Impact of Board Size and Composition on the Efficiency of Banks: Evidence from Pakistan

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Abstract

This paper examines the impact of board size and its composition on banks efficiency. We have collected the data of 24 conventional and Islamic banks operating in Pakistan from 2012-2016. Data envelopment analysis and pooled OLS panel data methods are used to check the association between efficiency and board size and composition. Bank size, capital strength, and capital adequacy ratio are used as control variables. The results reveal that board size and board composition have a positive and significant association with bank efficiency. Though the board size hasn't statistically significant influence on all measures of efficiency yet robustly board composition has a significant influence on all measures of efficiency.

Keywords: Commercial & Islamic banks, board size, board composition, bank Size, operational efficiency

Introduction

Corporate board size and composition, as determinants of corporate governance practices, have received considerable attention from different stakeholders such as academicians and policy makers. For example, OECD (2004) emphasizes corporate governance as a major determinant of economic efficiency and suggests that corporate governance framework should be extended with a view to have its impact on overall financial performance. The Basel Committee on Banking Supervision (2006) also mentions that "enrichments in the corporate governance mechanism should be driven by such benefits as enhanced financial performance, more access to capital at lower cost and better reputation." However, the theory provides contradictory views as to the board size and composition on firm performance and control, whereas the empirical indication is indecisive. There are studies in corporate governance area. However financial firms are rarely included as target market while sampling in comparison to non-financial sector to study the impact of board structure on financial firms (Adams & Mehran, 2008). Nonetheless, studies focusing on banking sector are necessary due to the distinctive attributes of banking firms and significance of corporate governance for banks (Barth *et al*., 2006; Levine, 2004; Zulkafli & Samad, 2007). For example, banks operate in a regulated industry, which introduces various challenges in the field of corporate governance (De Andres & Vallelado, 2008). The financial crisis of 2007-08 also requires such studies to lessen the governance problems in banking industry.

Banks exist with distinct aims and objectives and are subject to various regulations and principles regarding the conduct of business besides the prudential need for analysis and action. The regulations of conduct within the banking system include the conduct of banks towards their retail customers and the conduct of participants in financial markets. The aim of the codes of conduct is to, inter alia, improve the long-term efficiency and ensure that banks honestly take care of their customers and allow authorities to intervene in retail products development. The regulations, on the other hand, are designed to control the risk-oriented nature of the financial system and can be described as macro prudential and micro-prudential ones. The macro-prudential regulations are aimed at controlling the systemic risks associated with the interactions of the financial market and the economy as a whole. The micro-prudential regulations, in contrast, are aimed at controlling the activities of individual financial institutions by adherence to Basel II regulations (capital adequacy requirements, official supervision, and market discipline) and activity restrictions associated with their banking business. In addition to these types of regulations, banks are also subject to various principles and policy recommendations that directly influence the way they are governed. For example, the Basel Committee's (1999, 2006) instructions on banks' corporate governance particular highlight the importance of board members by discussing numerous rules that describe the board functions. In connection with bank governance, Walker (2009) discusses various issues and crafts some suggestions regarding board size, composition, qualification and remuneration.

Corporate governance practices are affected by the privatization process that started in early 1980s. Good performing banks were internally privatized, whereas poorly operating banks are owned by the state and investment funds. Banking sector in Pakistan was performing poorly in the early 1990s due to high ownership concentration, smaller board size and ineffective composition (Economic Survey 1992-93). Thus, present study aims to address the question that does the board size and composition affect efficiency of banks in Pakistan?

In order to alleviate the corporate governance (CG) problems diverse methods can be adopted. For example, Denis & McConnell (2003) differentiate CG as internal and external mechanism. The internal CG mechanism works through board members, composition, and ownership concentration whereas external CG system considers the corporate control and legal system. Moreover, Becht *et al*., (2000) classify CG mechanisms as board size, board composition, voting right, the controlling hand over on the board, the coalition of managerial interests with investors and clearly described CEO duty. Agrawal & Knoeber (1996) also suggest other CG methods like insider shareholdings, institutional shareholdings and board composition.

Existing studies describe board size and its composition as an imperative corporate governance practice. Different board members work actively and can decrease agency costs. Various researchers differentiate between outsider and insider board members and its impact on the firm's performance. Researchers such as Tanna *et al*. (2011) and Franks & Renneboog (2001) find that outsiders as board members play more active role as compared to insiders. However, majority of researchers show a significant impact of board structure on firm performance in developed and developing markets. However, board size and board composition in the Pakistan's banking sector have not been thoroughly examined so far. Thus, the purpose of this study is to address this gap by examining the impact of board size and composition on the efficiency of Pakistani banks. Using board size and composition as the two main dimensions of board structure, the following objectives are formulated:

- To examine the impact of board size on bank's efficiency.
- To examine the impact of board composition on bank's efficiency

Empirical research on corporate governance for banks is limited in Pakistan, and there is no consensus in the existing literature regarding the impact of board size and composition on bank's performance. Furthermore, most of the empirical evidence is based on the use of traditional performance measures, for example, Tobin's Q and ROA. However, the use of these financial measures has recently gone through sheer criticisms (Bozec & Bozec, 2010; Destefanis & Sena, 2007; Dybvig & Warachka, 2010). In view of above, frontier efficiency methods have been adopted as an alternative approach to assess bank's performance. Furthermore, according to our best understanding, only a few studies link board size and composition to bank's efficiency, namely Pi & Timme (1993) and Choi & Hasan (2005). This study, therefore, plays a grave role to augment the existing literature by providing evidence for Pakistan's banking sector.

Background and Theoretical Considerations

The literature on CG is rich with theoretical perspectives and suggests several conflicting hypotheses about the role and importance of board of directors. Moreover, De Andres & Vallelado (2008) acknowledge that banking regulations may conflict with the role of the corporate governance mechanism.

The agency theory (Eisenhardt, 1989; Jensen &Meckling, 1976) presumes the separation of ownership and control, and therefore disagreements may arise between management and shareholders. Theoretically, the major role of the board of directors is to supervise managers and support shareholders' interests (Fama& Jensen, 1983). Arguably, this task is facilitated by a larger board size and one whose composition reveals a

higher percentage of outsiders (independent board members), since the latter could signify a more effective force in monitoring and controlling managerial accomplishments. Thus a possible trade-off to be maintained between diversity and harmonization as an additional member is added in the board. In contrast, the stewardship theory argues that managers are trustworthy and there are no agency costs (Donaldson & Preston, 1995). According to this argument, executive directors make good decisions and able to maximize the bank profitability because of better business knowledge and experience (Donaldson & Davis, 1991). Different descriptions regarding the role of directors have also been suggested in relation to resource dependence theory (Pfeffer, 1972; Zald, 1967) and theory of managerial hegemony (Vance, 1983). The former implies that boards can endow with networking and access to resources that should be useful in maximising the firm's value (Kiel & Nicholson, 2003); the latter suggests that boards consequently play a proactive role in strategy development and in directing the firm.

Bank Governance and Performance

Corporate governance is one of the major factors for getting better operational efficiency of banks. From an investor's point of view, Shleifer & Vishny (1997) define corporate governance as a mechanism which ensures the corporate investors will receive a good return on their investments. The corporate governance is a way to control and monitor firms (Cadbury, 1992). The OECD (2004) characterizes it as a link between board, management, shareholders and stakeholders that improves firm's operating efficiency. The corporate governance is an appropriate protection mechanism and management control process with the objective of protecting the interests of all stakeholders.

Tanna *et al*. (2011) identify the link between bank efficiency and board structure by using data of 17 UK banks from 2001-2006. They use DEA approach to examine the measures of bank efficiency. They also employ pooled OLS to investigate the influence of board composition and size on bank efficiency. They document that board size and composition have positive association with bank efficiency. Coles *et al*. (2008) document a positive association of board size with firm value, thus bigger board size maximizes the wealth of bank's shareholders.

The possible problems of bigger board size will depend on particular functions and efficacy of boards and this will be different in line with the institutional and legal environment. At this point, it should be mentioned that while regulations are seen as a way of shaping managerial behaviour De Andres & Vallelado (2008) point out this may also reduce the efficacy of other methods in coping with corporate governance problems. Researchers like Arun & Turner (2004) and De Andres & Vallelado (2008) also seem to

agree that the regulatory bodies' agenda is to decrease systemic risk and conflict among bank stakeholders. In agreement to this Walker (2009) suggests that a critical balance should be created between policies and financial regulation which enhance the board ability to take decisions; consequently board members work in the interests of shareholders. The conflicting theoretical views and the likely impact and effectiveness of regulatory policy for bank governance; it is not surprising to find mixed evidence on effect of board size and composition on bank performance.

Lipton & Lorsch (1992) suggest seven to eight board members, which is also supported by Jensen (1993). However, board size is likely to industry-specific. In view of the fact, Adams & Mehran (2008) point out that banks board size should be significantly bigger as compared to manufacturing firms. They find that US Banks' board size positively (significant) effect Tobin's Q, though insignificant association is found with ROA. In contrast, by using the data of European banks, Staikouras *et al*. (2007) show that board size negatively (significant) effect ROA and ROE, and also on Tobin's Q. In another study related to European banks, Busta (2007) finds the insignificant effect of board size on performance in most cases. Furthermore, the impact of the non-executive members in board is statistically significant and negative in all cases, suggesting that the board composition effect varies for groups of European countries based on their legal foundations. For an international sample of banks from six countries, De Andres & Vallelado (2008) report an inverted U-shaped relation between performance (Tobin's Q, ROA, and annual market return) and board size, implying that the latter has a positive impact on the former up to a certain size beyond which the effect turns negative.

For Asian banks Zulkafli & Samad (2007) find an insignificant association between board size and banks performance. Similarly Pi &Timme (1993) and Choi &Hasan (2005) using efficiency measures in addition to traditional profitability indicators find insignificant association between the outsider board members and bank performance for the USA and Korea, respectively. In the light of the preceding discussion on theoretical and policy perspectives and taking account of the recommendations of the Basel Committee (2006) and Walker (2009) report we assume that board structure has an impact on performance. Nevertheless the nature of the impact is unclear which is evident in existing studies.

Abbas *et al*. (2015) calculate the Malmquist Index of conventional and Islamic banks to examine their efficiency from 2005-2009. The findings indicate that the growth of Islamic banks have been remarkable throughout the sample period. Their development is extraordinary in Islamic economies on account of patronization for religious reasons. There existed vacuum in

research of their productivity change over the years. The application of the Malmquist Index has been divided into Efficiency Change Index, Technological Change Index, Pure Efficiency Change Index and Scale Efficiency Change Index in order to obtain an insight about the reasons for the change in productivity. The finding reveals that the productivity of Islamic banks decreased in 2007. The productivity growth of Islamic banks had increased in 2005-2006, but there is a subsequent decrease in following years with respect to conventional banks. Gul, Awan & Ahmad (2015) conduct a comparative study on conventional and Islamic banks in Pakistan and conclude that in the post 2007 financial crisis period the performance of conventional banks is significantly better than Islamic banks. They conclude that conventional banks are significantly larger in size and therefore these banks are better able to handle the crisis situation than the Islamic banks. But their study does not link board size and composition to bank performance and efficiency. The current study focuses on the link between board structure and bank efficiency using bank size, capital strength and capital adequacy ratio as the control variables.

Using board size and composition as the major dimensions of board structure, we specify and test the following hypotheses:

H_1: *There is a significant association between board size and efficiency of banks.*
H_2: *There is a significant association between board composition and efficiency of banks.*

Data and Methodology

This paper examines the impact of board size and composition on bank efficiency. For this purpose, we have collected data of 24 banks of Pakistan banking sector from 2012-2016. We used data envelopment analysis (DEA) to estimate various efficiency measures. First, we calculated technical efficiency (TE), which in an input-oriented context refers to the minimization of inputs to achieve a given level of output. As mentioned in Isik& Hassan (2003), TE is also known as "managerial efficiency" which is the one feature of efficiency over which management can exercise direct control. Secondly, we also estimated scale efficiency (SE), which refers to a proportional reduction in inputs if the bank can attain the optimum production level. While scale inefficiency may reflect the adverse effect of market or regulatory forces, it is also influenced by managerial choices to achieve an optimum level (Isik& Hassan, 2003). Thirdly, we calculated allocative efficiency (AE), which is related to the capability of bank managers to utilize the best possible mix of inputs. Fourthly, we obtained estimates of cost efficiency (CE), which is an overall measure of efficiency, calculated as the product of TE and AE. In other words, CE illustrates the bank manager capability to work without wasting resources as a result of allocative and technical inefficiency. As an

alternative to CE, we also considered a measure of profit-orientated efficiency. Overall, the aforementioned efficiency measures capture different aspects of managerial performance, thus allowing us to obtain significant additional information that can extend our efforts to reveal the impact of governance on bank efficiency.

Data Envelopment Analysis

All inputs and outputs of a business organization are taken into account using Frontier techniques like DEA contrary to ratios where one input (total assets) is associated to one output (profits) each time (Thanassoulis, 2001). Thus frontier efficiency measures are more illustrative in capturing the concepts of "economic efficiency" and "overall economic performance", as described by OECD (2004), and/or the "operating efficiency", as discussed in the report of the Basel Committee (2006). Destefanis & Sena (2007) provide further economic justification for the preference of frontier efficiency measures over traditional ratios, with particular emphasis on corporate governance issues. Additionally in CG studies a growing number of scholars have recently highlighted various drawbacks in the use of the traditional accounting performance approaches i.e., Tobin's Q and ROA (Bozec *et al.*, 2010; Dybvig & Warachka, 2010).

Therefore, in this paper we use DEA which is the most widely adopted non-parametric technique in measuring bank efficiency. Berger *et al.* (2005) in their survey of the efficiency of financial firms also identified 130 studies dealing with frontier techniques out of which 69 employed the non-parametric Data Envelopment Analysis (DEA) that we used in this study, while Fethi & Pasiouras (2010) identify 150 DEA applications between 1998-2009. Given that DEA efficiency is a relative measure, it is appropriate to use a balanced sample to avoid potential bias from the entry and exit of banks over the period of examination.

One of the main considerations for selecting DEA over parametric methods is its capability of handling small samples. As Charnes, Cooper, & Rhodes (1978) propose an input-oriented measure of overall technical efficiency (OTE) under the assumption of constant returns to scale (CRS). While Banker *et al.* (1984) suggest the use of variable returns to scale (VRS) that decomposes OTE into two elements. First component is technical efficiency under VRS or pure technical efficiency (PTE), and another component is scale efficiency (SE) which relates to utilization of the economies of scale. The technical efficiency scores under VRS are always more or equal to 1 which attained under CRS. The SE can alternatively be attained by dividing OTE with PTE. Latest researches tend to adopt VRS assumption as being more realistic and, therefore, we follow this approach.

When input prices are available, one can also estimate allocative efficiency (AE) and cost efficiency (CE).

The existing banking literature use inputs and outputs for estimating efficiency. There are two major approaches such as "intermediation and production approach". Firstly Sealey& Lindley (1977) introduce the intermediation approach which explains banks act as financial intermediaries. Whereas, Berger & Humphrey (1997) argue that production approach is more suitable for branch operational efficiency measurement, while the intermediation approach is more appropriate for measuring efficiency of whole financial institutions. In line with existing studies, we employ intermediation approach to estimate an input-oriented model. Consistent with previous studies, the following three inputs are used, such as, fixed assets, personnel expenses and short-term funding and deposits. The input computed as overhead expenses to fixed assets, interest expenses to deposits and personnel expenses to total assets. The two outputs are net loans (gross loans net of reserves for impaired loans/ NPLs) and other earning assets. The choice of these outputs methods are consistent with following researches such as, Akhtar (2010), Ariff & Luc (2008), Casu & Girardone (2004; 2006), Casu & Molyneux (2003), Pasiouras *et al*. (2008), and Percin & Ayan (2006). The majority of the empirical studies on bank efficiency use either OLS or Tobit regressions in the second stage, with efficiency scores obtained from the first stage. However, Tobit regression can be problematic because the efficiency scores are not based on a truncated distribution. On the other hand, using OLS may be inappropriate because these values are bounded between zero and one. To overcome this problem, we adopt the following transformation (Ataullah & Le, 2006; Gaganis *et al*., 2009).

$$BEF_{it} = Ln[\frac{BEF_{it}}{1 - BEF_{it}}]$$

Where BEF_{it} is the bounded efficiency score of bank i estimated by DEA, and denotes the natural logarithm. As Hardwick *et al*. (2003) mention, one can then use OLS to regress BEF_{it} on the control variables. By employing transformed bank efficiency estimates as a dependent variable, we use pooled OLS following models to underlie the estimate:

$$BEF_{it} = \alpha + \beta_1 BSIZE_{it} + \beta_2 LNTA_{it} + \beta_3 EQAS_{it} + \beta_4 CAR_{it}$$
$$BEF_{it} = \alpha + \beta_1 BCOMP_{it} + \beta_2 LNTA_{it} + \beta_3 EQAS_{it} + \beta_4 CAR_{it}$$
$$BEF_{it} = \alpha + \beta_1 BSIZE_{it} + \beta_2 BCOMP_{it} + \beta_3 LNTA_{it} + \beta_4 EQAS_{it} + \beta_5 CAR_{it}$$

Where; BEF_{it} is a transformed efficiency of bank i in time t; $BSIZE_{it}$ is no. of board members in bank i in time t; $BCOMP_{it}$ is board composition, measures as percentage of non-executive member in board of bank i in time t. In all three models, we also include a time trend (T) to account for the fact that the inefficiency effects may change linearly with respect to time. The

capital Adequacy (CAR) is calculated as described by Basel II. The control variables, LNTA which is measure as log of total assets and EQAS proxy use to measure the capital strength and calculated by equity to assets ratio.

Empirical Results

The objective of this paper is to examine the impact of board size and composition on efficiency of banking sector in Pakistan. Descriptive statistics of original and transformed efficiency estimates as well as for controlled variables are provided in table 1. Cost efficiency's mean score is 0.794; this implies that banks could enhance their cost efficiency about 21.8%. This also indicates that banks could potentially have used 78.2% of the resources as input to generate the similar level of outputs. Our results reveal that technical efficiency (both pure and overall) is higher than allocative efficiency, with the latter exhibiting much greater variability across the sample and period of study. This indicates that the source of cost inefficiency is more allocative than technical. Thus banks are comparatively more capable to use the smallest level of inputs for given level of outputs as opposed to choosing the best possible mix of inputs. The percentage of non-executives in the board ranges between 20.09% and 56.12% over the sample with an overall average approximately 40.03%; board members of banks are between 7 and 13 with an overall average equal to 9.14.

Table1: *Descriptive statistics*

Variables	Mean	Min	Max	St. Deviation
OTE	0.782	0.419	1.000	0.409
(Transformed OTE)	(2.684)	(0.638)	(4.901)	(1.901)
PTE	0.863	0.392	1.00	0.109
(Transformed PTE)	(3.902)	(0.864)	(5.194)	(0.932)
SE	0.949	0.358	1.00	0.375
(Transformed SE)	(3.934)	(0.572)	(4.592)	(0.867)
AE	0.827	0.409	1.00	0.371
(Transformed AE)	(3.096)	(0.098)	(5.010)	(1.396)
CE	0.794	0.209	1.00	1.284
(Transformed CE)	(3.196)	(0.946)	(5.201)	(2.094)
BCOMP (%)	40.034	20.095	56.190	0.928
BSIZE	9.139	6.00	13.000	1.006
LNTAS	14.836	3.967	20.920	0.678
EQAS (%)	8.648	2.034	12.110	0.346
CAR	0.075	0.061	0.098	0.387

Notes: Figures in parentheses correspond to transformed efficiency measures. OTE = overall technical efficiency; PTE = pure technical efficiency. SE = scale efficiency. AE =allocative efficiency. CE = cost efficiency. BCOMP = board composition. EQAS = Equity/total assets. BSIZE = board size. LNTAS = logarithm of assets and CAR=capital Adequacy.

The correlations between independent variables are reported in table 2. The correlation between board size and bank size is 0.507, suggesting that larger boards tend to be associated with bigger banks. However, the association between bank size and the proportion of non-executive directors on board is not strong (0.172). The correlation between board size and composition is weak which suggests that these two measures do not necessarily move in parallel. Results in table 2 also reveal that capital strength (equity to assets) is negatively correlated with bank size, and similarly with board size and composition. Hence, larger banks tend to be less well capitalized, and this negative association may be a function of the board structure as well as the confidence in the large size of the bank.

Table 2: *Correlation Coefficients*

	BSIZE	BCOMP	LNTA	EQAS	TREND
BCOMP	0.074				
LNTA	0.507	0.172			
EQAS	-0.529	-0.206	-0.493		
TREND	0.064	0.238	0.074	0.264	
CAR	0.187	0.209	0.381	0.429	0.264

Notes: BSIZE: Board size, BCOMP: Board composition. LNTA: Total assets, EQAS: equity/total assets, TREND: time trend. CAR is capital Adequacy; *Significant at 10%; **Significant at 5%; ***Significant at 1% level.

Moreover, we employed pooled OLS to examine the impact of board structure on banks efficiency and results are provided in table 3. We use the transformed efficiency estimates as dependent variables. To ensure that the results are not sensitive to one particular efficiency measure, we present the regression estimates for all measures of efficiency. Model 1 and 2 show the results of board size and board composition individually, while Model 3 reports the impact of both variables. Additionally the F-tests estimates confirm the overall significance of overall model. The model-1 results show that board size significantly affects all efficiency measures except scale efficiency. This suggests that a larger board contributes to improving technical, allocative, and most notably cost efficiency of Pakistani banks (where the marginal impact of board size is much higher). Though, this effect becomes insignificant when we control for the percentage of non-executive board members in Model 3. Moreover, BCOMP positively effects all efficiency measures, this conclude that a large percentage of non-executives members in a bank's board contribute towards efficient consumption of input resources (technical efficiency), as well as towards the optimum use of inputs given their respective prices (allocative efficiency), and thereby towards cost efficiency.

Table 3: *Pooled OLS results (Dependent variable: OTE and PTE)*

Variables	(Dependent variable: OTE)			Dependent variable: PTE)		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Constant	0.863	0.525	0.904	-0.290	0.471	0.694
	(0.187)	(0.057)	(0.886)	(0.198)	(0.071)	(0.180)
BSIZE	0.632*		-0.574	0.732**		-0.355
	(0.340)		(0.894)	(0.340)		(0.291)
BCOMP		0.068***	0.061***		0.052***	0.040***
		(0.010)	(0.021)		(0.015)	(0.013)
LNTA	-0.148**	-0.197	0.176	-0.017	0.038***	0.265**
	(0.058)	(0.749)	(0.195)	(-0.031)	(0.014)	(0.120)
EQAS	0.027**	-0.019	-0.049	0.0440***	0.061	0.140**
	(0.012)	(0.706)	(0.579)	(0.009)	(0.184)	(0.062)
CAR	0.037	0.058	0.050**	0.022***	0.036	0.029**
	(0.392)	(0.901)	(0.025)	(0.001)	(0.032)	(0.015)
TREND	-0.278***	-0.196	-0.165***	-0.169	-0.085	-0.074
	(0.017)	(0.162)	(0.046)	(0.217)	(0.062)	(0.901)
R2	42.34%	29.84%	36.74%	39.50%	40.19%	32.06%
F-stat	4.219***	2.265*	2.016*	3.473**	3.526**	2.895**

Table 3A: *Pooled OLS results (Dependent variable: SE and AE)*

Variables	Dependent variable: SE			Dependent variable: AE		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Constant	-0.271	0.679	0.904	-0.438	0.563	0.583
	(0.858)	(0.390)	(0.096)	(0.100)	(0.974)	(0.103)
BSIZE	0.289		-0.9831*	0.022***		-0.020**
	(0.843)		(0.590)	(0.000)		(0.010)
BCOMP		-0.0519***	0.05237***		0.042*	0.047*
		(0.009)	(0.000)		(0.025)	(0.030)
LNTA	-0.194**	0.254***	0.103	0.209	0.439***	0.507***
	(0.067)	(0.010)	(1.085)	(0.510)	(0.127)	(0.095)
EQAS	0.003	0.043	0.144	0.128***	0.084	0.184
	(0.183)	(0.539)	(0.693)	(0.009)	(0.205)	(0.938)
CAR	0.031**	0.043	0.039***	0.063	0.189***	0.138***
	(0.014)	(0.528)	(0.008)	(0.493)	(0.052)	(0.003)
TREND	-0.135***	-0.050	-0.048	0.521*	0.272	0.363**
	(0.017)	(0.943)	(0.872)	(0.356)	(0.489)	(0.209)
R^2	48.25%	43.37%	39.43%	41.16%	38.76%	51.38%
F-stat	3.560**	3.092**	2.042*	2.159**	2.109*	3.001**

Table 3B: *Pooled OLS results (Dependent variable: CE)*

Variables	Model 1	Model 2	Model 3
Constant	-0.1368	-0.480527	-0.3053
	(0.986)	(0.106)	(0.839)
BSIZE	0.0255***		-0.1972

	(0.009)		(0.410)
BCOMP		0.0544**	0.0547**
		(0.028)	(0.019)
LNTA	0.2188***	0.5454***	0.6346**
	(0.0731)	(0.109)	(0.290)
EQAS	0.145390***	0.135847	0.1983
	(0.046)	(0.639)	(0.701)
CAR	0.0296**	0.0394	0.0409***
	(0.009)	(0.381)	(0.008)
TREND	-0.0147	0.0814***	0.0818**
	(0.371)	(0.028)	(0.036)
R2	41.16%	34.17%	40.92%
F-stat	5.975***	3.611**	2.899*

Notes: BSIZE: Board size, BCOMP: Board composition. LNTA: Total assets, EQAS: equity/total assets, TREND: time trend. CAR is capital Adequacy; *Significant at 10%; **Significant at 5%; ***Significant at 1% level.

Among the control variables, bank size has a statistically significant and positive effect on allocative and cost efficiency. The significance of capital strength (EQAS) is positively reflected on all measures of efficiency except scale, but only in the Model 1 regressions (with BSIZE) where the sample size is larger. The effect of time trend is statistically significant and negative on technical efficiency but insignificant on allocative and cost efficiency. Overall, our results indicate that board size and board composition tend to influence the ability of Pakistan banks positively to improve efficiency. This is particularly so when the board reflects a high percentage of non-executive directors, presumably because non-executive directors render services to the board that avoid wasteful use of input resources, thereby yielding efficiency improvements. These findings are consistent with existing studies (Barth *et al.*, 2006 and Caprio *et al.*, 2007) and also with Fama & Jensen (1983) theoretical viewpoint. In addition, our findings also endorse the advices of the Basel Committee (2006) that non-executive board members can bring innovation through their experience and thus are significant sources of management expertise.

One could argue that since the objective of banks is to maximize profits, the use of a profit efficiency measure may be more appropriate. While this may be true to an extent, we have, nevertheless, focussed on the use of a cost-based efficiency model for a number of reasons. First, some studies have documented a positive relationship between measures of technical and cost efficiency and stock returns (Beccalli *et al.*, 2006; Pasiouras *et al.,* 2008). Hence, there appears to be a strong association between technical/cost efficiency and shareholders' wealth maximization suggesting reasonability of the efficiency measures we have used in the present study. Second, there are difficulties associated with the estimation of profit efficiency measures using

DEA, such as gathering reliable information regarding output prices and disaggregating earning efficiency into technical and allocative efficiency (Coelli *et al.,* 2005; Fethi & Pasiouras, 2010). Finally, one can argue that bank managers have better control over inputs rather than outputs. Thus the more efficient firms may reduce the costs incurred for different revenue streams, and subsequently increase profitability (Drake *et al.,* 2006).

Furthermore, we find consistent results in model 1 and 2 of table 3, that BSIZE and BCOMP individually have a positive and statistically significant impact on profit oriented efficiency (Models 1 and 2 estimated using the profit orientated efficiency scores). However, in contrast to the results presented in model 3 of table 3, the simultaneous inclusion of the two variables in the regression does not affect the significance of BSIZE (Model 3). Thus the results confirm that larger boards and a higher proportion of non-executives increase the profit-oriented efficiency of banks in our sample.

Conclusions and Suggestions for Future Research

Corporate governance has been considered as an important topic in banking sector, which has been emphasized in the Basel Committee on Banking Supervision (1999 and 2006) reports and also in numerous recent studies (Akhigbe & Martin, 2008; Pathan, 2009; Tanna *et al.,* 2011). In short, good corporate governance practices for banks ensure effective monitoring by board of directors over the activities of management. In contrast, bank managers who are inclined to work for self-interest are more likely to allocate resources less efficiently and may not themselves exert effective monitoring over the firms they fund. This moral hazard problem is severe among banks as informational asymmetries are larger. Still, researches that examine the effect of governance mechanisms on banking performance are limited as compared to non-financial firms.

Our paper has stimulated a theoretical debate by providing mixed empirical results. Nonetheless, various policy recommendations about the role and function of the board of directors for the governance of Pakistani banks shed light on the compelling evidence relating to the impact of board size and composition on the efficiency of Pakistani banks. By using board structure data for 24 conventional and Islamic banks operating in Pakistan from 2012-2016, and combining data envelopment analysis with second-stage regressions, we find that a larger board size contributes to technical efficiency, although the significance of this association is not robust. Moreover this finding is not surprising given conflicting views in the literature regarding the impact of board size. Walker (2009) also suggests that board size decisions will be based on nature and scope of the business, organizational structure and leadership style.

As regards board composition, we document a large percentage of non-executive board members posing significant relationship with all efficiency measures. This result supports the view that non-executive directors can bring important knowledge to banking firms for efficient use of resources, in addition to enhancing independence and objectivity, as advised by Basel Committee (2006). Walker (2009) also particularly emphasises the role of non-executive directors by describing their role in terms of ensuring an efficient executive team which actively participates in the decision making. Walker (2009) also mentions that it is not necessary that all non-executive directors have industry experience closely relevant to the business of the firm, since the ones with less industry-specific knowledge also improve decision making in the board. The same view is supported in present study's empirical results for Pakistani banks

Nevertheless, as a cautionary remark, we would like to mention certain limitation about current study. Our study indicators focus primarily on efficiency but do not measure the risk or financial viability of banks. Although, there is also a trade-off between monitoring and advising regarding co-ordination, control, and decision making associated with larger boards and more outside directors. Furthermore, as discussed earlier, bank boards have to maintain the delicate balance between their dual role aimed at maximizing stakeholder value and meeting the concerns of regulators whose primary function is to reduce systemic risk and safeguard the stability of the banking system. This dual role of banks' boards implicitly reflects a trade-off between risk and efficiency that our present analysis has not adequately taken into account.

One way in which we can address this complexity between risk and efficiency in future research is to use systems approach to examine how they are simultaneously determined by the corporate governance mechanisms. This could be of particular interest because the efficiency measures that we used can be related to risk in several ways. Finally, additional governance variables could be incorporated into our analysis of bank risk-taking and efficiency, such as frequency of board meetings, existence of committees, executives' compensation, and CEO power.

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