pakistan, due to liberalization policy introduced in late 90's. There are only four state owned banks out of forty banks in the sectors. At the same time, good governance like board independence, ownership concentration and board size have strong impact on private banking sector performance as compared to foreign and public banks which is quite unusual.

In making conclusive arguments, some limitations must be considered here. First, we took only a few corporate governance variables, like board size, board independence, and ownership structure, there are many other

variables which can influence banking efficiencies. Secondly, political influence on economic changes can create a significant difference, but we did not consider the political impact on economic changes. Inspite of the limitations, the overall results of the study are very encouraging. These results are also very relevant to the policy makers and market investors. The results suggest that the corporate governance practices should be practice within the banks to improve their efficiencies and performance. Future research can be conducted on non-financial firms of the market.

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