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THE CORPORATE GOVERNANCE AND EFFICIENCY OF COMMERCIAL BANKS IN PAKISTAN: APPLICATION OF THE NON-PARAMETRIC APPROACH

This study examined the relationship of Corporate Governance (CG) on the efficiency of commercial banks listed on the Pakistan Stock Exchange (PSX) over the period from 2005 to 2014. The CG of commercial banks is measured with the composite CG index which is further subdivided into: board of directors, audit committee, disclosure and transparency, remuneration committee and shareholder's rights. The Data Envelopment Analysis (DEA) approach is used to measure the technical efficiency (TE) and cost efficiency (CE) whereas the Tobit regression model is used to investigate the relationship between CG and both efficiency scores. The results for the composite CG index suggest that there is a positive and significant relationship of CG with both TE and CE of commercial banks. Moreover, the sub-indices also validate our results as they were mostly found positively and significantly associated with both efficiencies.

Keywords: CG index, technical efficiency, cost efficiency, DEA, commercial banks
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1. INTRODUCTION

It has turned into a worldwide dictum that the quality of corporate governance (CG) has a critical effect on the efficiency of commercial banks. The level of CG compliance describes that how much a firm is run in a transparent way (Sanusi, 2003). Hence, the practice of effective CG involves compliance with the statutory regulations, transparency, accurate reporting, and openness etc. Historically, predecessors demonstrate that recession or financial crisis is an immediate outcome of the absence of good CG in banks; invariably one of the sources of instability in the banking sector is a lack or inadequate practice of CG (Kirkpatrick, 2009).

CG practices are important for any industry, particularly for the banking industry since it has the major contribution in the overall economic growth

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of the country. Commercial banks, like many other organizations, are expected to generate profit through the effective and efficient utilization of inputs to produce maximum output. Commercial banks in each country help the central bank to achieve the economic targets. Moreover, the commercial banks keep the money as savings and helps to reallocate them as loans and investment in various financial markets.

After obtaining independence from Britain in 1947, the government realized their importance and established the central bank called the State Bank of Pakistan in 1948. Commercial banks have grown rapidly and gone through various developments over the years. The banking sector in Pakistan is comprised of 24 local and 16 foreign scheduled banks. According to State Bank of Pakistan, the total assets of commercial banks have increased from approximately 4.2 trillion PKR to 12.1 trillion PKR from 2006 to 2014 which shows an increase of 188%. Bank deposits have increased from approximately 3.1 trillion PKR to 9.3 trillion PKR from 2006 to 2014 showing an increase of 200%.

The assets of banks in Gross Domestic Product (GDP) of Pakistan over the period of 2004 to 2015 is shown in Figure 1. Their contribution gradually increased over the studied period except during the financial crises in the late 2000s and early 2010s.This also confirms that the banking sector has a significant role in the overall development of Pakistan.

In the banking industry, CG significantly differs from the nonbanking firms due to the fact that banks are highly regulated by central banks (Macey, O'Hara 2003; Spong, Sullivan 2007; Andres, Vallelado 2008; Agoraki, Delis, Panagiotis 2009). The board and the management of the banks are responsible towards proprietors as well as to contributors, borrowers, investors, customers, bank and furthermore regulators (Ciancanelli et al., 2000; Pathan et al., 2007). According to Andres and Vallelado (2008), an additional system of governance is created by the strict regulations in banks. This greatly reduced the effectiveness of the CG in the banking industry and thus affects the bank's performance. In addition, the role of the banking industry is essential in ensuring the smoothness of monetary policy transmission in the developing countries because it provides the main source of financing to businesses. In this context, banks act as the assets transformers in transforming the short-term liabilities in the form of deposits into long-term loans. Therefore, the banking industry is highly leveraged and the mismatch resulted from the assets transformations may contribute to the failure of banks as well as distorting the creation of a sound financial system in the country. Furthermore, it is always a concern of the

bank's regulators to prevent the effect of systemic risk in the banking industry. This is because the failure of one bank created a spillover effect to other banks and resulted in destabilization of the country's economic system (Calomiris 2007).

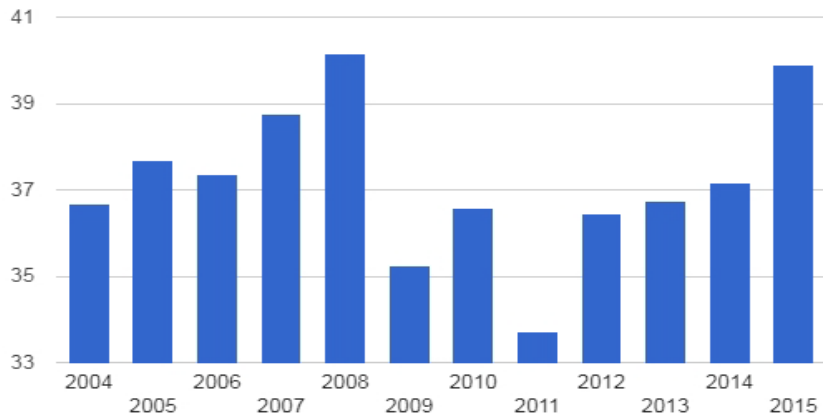

Fig.1: Assets of Commercial Banks to Gross Domestic Product (GDP) in Pakistan

Source: The Global Economy, The International Monetary Fund (IMF).

In this study, the Data Envelopment Analysis (DEA) approach has been used to measure bank efficiency. The panel data regression technique has been used to check the relationship between CG and the efficiency of commercial banks. The data of all 24 local scheduled banks listed on the Pakistan Stock Exchange has been gathered since the CG practices are implemented in the listed banks. This study is of a great value for the central bank (SBP), commercial bank managers, academics, and shareholders. By constructing a CG index, while including 38 variables (five sub-indexes) can provide future researchers with an alternative summary measure. This study has provided a picture of where commercial banks are currently stand in respect of following principles and codes introduced by the governing body. Moreover, this study will help the boards of directors to benchmark the performance of their banks against their competitors. Due to the requirement of this study we have only considered local commercial banks listed on Pakistan Stock Exchange (PSX) since CG regulations are only considered for listed firms. This study has considered all of the 24 scheduled local listed banks for analysis.

The primary objective of this study is to find the level of CG in the commercial banks of Pakistan, whereas the second objective of this study is to examine the relationship between CG and efficiency (TE and CE) scores.

2. LITERATURE REVIEW

There are many studies in the empirical literature which have investigated the relationship between CG and efficiency. On the one hand, there are some studies which have found a positive relationship between CG and the performance of a firm. For instance, Khatab et al. (2011) used Tobin's Q, ROA, and ROE as performance indicators and found that the CG impacts positively the performance of the firms in Pakistan. Lin et al. (2009) used the number of board meetings and the percentage of outside directors as the main variables for the CG, and by applying the DEA approach found that CG has a positive effect on the efficiency of Chinese public listed manufacturing companies. Wang et al. (2007) has taken inside ownership, rights of voting and composition of the board as the variables for CG and applied the DEA approach to measuring technical and cost efficiency. It was found that CG has a positive relationship with the efficiency of Taiwan insurance companies. Kandukuri et al. (2015) found a positive association of CG with company performance measured by Tobin's Q in India. Another study by Bishnoi and Sh (2016) found the positive relationship of CG with the performance of foreign firms in India. Board size, board composition, board independence, and the conduct of the board and its committees were taken as variables for CG and the ratios of profit after tax to total assets and total income were taken as variables to measure performance. Asfandyar et al. (2013) took board size and leadership as CG variables and ROA and Tobin's Q as the financial performance variables and found the positive relationship between CG and financial performance of listed firms of Pakistan. Yasser et al. (2011) also suggested a positive relationship between CG and the financial performance of listed firms in Pakistan. Lee et al. (2013) showed the positive relationship between CG and efficiency of biotechnology and medical equipment industry in Taiwan. Abdoush (2017) suggested a significant relationship of CG with the performance of UK life and non-life insurance firms. He et al. (2015) investigated the impact of CG on the efficiency of listed manufacturing industry firms in China. The empirical results showed that CG is directly associated with the efficiency of listed manufacturing firms. Salim et al. (2016) also found a positive relationship between CG and the efficiency of eleven Australian banks. The data was taken for the period from 1999 to 2013.The two stage double-bootstrap DEA model was applied in this study.

On the other hand, Makki and Lodhi (2013) did not depict the significant relationship between CG and the financial performance of Pakistani listed firms. For CG, the proportion of directors, the proportion of Non-Executive Directors (NEDs) on board, the dual role of CEO, director remuneration and the number of shareholders were taken. For company performance ROA and ROE were taken. Nanka-Bruce (2011) showed no positive relationship between CG and the efficiency of manufacturing firms in fifteen Western European countries. Board size and composition were taken as variables for CG and technical efficiency was calculated using the DEA approach to measure efficiency. Andries et al. (2018) investigated the relationship between CG and bank efficiency and for this purpose the data of banks were taken from seventeen countries of Central and Eastern Europe. The results showed that CG is negatively associated with cost and technical efficiency.

Studies in Pakistan have just focused on traditional performance measures such as accounting and market-based measures as discussed earlier (Makki and Lodhi, 2013; Yasser et al. 2011). These traditional measures neglect various aspects to account for the influences of output price, input price and different exogenous business sector components due to which these traditional performance ratios do not depict the true performance. To measure the performance of financial institutions, academic research has progressively centered on another methodology, called frontier efficiency (or X-efficiency) methodology in the last thirty years.

This study fills this gap by applying the frontier efficiency approach to measure efficiency scores. In addition, instead of considering one or two variables to measure CG, this study has prepared a CG index which includes 38 variables of five sub-indexes including: board characteristics, audit committee, disclosure and transparency, remuneration committee and shareholders' rights.

3. DATA AND METHODOLOGY

The banking sector in Pakistan is comprised of local and foreign banks. Local banks include both public and private sector banks. For this study, data from local banks including five public and nineteen private sector banks were collected which are listed on the Pakistan Stock Exchange. These were the only listed commercial banks since the CG practices are followed by the listed firms in the only stock market of the country (PSX).

There are many studies which have tried to analyze the relationship of performance and CG, but it is worth noting that most of these studies

measured the performance with the traditional accounting (ROA and ROE, etc.) and market measures (Tobin's Q, etc.). However, these traditional performance ratios neglect to account for the influences of overall inputs and outputs which ultimately did not take into account the related exogenous business sector components, as eventually these traditional methods did not depict the overall performance.

To measure the performance of commercial banks, previous studies extensively used the frontier efficiency methodology for the last thirty years. Frontier efficiency works by measuring performance deviations from that of "best practice" firms. It shows how efficiently the management is utilizing resources and whether cost reduction of doing business is possible. Therefore, the study considered nonparametric Data Envelopment Analysis (DEA) for the measurement of the overall efficiency of the commercial banks in Pakistan. The technical and cost efficiencies are taken as the representatives of frontier efficiency since the technical efficiency indicates whether the management is able to produce optimally with the utilization of lower total inputs, whereas the technical efficiency is measured in terms of input prices. This is based on the optimization problem, therefore it does not require assumptions on the specification of the efficient frontier. The estimation of technical and cost efficiency from the DEA approach consists of two steps. Firstly, the technical efficiency of each decision-making unit (DMU) is computed following Banker et al. (1984); the model is presented in model 1.

In Model 1 and 2, y_{rj} and x_{io} are the output and input of the n-th DMU, whereas λ is the weight. θ is the efficiency score of DMU which is to be measured and by solving the non-parametric model, minimum θ_0 is the efficiency score of that DMU_0. The index j specifies DMUs for $j=1,\ldots,N$. y_{rj} is the r-th output of the j-th firm for $r=1,..,R$. x_{ij} indicates the i-th input of the j-th DMU for $i = 1\ldots\ldots I$ (Mahlberg, 2000). The first constraint shows that output of the mentioned unit must be at least at the same level as the output of DMU. The second constraint states that the input usage of DMU_0 must be higher than or at the same level as the input of the mentioned unit.

Model 1: Technical Efficiency

$$min\ \theta$$

subject to

$$\sum_{j=1}^{n} \lambda_j y_{rj} \geq y_{r0}, \qquad r = 1,2,3,\ldots,s \tag{1}$$

$$\sum_{j=1}^{n}\lambda_j x_{ij} \le \theta_{i0} x_{i0}, \qquad i = 1,2,3,\ldots,n \tag{2}$$

$$\sum_{j=1}^{n}\lambda_j = 1 \tag{3}$$

$$\lambda_j \ge 0, \qquad j = 1,2,3,\ldots,n\ .$$

(1) is the output constraint, and (2) is the output constrain in Model 1.

The second step is to compute the cost efficiency by following model.

Model 2: Cost Efficiency

$$\min_{\lambda} w_{i0} x_{i0}$$

subject to

$$\sum_{j=1}^{n}\lambda_j y_{rj} \ge y_{r0}, \qquad r = 1,2,3,\ldots,s,$$

$$\sum_{j=1}^{n}\lambda_j x_{ij} \le w_{i0} x_{i0}, \qquad i = 1,2,3,\ldots,n,$$

$$\sum_{j=1}^{n}\lambda_j = 1\ ,$$

$$\lambda_j \ge 0, \qquad j = 1,2,3,\ldots,n.$$

w_i is a vector of input prices for i-th DMU and x_i is the vector of cost minimization for input quantities for the i-th DMU given the price of the input vector w_i and the y_i is the output vector. In both equations, the third constraint introduces variable return to scale (VRS) into the model.

Variables for the inputs and outputs are not easy to identify in the banking industry since there are two main approaches for the selection of the inputs and outputs of the banking sector, which are the intermediation and production approach (Sealey and Lindley, 1977). The intermediation approach is best suited here because banks collect deposits and issue loans. For the purpose of this study, the choice of inputs and outputs is proposed by the choices provided in the previous studies (Sealey and Lindley, 1977; Ghosh et al. 2014). The study selected three inputs and three outputs. For the determinants of inputs, this research included: total deposits (x_1), fixed assets

(x_2) and number of employees (x_3), whereas total loans (y_1), investments (y_2) and total income (y_3) are considered as outputs of the banks. The details of these variables are provided in Table 1.

Technical efficiency and cost efficiency scores are considered as dependent variables in our Tobit regression. The data for the selected input, output variables, and CG were gathered from the annual reports of the banks. The CG is measured by constructing a CG index (CGI) by following the study of Munisi and Randøy (2013) which includes five dimensions of CG; board of directors, audit committee, disclosure and transparency, remuneration committee and shareholder's rights. These five sub-indexes have questions in them with the answer 'yes' or 'no' to check the degree of compliance of banks practicing with CG. These questions are the rules set by the code of CG which all banks have to follow for practicing good CG. The answers to these questions were taken from the annual financial statements of each bank taken in this study from 2005 to 2014. There are 38 questions in total divided into five sub-indexes appropriately, and their answers in the form of 'yes' or 'no' are taken from the annual financial statements of each bank yearly. The answer of 'yes' is given a numerical value 1 and 'no' is given 0. All the values of 1 are added to form an overall index. The first sub-index is regarding the board of directors, the second sub-index is about the audit committee, the third sub-index is regarding the disclosure and transparency, the fourth sub-index is about the remuneration committee, the fifth and the final sub-index is regarding shareholders' rights. To prepare the CG index, the equal-weighted approach is applied in this study by following Bebchuk et al. (2009) and Gompers et al. (2003).

The study has also considered various control variables suggested in empirical literature including: bank's size, liquidity, age, capital adequacy, and growth.

Bank's size

There is no consensus about the relationship between bank size and performance since the large size of the bank gives it advantages such as economies of scale and better access to customers, whereas they also face problems like lower growth and high fixed cost. Therefore, many studies reported a mixed relationship between the size of the firm and performance (Agrawal and Knoeber, 1996; Charles, et al., 1999; Nenova, 2003; Durnev and Kim, 2005; Short and Keasey, 1999). This study measured a bank's size by taking the natural log of total assets following Muth and Donaldson, (1998), Elsayed (2007) and Al-Matari et al. (2012).

Liquidity

Jose et al (1996) declared that liquidity is important for a firm's survival. Liquidity is essential for an organization's smooth running but higher amounts of liquid assets increase the firm's opportunity cost (Fang et al., 2009). Liquidity ratio is measured as cash plus reserves divided by total assets following Pradhan and Shrestha (2016).

Bank's age

Company's age is an important control variable that has been utilized by various studies since it measures the firm's experience which comparatively gives an edge over others in terms of risk management, optimal utilization of resources and targeting the population; see Berger and Udell (1998). Bank's age is positively associated with bank's performance as age is positively correlated with experience which helps in achieving higher performance (DeYoung and Hasan, 1998; DeYoung et al., 1999). On the other hand, El-Chaarani (2014) found no significant relationship between age and performance of the bank. Bank's age is measured by the number of years since the incorporation of the bank following Berger and Udell (1998), and Boone et al. (2007).

Capital adequacy ratio (CAR)

Capital adequacy ratio also affects the performance of the bank if we look at the past studies (DeYoung and Hasan, 1998). This ratio set by regulators indicates keeping a minimum capital requirement by the bank to properly manage their assets and to increase their performance (Unite and Sullivan, 2003; Naceur and Kandil, 2009). The bank performance can be enhanced by a satisfactory level of CAR ratio together with a viable and proficient bank administration and financing activities (Utama and Musa, 2011). This ratio is taken from the annual reports of banks.

Growth in assets

Assets are characterized as the economic resource of any firm that is expected to benefit the future operations of the firm. According to Salim and Yadav (2012), Soumadi and Hayajneh (2012) and Fairfield et al. (2003), growth in total assets is positively associated with the financial performance. The growth in total assets indicates the percentage increase of investment in

assets by a bank. We measured growth as $(GTA_T - GTA_{T\text{-}1})/GTA_{T\text{-}1}$ following Fairfield et al. (2003). The variables with measurements are described in Table 2.

By concluding the above discussion, this study provided the following models in equations 4 and 5 to investigate the relationship of the CG index with efficiency.

3.1. Tobit regression equations

$$\mathrm{TE}_{it} = \beta_0 + \beta_1 CGI_{it} + \beta_2 BSIZE_{it} + \beta_3 AGE_{it} + \beta_4 LIQUIDITY_{it} + \beta_5 CAR_{it} + \beta_6 GRWTH_{it} + e_{it}, \quad (4)$$

$$\mathrm{CE}_{it} = \beta_0 + \beta_1 CGI_{it} + \beta_2 BSIZE_{it} + \beta_3 AGE_{it} + \beta_4 LIQUIDITY_{it} + \beta_5 CAR_{it} + \beta_6 GRWTH_{it} + e_{it} \quad (5)$$

where $i = 1,\ldots, 24$ commercial banks, $t = 2005,\ldots, 2014$.

This study applied the Tobit regression technique. The Tobit model is a measurable model proposed by James Tobin (1958) and is used widely in the existing literature, e.g. Drakos and Bekiris (2010), Lee et al. (2013) and Afza and Asghar (2017), to check the relationship between CG and efficiency.

4. EMPIRICAL RESULTS

Loans, investments, and income of commercial banks have increased by 158%, 663% and 332%, respectively, whereas fixed assets, deposits and number of employees increased by 320%, 270% and 60%, respectively over the studied period (see Table 2). The mean and standard deviation of CG sub-indices presented in Table 3 show that in the early years of study, banks were reluctant to practice good CG, however with time they improved their overall index since the CG index score increased from 33% to 88% on average over that period. Descriptive statistics of DEA inputs and outputs, CG sub-indexes and control variables are presented in Tables 3 and 4.

4.1. CG index results

The first research objective of this research is to check the level of CG and for this reason the score card or CG index of commercial banks is given in Table 4. It can be seen that in 2005 very few banks were implementing good CG practices, since in 2005 the Al-Falah bank was on top with a CG

score of 54.82, the KASB bank was second with a CG score of 50.87. Furthermore, only four banks: the Askari bank, the Al Habib bank, the NIB and the Meezan bank had a CG score above 40. In 2010 all the banks improved their CG score with no bank showed their CG score as less than 60. In addition, four banks (the MCB, the Askari Bank, the United Bank and the Meezan bank) showed significant improvement with CG scores of 94, 92, 93 and 92, respectively. The CG score of all banks further improved in the later years of study. In 2014 the leading bank regarding the good practice of CG was the MCB bank with a CG score of 98.9. In addition, most of the banks had a CG score of 80 or above with the exception of Sindh and the National Bank of Pakistan. These CG scores suggest that a large number of the commercial banks were slower during 2005 to 2008 in implementing good CG practices which may be because of the fact that the idea of CG was new to corporations in Pakistan. However, after 2008 banks understood CG's significance and therefore they raised their CG practices which eventually enhanced their CG score since the majority of the banks in 2014 had a CG score of above 80. The score card of CG is given in Table 5.

4.2. Tobit results

The Tobit regression was applied to investigate the relationship of CG scores with the technical and cost efficiency scores. CG has a positive relationship with technical and cost efficiency and these results are in line with the study of Nanka-Bruce (2011), Tanna et al. (2008), Wang et al. (2007) and Lee et al.(2013). The board of directors was found positively and significantly related with both cost efficiency and technical efficiency; this result is consistent with Huang, Lai, McNamara, and Wang (2011), Lin et al. (2009) and Jegede et al. (2013). The audit committee was found positively and significantly related with cost efficiency and this result is consistent with Yasser et al. (2011). However, the study failed to find any significant relationship between the audit committee and technical efficiency Ahmad et al. (2014) also found same results. In the same way disclosure and transparency also showed a positive relationship with cost and technical efficiency, and this result is consistent with Javid and Iqbal (2014) and Akingunola et al. (2013). Remuneration committee was found positively and significantly related to both cost and technical efficiency, consistently with Windsor and Cybinski (2009). The shareholders' rights also showed a positive relationship between cost efficiency and technical efficiency and

this result is consistent with Chugh et al. (2010).These results are taken from performance, since there is a lack of literature on efficiency. The Tobit regression results are shown in Table 6.

CONCLUSION

In the present era, many financial scandals have shaken investors' faith in banks as well as in capital markets, hence investors are comparatively giving more importance to good CG practices than ever before, since it promotes accountability and transparency. CG combats with challenges like: unprofessional conduct, fraud and forgeries, weak internal control measures and non-implementation of internationally acceptable accounting principles. These aforementioned problems affect the relative performance of the banks which lead to inefficiency.

This study used the frontier efficiency technique to measure the efficiency of commercial banks and then analyze the relationship of CG with the efficiency of commercial banks. In addition, this study has constructed an index of CG for commercial banks and further decomposed this index into: board of directors, audit committee, disclosure and transparency, remuneration committee and shareholders' rights for a more comprehensive analysis.

The study suggests that CG is positively related to both technical and cost efficiency thus affirming agency theory hypothesis which states that there may be a source of conflict between the agents and the principals when they have different interests. The further findings on the relationship between sub-indexes of CG and efficiency also affirmed the same results.

The empirical results may encourage further study to examine the relationship of each variable of the sub-index with efficiency or may enhance the sample size by adding other financial institutions. They can also consider other countries for a comparative analysis.

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APPENDIX

Table 1

Variables for Data Envelopment Analysis

Inputs	Input prices	Outputs
Deposits (x_1)	Interest (Interest expense / Deposits) (w_1)	Total loans (y_1)
Fixed assets (x_2)	Depreciation (w_2)	Investments (y_2)
Number of employees (x_3)	Employee expense per capita (Total employee expense / Number of employees) (w_3)	Total income (y_3)

Source: authors' own selection.

Table 2

Dependent, independent and control variables

Symbol	Variable name	Measure
Dependent variables		
TE	Technical efficiency	DEA efficiency scores
CE	Cost efficiency	DEA efficiency scores
Independent variable		
CGI	Corporate Governance index (board of directors, audit committee, disclosure and transparency, remuneration committee and shareholders' rights)	Index in constructed using equal weight index
Control variables		
SIZE	Bank size	Log of total assets
AGE	Bank age	Age of bank
LIQUIDITY	Liquidity ratio	(Cash + reserves) / Total assets
CAR	Capital adequacy ratio	Capital / Risk-weighted assets
GRWTH	Growth in total assets	$(GTA_T - GTA_{T-1}) / GTA_{T-1}$

Source: authors' own selection.

Table 3

Descriptive statistics of DEA inputs and outputs (in PKR, M – million, K – thousand)

Variables		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Loans	Mean	89M	96M	110M	133M	141M	152M	149M	168M	181M	183M
	SD	92M	107M	115M	142M	153M	152M	156M	181M	184M	181M
	Min	2M	1M	3M	3M	3M	7M	7M	9M	9M	8M
	Max	308M	355M	381M	460M	531M	540M	596M	734M	713M	728M
Investments	Mean	35M	32M	52M	44M	69M	89M	122M	162M	174M	213M
	SD	40M	37M	57M	46M	66M	87M	120M	179M	198M	226M
	Min	2M	0.4M	3M	2M	4M	3M	5M	7M	7M	7M
	Max	157M	140M	211M	171M	218M	301M	419M	797M	826M	898M
Total income	Mean	13M	16M	20M	25M	30M	32M	36M	40M	40M	43M
	SD	13M	17M	20M	24M	30M	31M	36M	39M	40M	41M
	Min	1M	0.1M	1M	1M	1M	1M	2M	2M	2M	2M
	Max	43M	56M	64M	77M	97M	107M	116M	133M	140M	156M
Fixed assets	Mean	3M	3M	7M	7M	7M	8M	9M	9M	10M	10M
	SD	3M	4M	9M	9M	7M	8M	8M	9M	10M	11M
	Min	0.08M	0.14M	0.15M	0.17M	0.2M	0.19M	0.23M	0.24M	0.29M	0.38M
	Max	11M	12M	31M	33M	25M	28M	29M	30M	35M	32M
Depreciation	Mean	215K	229K	295K	395K	503K	558K	613K	636K	705K	776K
	SD	217K	221K	288K	354K	401K	430K	479K	484K	564K	652K
	Min	12K	6K	16K	15K	20K	20K	25K	25K	73K	65K
	Max	705K	743K	957K	1259K	1468K	1620K	1691K	1506K	1699K	2037K
Deposits	Mean	128M	126M	155M	169M	194M	226M	251M	295M	337M	374M
	SD	138M	143M	165M	184M	208M	231M	266M	320M	362M	393M
	Min	6M	2M	8M	6M	9M	10M	14M	19M	18M	13M
	Max	462M	502M	592M	625M	728M	832M	934M	1215M	1401M	1525M
Avg. interest	Mean	0.03	0.05	0.06	0.08	0.08	0.08	0.08	0.07	0.06	0.06
	SD	0.01	0.03	0.02	0.03	0.03	0.02	0.02	0.02	0.02	0.02
	Min	0.01	0.0002	0.03	0.04	0.04	0.04	0.05	0.05	0.04	0.03
	Max	0.07	0.10	0.10	0.13	0.14	0.14	0.14	0.13	0.09	0.11
No. of employees	Mean	4418	4187	4576	4946	4905	5066	5105	5179	5317	5581
	SD	4990	4774	4666	4730	4569	4576	4718	4584	4514	4595
	Min	495	18	319	540	569	585	462	641	614	573
	Max	16314	14572	14552	15441	16248	16457	16924	16921	16619	16190
Employee Expenses per capita	Mean	359	388	468	546	615	654	721	792	837	901
	SD	110	143	151	152	208	212	246	246	251	318
	Min	202	42	192	282	353	387	394	407	440	520
	Max	639	626	816	835	950	1034	1421	1391	1353	1803
No of banks (observations)		19	23	23	23	23	23	24	24	24	24

Source: author own calculations.

Table 4

Descriptive statistics of Corporate Governance sub-indices and control variables

Sub-indices		2005	2006	2007	2008	2009	2010	2011	2012	2013	2014
Board of directors	Mean	6.98	9.69	11.77	12.81	15.31	16.25	17.19	17.92	18.23	18.23
	SD	5.05	4.38	5.03	5.53	3.99	4.04	2.13	1.90	1.73	1.73
	Min.	0	0	0	0	0	0	12.5	15	15	15
	Max.	15	15	20	20	20	20	20	20	20	20
Audit committee	Mean	9.17	13.33	15.00	16.17	17.33	18.33	18.67	18.83	19.00	19.33
	SD	8.04	7.04	7.10	6.51	5.10	4.24	2.81	2.20	2.13	1.93
	Min.	0	0	0	0	0	0	8	12	12	12
	Max.	20	20	20	20	20	20	20	20	20	20
Disclosure and transparency	Mean	4.78	6.36	9.04	10.96	12.68	13.55	14.25	14.91	15.18	15.75
	SD.	3.48	3.22	2.94	3.30	3.32	3.23	2.48	2.66	2.84	2.14
	Min.	0	0	0	0	0	0	5.26	7.37	8.42	11.58
	Max.	10.53	12.63	13.68	16.84	16.84	16.84	17.89	18.95	20	20
Remuneration committee	Mean	0.83	0.83	1.88	4.17	7.08	12.29	11.88	12.92	15.21	15.63
	SD	2.41	2.41	4.62	6.86	7.79	8.07	8.18	7.79	5.99	5.95
	Min.	0	0	0	0	0	0	0	0	0	0
	Max.	10	10	20	20	20	20	20	20	20	20
Shareholders' rights	Mean	4.17	5.42	6.67	9.17	11.25	16.67	15.83	18.75	18.33	19.58
	SD	5.04	5.88	6.37	7.17	6.12	6.37	7.17	3.38	4.82	2.04
	Min.	0	0	0	0	0	0	0	10	0	10
	Max.	10	20	20	20	20	20	20	20	20	20
Bank size	Mean	15.90	16.12	16.45	16.53	16.76	16.89	17.08	17.25	17.30	17.44
	SD	5.79	5.32	5.37	5.39	5.44	5.47	5.39	5.43	5.44	5.48
	Min.	2.64	2.71	2.77	2.83	2.89	2.94	3.00	3.04	3.09	3.14
	Max.	20.17	20.27	20.45	20.52	20.67	20.76	20.87	21.20	21.26	21.29
Bank age	Mean	26.14	27.29	25.91	26.91	27.91	28.91	28.67	29.67	30.67	31.67
	SD	30.61	30.49	30.12	30.12	30.12	30.12	30.08	30.08	30.08	30.08
	Min.	2	1	1	2	3	4	5	1	2	3
	Max.	121	122	123	124	125	126	127	128	129	130
Liquidity ratio	Mean	0.72	0.72	0.51	0.52	0.56	0.45	0.48	0.47	0.45	0.42
	SD	2.56	2.76	1.92	2.00	2.25	1.73	1.90	1.90	1.80	1.66
	Min.	0.09	0.08	0.04	0.03	0.05	0.05	0.04	0.03	0.05	0.05
	Max.	11.30	13.40	9.30	9.70	10.90	8.40	9.40	9.40	8.90	8.24
Capital adequacy ratio	Mean	0.13	0.19	0.19	0.16	0.15	0.14	0.18	0.16	0.15	0.15
	SD	0.04	0.15	0.15	0.12	0.02	0.11	0.12	0.10	0.09	0.08
	Min.	0.08	0.05	0.06	0.02	0.01	-0.04	0.07	-0.06	-0.04	-0.05
	Max.	0.22	0.62	0.65	0.55	0.57	0.53	0.56	0.44	0.42	0.37
Growth in assets	Mean	0.13	0.47	0.68	0.52	0.35	0.16	0.14	0.09	0.09	-0.03
	SD	0.02	0.24	0.18	0.19	0.19	0.10	0.06	0.07	0.03	0.12
	Min.	0.03	0.01	-0.03	-0.88	-0.50	-0.34	-0.12	-0.24	-0.06	-2.73
	Max.	0.25	5.51	48.50	4.08	4.40	2.13	1.18	1.67	0.55	0.56
No of banks (observations)		19	23	23	23	23	23	24	24	24	24

Source: authors' own calculations.

Table 5. Descriptive statistics of Corporate Governance index (annually)

Bank	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	**Mean**	**SD**	**Min**	**Max**
FWB	4.21	5.26	6.32	8.42	51.53	66.58	66.58	68.03	86.58	86.58	45.01	35.02	4.21	86.58
NBP	35.66	38.16	44.47	44.47	60.13	74.74	74.74	74.74	75.79	75.79	59.87	17.33	35.66	75.79
Sindh	N/A	N/A	N/A	N/A	N/A	N/A	25.76	46.87	52.92	56.08	18.16	13.64	25.76	56.08
BOK	27.53	34.03	40.53	40.53	40.53	77.24	80.79	82.89	92.89	92.89	60.99	26.40	27.53	92.89
BOP	23.71	23.71	26.87	30.03	44.68	69.74	69.74	79.74	82.24	92.24	54.27	27.18	23.71	92.24
Allied	30.82	30.82	39.42	71.53	77.58	89.68	92.84	92.84	96.84	96.84	71.92	27.69	30.82	96.84
Askari	48.16	58.16	63.42	91.18	92.24	92.24	96.84	97.89	97.89	97.89	83.59	19.17	48.16	97.89
Al Falah	54.82	54.82	60.47	80.13	81.18	81.18	81.18	89.34	92.50	92.50	76.81	14.73	54.82	92.50
Al Habib	46.32	46.32	48.42	50.53	60.13	60.13	61.18	71.18	87.24	87.24	61.87	15.54	46.32	87.24
Faysal	20.05	20.05	64.47	84.74	86.84	91.84	91.84	91.84	91.84	91.84	73.54	29.40	20.05	91.84
Habib	22.16	22.16	30.32	30.32	41.63	79.29	79.29	91.39	91.39	95.39	58.33	31.45	22.16	95.39
Habib Metro	31.26	33.76	41.13	52.18	64.68	79.68	79.68	79.68	80.74	80.74	62.35	20.87	31.26	80.74
JS	N/A	28.71	52.97	62.97	65.08	66.13	66.13	71.13	82.18	82.18	57.75	16.16	28.71	82.18
Kasb	50.87	50.87	56.13	58.24	57.18	77.24	79.74	80.79	85.79	85.79	68.26	14.75	50.87	85.79
MCB	38.53	50.53	65.53	86.84	86.84	94.34	95.39	98.95	98.95	98.95	81.49	22.08	38.53	98.95
NIB	40.92	43.42	55.53	56.58	79.74	79.74	79.74	92.24	92.24	92.24	71.24	20.26	40.92	92.24
Samba	11.71	54.47	55.53	59.08	59.08	85.13	87.63	87.63	88.68	88.68	67.76	24.91	11.71	88.68
Silk	N/A	34.21	34.21	54.47	70.53	85.13	87.24	87.24	87.24	89.34	62.96	23.18	34.21	89.34
Soneri	20.26	22.76	24.87	51.58	54.08	70.13	70.13	70.13	70.13	72.24	52.63	21.92	20.26	72.24
Std Chtd	38.53	38.53	38.53	38.53	73.24	78.24	78.24	87.84	88.89	92.89	65.35	23.78	38.53	92.89
Summit	N/A	45.87	55.92	56.97	68.03	81.58	82.63	82.63	82.63	93.68	64.99	16.14	45.87	93.68
United	33.82	35.92	66.18	66.18	80.79	93.29	93.29	94.34	94.34	94.34	75.25	24.04	33.82	94.34
Islami	N/A	35.47	41.97	43.03	69.74	84.74	54.74	84.74	66.97	92.24	57.36	20.99	35.47	92.24
Meezan	42.92	47.13	51.13	60.13	62.24	92.24	92.24	95.79	95.79	95.79	73.54	22.68	42.92	95.79
Mean	32.75	37.18	46.28	55.59	66.42	80.45	77.82	83.33	85.95	88.52				
SD	13.51	13.12	15.15	19.69	14.58	9.55	15.74	11.93	10.80	9.62				
Min	4.21	5.26	6.32	8.42	40.53	60.13	25.76	46.87	52.92	56.08				
Max	54.82	58.16	66.18	91.18	92.24	94.34	96.84	98.95	98.95	98.95				

Source: author own calculations.

Table 6

Tobit regression results, 2005-2014

Variables	Cost efficiency		Technical efficiency	
	Coefficient	*p*-value	Coefficient	*p*-value
1	2	3	4	5
CG index (composite)				
Constant	0.5869***	0.0000	0.8818***	0.0000
CG index	0.0020**	0.0184	0.0008**	0.0397
Bank size	-0.0122***	0.0011	0.0000	0.9793
Bank age	0.0000	0.9615	-0.0007**	0.0206
Liquidity	-0.0140	0.1537	-0.0092**	0.0339
Capital adequacy ratio	-0.2915	0.1204	0.0042	0.9637
Growth in total assets	-0.0021	0.5540	0.0016	0.3792
Mean dependent variable	0.4494		0.8875	
S.E. of regression	0.2670		0.0963	
Log likelihood	-73.8455		34.9755	
Avg. log likelihood	-0.3253		0.1619	
Board of directors				
Constant	0.5576***	0.0000	0.8977***	0.0000
Board of directors index	0.0113**	0.0106	0.0032	0.1186
Bank size	-0.0132***	0.0003	0.0004	0.8107
Bank age	0.0000	0.9464	-0.0008***	0.0067
Liquidity	-0.0122	0.1917	-0.0097**	0.0216
Capital adequacy ratio	-0.3085*	0.0850	-0.0386	0.6732
Growth in total assets	-0.0025	0.4479	0.0011	0.5116
Mean dependent variable	0.4395		0.8917	
S.E. of regression	0.2583		0.0934	
Log-likelihood	-59.3396		35.9791	
Avg. log likelihood	-0.2661		0.1705	
Audit committee				
Constant	0.5677***	0.0000	0.9237***	0.0000
Audit committee index	0.0070*	0.0568	0.0002	0.9261
Bank size	-0.0140***	0.0000	0.0005	0.7713
Bank age	0.0005	0.3757	-0.0006**	0.0376
Liquidity	-0.0075	0.3818	-0.0081*	0.0633
Capital adequacy ratio	-0.2284	0.1637	-0.0015	0.9875
Growth in total assets	-0.0014	0.6340	0.0014	0.4431
Mean dependent variable	0.4219		0.8875	
S.E. of regression	0.2424		0.0972	
Log likelihood	-34.5634		32.8734	
Avg. log likelihood	-0.1600		0.1522	

1	2	3	4	5
Disclosure and transparency				
Constant	0.4971***	0.0000	0.8513***	0.0000
Disclosure and transparency index	0.0183***	0.0002	0.0069***	0.0020
Bank size	-0.0119***	0.0011	0.0002	0.9226
Bank age	-0.0003	0.6528	-0.0008***	0.0068
Liquidity	-0.0109	0.2544	-0.	0.0592
Capital adequacy ratio	-0.2762	0.1334	0.0051	0.9555
Growth in total assets	-0.0021	0.5334	0.0016	0.3823
Mean dependent variable	0.4494		0.8875	
S.E. of regression	0.2619		0.0951	
Log likelihood	-69.7957		37.5845	
Avg. log likelihood	-0.3075		0.1740	
Remuneration committee				
Constant	0.6370***	0.0000	0.9002***	0.0000
Remuneration committee index	0.0062***	0.0098	0.0026**	0.0193
Bank size	-0.0105***	0.0047	0.0007	0.6573
Bank age	-0.0001	0.9216	-0.0007**	0.0147
Liquidity	-0.0140	0.1500	-0.0092**	0.0320
Capital adequacy ratio	-0.2520	0.1816	0.0209	0.8223
Growth in total assets	-0.0020	0.5719	0.0017	0.3569
Mean dependent variable	0.4494		0.8875	
S.E. of regression	0.2666		0.0962	
Log likelihood	-73.2969		35.5968	
Avg. log likelihood	-0.3229		0.1648	
Shareholders' rights				
Constant	0.6646***	0.0000	0.9247***	0.0000
Shareholders' rights index	0.0060**	0.0310	0.0024*	0.0578
Bank size	-0.0144***	0.0001	-0.0003	0.8777
Bank age	-0.0001	0.8761	-0.0009***	0.0039
Liquidity	-0.0123	0.1901	-0.0101**	0.0160
Capital adequacy ratio	-0.2628	0.1432	-0.0278	0.7594
Growth in total assets	-0.0020	0.5557	0.0013	0.4441
Mean dependent variable	0.4395		0.8917	
S.E. of regression	0.2592		0.0926	
Log likelihood	-60.2607		36.5455	
Avg. log likelihood	-0.2702		0.1732	

* Significant at 10%, ** significant at 5%, *** significant at 1%

Source: authors' own calculations.