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Impact of Bank-Specific, Corporate Governance and Environmental Factors on Bank Efficiency and Profitability in Pakistan

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ABSTRACT

The study aims to investigate the impact of bank-specific, board structure, gender diversity, and environmental factors on bank efficiency and profitability in Pakistan by taking a sample of seventeen commercial banks for the period 2013-2018. Data envelopment analysis (DEA) and return on assets (ROA) are used as a proxy to measure bank efficiency and profitability. Panel estimation techniques and Generalized Method of Moments (GMM) are used to conceptualize the research framework and to test the hypotheses. The findings indicate a negative relationship of non-performing loans, advances, level of involvement of women into other committees, and CSR index with ROA; while more presence of women on board reveals a positive and significant impact on ROA that is consistent with critical mass theory. However, CEO duality shed a positive impact on technical efficiency; while bank size signifies an inverse relationship with ROA and technical efficiency. Moreover, deposit influences ROA positively; while board size finds a positive and significant relationship with ROA and technical efficiency. The findings are important for various stakeholders as they can efficiently take their decision-making to better understand the factors influence bank performance. This study recommends future researchers do the same research by inculcating a larger sample size.

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1.   Introduction

The financial sector plays a significant role in the economic progress, growth, and development of the country (Chortareas, Girardone & Ventouri, 2013). History depicts that most of the economic crisis in the banking sector arises due to excessive borrowings, risky over-lending, heavy existence of non-performing loans, illiquidity of assets, weak regulatory and supervisory frameworks/regulations, inadequate credit analysis, bad governance, corruption, political interferences to write-off loans, fraudulent practices such as accounting manipulations, weak internal control systems, etc (Bank for International Settlement, 2015). Thus, a strong and effective financial system is necessary to handle the issues related to poverty elimination, social injustice, unequal distribution of wealth, community's development, unemployment, inflation, market openness, bad governance, corruption, money laundering, earning manipulations, political interference, global warming, environmental degradation, etc.

Broadly, there are two factors affecting bank performance i.e. internal and external. Internal are those that are under the control of management such as bank-specific, governance, corporate social responsibility disclosure, reporting manipulations, etc. However, external are those that are beyond the control of management such as political, social, regulators (central bank and government), macro-economic, technological, competition, demographics/contextual, etc. All these factors may positively or negatively influence the bank's performance, hence ultimately affects stakeholders' interests. For example, poor asset quality, measured by the non-performing loans to total loans (NPLs/TL) is an indicator of bank failures. This implies that the higher value of this ratio increases the probability of default risk that undermines performance (Batir, Volkman & Gungor, 2017). Liquidity, as measured by deposits to total assets and loans to total asset ratio, may also positively or negatively influence bank performance. They argue that more lending implies more generation of interest revenue if manage risk in a better way, but on the other side, more lending faces a higher risk of bankruptcy that deteriorates performance (Goddard, Liu, Molyneux, & Wilson, 2013). Similarly, the higher level of deposits is a signal of illiquidity of assets which means bank provides lesser lending that not only hampers economic activities but also affects performance (Batir et al., 2017). Capital Adequacy indicates the financial strength of banks or their ability to absorb captivated shocks or losses or unanticipated losses. Larger banks positively influence bank performance as they enjoy the benefits of economies of scale, more market power, ease of obtaining equity, raise debt at a lower cost. etc (Molyneux & Thornton, 1992). Conversely, larger banks may negatively influence bank performance due to the too big to fail paradigm (Batir et al, 2017).

Similarly, the dimensions of corporate governance may also positively or negatively influence bank performance. The theories that better explain the relationship between dimensions of corporate governance and performance include information

asymmetry theory, agency theory, stewardship theory, tokenism theory, critical mass theory. Agency theory criticizes the duality concept and argues that duality makes managerial monitoring ineffective (Krause, Semadeni, & Cannella, 2014). However, stewardship theory promotes the concept of duality as it states that duality will facilitate strong and unified leadership and makes managerial monitoring effective as insiders have more information and knowledge about the organization than outsiders. Gender diversity is one of the most burning issues regarding the corporate sector because males and females are traditionally, culturally, and socially different (Conyon & He, 2017; Varnita, Niladri, & Jamini, 2018). Regarding gender diversity, few questions arise such as why it is necessary to enter women into the corporate board? What and how they will bring change into a corporate culture that enhances organization performance? Whether her role in the corporate board as a showpiece (token) or key influencers?

Likewise, the environmental factors may also positively or negatively influence bank performance. Environmental factors are those that are linked with corporate social responsibility (CSR) disclosure. Disclosure protocols are monitoring devices that reduce information and agency costs by sharing useful and quality information among stakeholders. The banking industry has both a direct and an indirect influence on the environment. Direct impact belongs to the operations within banks such as the use of natural resources (energy management, water management, waste management), digitalization (paperless banking, using ATMs, installation of solar systems, dual utilization of papers), and reduction in greenhouse gas effect (conducting meeting through video conferencing). Indirect impacts belong to the external environmental system i.e. consists of two factors such as the incorporation of environmental risk before lending/ advances and sustainable/green financing. The indirect impact seems to be more important than the direct one as it shed overall influence on society. As in the case of external environmental impacts, the banks provide loans to those projects that lessen pollution and involve the plantation of trees, safe water, renewable energy, etc. The bank should involve in green banking/financing. Green Financing includes 3Ps i.e. Planet, People, and Profit. It refers to engage in such activity that helps to reduce the external carbon emission and provide loans to borrowers compliant with health, safety, and environmental rules. Green banking initiatives include in-house environment management, introducing green finance, incorporation of environmental risk, creation of climate risk fund, introducing green marketing, employee training, customer awareness, and green events. We have also seen that well-established banks also play their role in philanthropic activities (education, health, disaster management, etc), the well-being of employees/citizens, and community development (Szegedi, Khan, & Lentner, 2020; Oyewumi, Ogunmeru, & Oboh, 2018).

Primarily, the study examines the impact of multiple factors on bank performance in the context of Pakistan in a single model. A major contribution of this study is the inclusion of the bank-specific, board structure, gender diversity, and

environmental factors in a single model to evaluate the bank efficiency and profitability. This study used DEA (two-stage model) and return on assets (ROA) as a proxy to measure bank efficiency and profitability.

2.   Literature Review

Literature supports a positive relationship of non-performing loans (NPLs) with bank performance (Iveta, 2015; Syafri, 2012). Contrary to the above, Batir et al. (2017) find a negative impact of NPLs on bank performance. This is because of adverse borrower selection i.e. one of the implications of information asymmetry theory. The scholars argue that this happens due to an increase of defaulters that restrict the bank earning resultantly decreases the bank performance. Bourke (1989), Batir et al. (2017), and Gitau, Anyango, and Rotich (2017) find a positive relation of liquidity with bank performance. Contrary to the above, the scholar finds a negative relationship of liquidity with bank performance (Athanasoglou, Brissimis, & Delis, 2008; Havrylchyk, 2006). Bourke (1989), Syafri (2012), Hasanul et al. (2017); and Aziz and Knutsen (2019) find a positive relationship of capitalization with bank performance. This is consistent with the signaling theory and the expected bankruptcy cost hypothesis. Contrary to the above, the scholars find a negative relationship of capital adequacy with a bank's performance (Bitar, Pukthuanthong & Walker, 2018). This is consistent with the risk-return hypothesis. The supporters of finding a positive relationship of bank size (BS) with performance argue that larger banks enjoy the benefits of economies of scale (Aziz and Knutsen, 2019; Hasanul et al., 2017; Gitau et al., 2017). Conversely, the supporters of finding negative relation of BS with performance posits that larger banks face too big to fail paradigm which implies that it may lessen profits as a result of diseconomies of scale (Bourke, 1989, Batir et al., 2017). The scholars find a relationship between bank size and performance looks like Kuznets inverted U-curve theory, business cycle and product life cycle includes Eichengreen & Gibson (2001).

The supporters of findings a positive relationship of board size (BoDS) with performance postulates that the larger board possesses versatile knowledge, skill to make better decisions, and difficult for CEO to dominate (Riyadh et al., 2019; Kiel & Nicholson, 2003). On the other side, the scholar finds a negative relationship of BoDS with performance argues that larger boards are ineffective as it becomes difficult to coordinate, encourages free-riding and each member has their interest that may conflict with the interest of the firm. So, they are in favor of a smaller board size that makes every member more accountable (Adnan, Htay, Rashid & Meera, 2011). Stewardship theory finds positive relation of CEO duality with performance and argues that duality will facilitate strong and unified leadership and makes managerial monitoring effective as insiders have more information and knowledge about the organization than outsiders (Kiel & Nicholson, 2003). Contrary to the above, agency theory finds negative relation of CEO duality with performance and argues that duality makes managerial monitoring

ineffective (Krause, Semadeni & Cannella, 2014). Andersson and Wallgren (2018); Beate and Gro (2010), Riyadh et al. (2019) find a positive relation of women's participation in the board with bank performance. This is consistent with critical mass theory. Torchia, Calabrò, and Huse (2011) argue that most firms still have only one woman on the board that is still considered as a token and finds a negative relationship with bank performance. Token women may face three types of fear such as visibility, polarization, and assimilation. These issues may be resolve when thirty percent of directors are female on the board of directors. Berger, DeYoung, Genay, and Udell (2000) present two hypotheses namely home field advantage and global advantage regarding ownership structure. The supporters of the home-field advantage hypothesis argue that domestic banks are more familiar with local culture, economic, social norms, government policy and regulations, institutional framework, and political factors (Sufian & Habibullah, 2010). Conversely, the global advantage hypothesis advocates that foreign banks may have a comparative advantage of product differentiation, knowledge transfer, modern technology, better risk exposure, and reduction in the cost of capital (Havrylchyk,2006).

Two opposite views are prevailing in the literature regarding CSR index and firm performance i.e. (i) Friedman (1970) argues that the manager's main responsibility to increase firm profit and stakeholder's wealth and doing anything else will be the misuse of the authority and brings additional expenses. Hence reduces the profit of the company. Fahad and Busru (2021) investigate a sample of 386 companies for the period of 2007-2016 in India and find that CSR disclosure negatively influences the return on assets. Oyewumi, Ogunmeru, and Oboh (2018) elucidate a negative relationship between CSR and performance. This is consistent with agency theory. (b) Conversely, Freeman (1984) posits that a firm task not only to meet the expectations of shareholders but also to protect the interests of various stakeholders as well. This is in line with the stakeholder theory. The scholars that find the positive relationship of CSR with firm performance claim that CSR disclosure would lead to improving its image/reputation, retention and loyalty of the customer, service delivery, attracting investors and prospective employees, employee productivity (Mravlja, 2017, Maqbool & Zameer, 2018). However, Riyadh et al. (2019) did not find any relation between CSR and profitability. This study used the CSRD index as a proxy to measure environmental factors. Based on the literature and objective, the following hypothesis was tested in this study;

H 0: There is a significant relationship of bank-specific factors (asset quality, liquidity, capitalization, bank size) with ROA and technical efficiency.

H 0: There is a significant relationship of governance (board size, CEO duality, gender diversity, ownership structure) with ROA and technical efficiency.

H 0: There is a significant relationship of environmental factors (CSR Index) with ROA and technical efficiency

3.   Data and Methodology

All banks that fall under the ambit of Pakistan are the population of this study. However, this study concentrates only on commercial banks as the services provided by banks are reasonably homogenous and comparable across countries. Convenience sampling is used and taken data of commercial banks from 2013 to 2018.

3.1.   Variables Description and Measurement

The variable choice in the study is based on the literature review to align with the past researches.

S. No.	Variable Name	Symbols	Formulas	Literature Support
1	Asset quality	NPL	Non-performing loans/total loans	Batir et al., (2017); Syafri (2012)
2	Relative Liability Size	DEP	deposits/total assets	Batir et al. (2017); Gitau et al., (2017)
3	Relative Lending Size	LOAN	loans(advances)/total assets	Batir et al., (2017); Syafri(2012)
4	Capitalization	CAR	shareholders equity/total assets	Hasanul et al., (2017); Bitar et al., (2018); Aziz and Knutsen (2019)
5	Bank size	BS	LN(Total assets)	Gitau et al., (2017); Batir et al., (2017); Aziz and Knutsen (2019)
6	Board of director size	BoDS	LN (total # of board members)	Riyadh et al., 2019; Adnan et al. (2011)
7	CEO Duality	CEOD	1 if CEO and board chairperson are different persons and 0 otherwise	Krause et al., (2014); Kiel and Nicholson (2003)
8	Presence of women on board	WTI	1 if the women are more than 30% of board and 0 otherwise	Andersson and Wallgren (2018); Riyadh et al. (2019)
9	Level of involvement of women into other committees	LIW	1 if women involved in more than one committee and 0 otherwise	Andersson and Wallgren (2018); Riyadh et al. (2019)
10	Ownership structure	OS	%age of shares owned by foreign shareholders to the total number of shares issued	Sufian & Habibullah (2010); Herdjiono and Sari (2017)
12	CSR Index	CSR	CSR score = sum of CSR items/ Total number of CSR items. "1" disclose CSR items and "0" otherwise	Fahad and Busru (2021); Mravlja, 2017, Riyadh et al. (2019)
13.	Stock market development	SMD	Stock market capitalization/GDP	Sufian, Kamarudin and Nassir (2016)

14.	Demand Density	DD	Total deposits of banking sector/Total Area	Dietsch and Lozano-Vivas (2000)
14	Return on Assets	ROA	Net Income/Total Assets	Mravlja (2017); Batir et al. (2017); Aziz and Knutsen (2019)
15	Data Envelopment Analysis	TE	Inputs: deposits, interest on deposits, fixed assets, share capital Outputs: total loans, interest on loans, net income	Sealey & Lindley (1977); Batir et al. (2017); Hasanul et al. (2017); Majeed and Zainab (2016)

Note: The table exhibits the description, measurements, and the previous scholars used these variables in their studies.

Corporate Social Responsibility Disclosure Index (CSR)

Literature exhibits the methods to measure CSRD Index such as (1) use of reputation indices such as Dow Jones Sustainability Index, ESG, Asset4, EIRIS, etc (2) content analysis (3) Surveys. This study uses content analysis for the collection of information related to the CSRD Index checklist from annual/sustainability reports, websites, etc. of individual banks. This study uses the dichotomous and unweighted disclosure index method as used by Maqbool and Zameer (2018), and Riyadh et al. (2019). If banks disclose dimensions of CSR in their annual reports or websites, it will be scored one and otherwise assigned zero. The formula used to calculate CSR Index is as under:

CSR Index = Sum of CSR items /Total number of CSR items

Summary of CSR Disclosure items based on GRI and on Previous Literature

"1" if CSR reported in annual/sustainability report and "0" otherwise	
CRG	CSR- Reporting-
CCG	CSR-Sustainable/CSR Committee-G
CSEG	CSR-Stakeholders Engagement
CNPG	CSR-National Policies-G
CGA	CSR-Accreditation of an international organization
CCEG	CSR-S_Ethics_Code of Conduct and Ethics
CCAMLG	CSR-S_Ethics_AML/KYC Policy- S
CCGG	CSR-S_Ethics_Grievance Redressal Policy
CSDG	Common forum for dialogue
CSIG	Other Information disclosure
CEWS	CSR_Employees Well Being
CCPS	CSR_Customer Privacy Policy
CPAS	CSR-Philanthropic Activities Description
CDonS	CSR_Donations
CNRE	CSR-E_Natural Resources(N)
CDE	CSR-E_Digitialization
CEDDE	CSR-E_Incorporation of Environmental Risk before lending (Environmental Due Diligence)
CGFE	CSR-EAC_Green Financing
CSR	CSR Index

3.2   Methodology

The study for the evaluation of the banking sector's performance is significant as it can influence the interests/decision-making of various stakeholders. The scholars use various proxies to measure bank performance such as accounting or profitability measures (RoA, RoE, etc.), market measures (EPS, market to book value ratio, Tobin Q, etc.), economic measures (economic value added), and efficiency measures (parametric and non-parametric approaches). This study uses return on assets (RoA) and technical efficiency (TE) as a measure of bank performance. ROA indicates that how the firm utilizes its assets to generate income and is used by Athanasoglou, Delis, & Staikouras (2006); Zheng, Rahman, Begum, & Ashraf (2017); Mravlja (2017); Riyadh, Sukoharsono & Alfaiza (2019). The other approach used in this study to measure bank performance is efficiency. Efficiency implies that how the firm utilizes its assets to get the maximum results/output. This study employs data envelopment analysis (DEA) that deals with many inputs and outputs in a single model as used by Farrell (1957); Charnes, Cooper, and Rhodes (1978); Banker, Charnes, and Cooper (1984). The main challenge in DEA is deciding the appropriate selection of input and output variables. This study uses the intermediation approach for the selection of inputs and outputs (Sealey & Lindley, 1977). Literature reveals that the intermediation approach is better than other approaches as it inculcates interest expenses that contribute more than fifty percent of the total costs. Two motives for the application of this approach i.e. (i) banks act as an intermediator to accept deposits and lend them for investments (ii) it is used to assess the efficiency of the entire bank. This study takes deposits, interest on deposits, fixed assets, and share capital as input and produces output in terms of total loans, interest on loans, and net income. Previous scholars that widely used this approach includes Sherman and Gold (1985); Sufian et al. (2016); Alharthi (2016); Majeed and Zanib (2016); Batir et al. (2017); Hasanul, Rubi, and Eric (2017); and Yonnedi and Panjaitan (2019).

3.3.   Model Specification

To test the hypothesis of this study, the following model is used.

$$ROA_{i,t}=\alpha_0 + \beta_1 NPL_{i,t} + \beta_2 Deposit_{i,t} + \beta_3 Loan_{i,t}+\beta_4 CAR_{i,t} + \beta_5 Size_{i,t} + \beta_6 BoDS_{i,t} + \beta_7 CEOD_{i,t} + \beta_8 Wti_{i,t} + \beta_9 LIW_{i,t} + \beta_{10}OS_{i,t} + \beta_{11}CSR_{i,t} + \beta_{12}SMD_t+\beta_{13}DD_t + \mu_t$$
……………………………**A**

$$TE_{i,t}=\alpha_0 + \beta_1 NPL_{i,t} + \beta_2 Deposit_{i,t} + \beta_3 Loan_{i,t}+\beta_4 CAR_{i,t} + \beta_5 Size_{i,t} + \beta_6 BoDS_{i,t} + \beta_7 CEOD_{i,t} + \beta_8 Wti_{i,t} + \beta_9 LIW_{i,t} + \beta_{10}OS_{i,t} + \beta_{11}CSR_{i,t} + \beta_{12}SMD_t+\beta_{13}DD_t + \mu_t$$
……………………………**B**

Where,

$ROA_{i,t}$ or $TE_{i,t}$ = Technical efficiency or Return on Asset at the ith bank and t time period

$NPL_{i,t}$= Non-Performing Loans to total loans at ith bank and t time period

$Loan_{i,t}$= Loans to total asset ratio at the ith bank and t time period

$Deposits_{i,t}$= Deposits to total asset ratio at ith bank and t time period

$CAR_{i,t}$ = Capital Adequacy at the ith bank and t time period

$BS_{i,t}$ = Bank Size at the ith bank and t time period

$BoDs_{i,t}$ = Board of Directors Size at the ith bank and t time period

$CEOD_{i,t}$ = CEO Duality at ith bank and t time period

$CEOW_{i,t}$ = CEO Women at ith bank and t time period

$Wti_{i,t}$ = Percentage of women on the board at the ith bank and t time period

$OS_{i,t}$ = Ownership Structure at the ith bank and t time period

$CSR_{I_{i,t}}$
= Corporate Social Responsibility Disclosure Index at the ith bank and t time period

Control Variables

DD_t = demand density at t time period

SMD_t = Stock Market Development at the t time period

μ_t = Error Term

3.4. Estimation Techniques

This study uses panel estimation techniques (common effect, fixed effect, and random effect) to examine the impact of multiple factors on bank performance. Panel data prefer over cross-sectional or time-series data as it addresses individual heterogeneity. However, the diagnostic test such as Breush-Pagan Lagrange Multiplier, Hausman test, Likelihood ratio executes to select which model is best among panel estimation techniques. This study further employs the system GMM estimation technique developed by Arellano-Bover/Blundell-Bond to handle the issues of normality, multi-collinearity, auto-correlation, heteroscedasticity, etc. The scholars who used the same technique in the literature include Aziz and Knutsen (2019), Varnita, Niladri, and Kanta (2018), Maqbool and Zameer (2018), Zheng et al., (2017).

4.   Results and Discussion

4.1.   Descriptive statistics

It tells us about the mean, median, maximum, minimum, and standard deviations of different variables used in the study. Table-1 presents descriptive statistics of all variables included in this study.

Table-1. Descriptive Statistics

Variables	Observations	Mean	Median	Maximum	Minimum	Std. Dev.
ROA	102	0.775	0.870	2.718	-2.660	0.900
TE	102	0.758	0.777	1.000	0.224	0.163
NPL	102	11.598	10.244	39.418	1.522	7.298
DEP	102	74.837	75.128	130.951	46.439	11.193
LOAN	102	38.587	37.703	61.098	15.331	7.974
CAR	102	8.723	7.960	25.327	2.240	4.066
BS	102	15.059	15.298	17.011	12.082	1.244
BoDS	102	2.157	2.079	2.565	1.609	0.198
CEOD	102	0.882	1.000	1.000	0.000	0.324
WTI	102	4.933	0.000	66.667	0.000	13.425
LIW	102	0.275	0.000	1.000	0.000	0.448
OS	102	12.172	2.313	78.878	0.000	20.692
CSR	102	0.427	0.392	0.952	0.056	0.226
SMD	102	28.077	28.080	33.000	24.400	2.975
D	102	100.746	100.023	122.366	80.144	15.664

Note: Table-1 shows the statistic summary (mean, median, minimum, maximum, and standard deviation) of dependent variables and explanatory variables used in this study. ROA of Pakistani banks is 0.775. This implies that banks earn 0.775% of total assets with a maximum value of 2.718 and a minimum value of -2.660, whereas standard deviation depicts the variation from means. Furthermore, the median profit of Pakistani banks is 0.870 which is higher than the return on assets. Similarly, TE indicates the efficiency of Pakistani banks with average efficiency and median values as denoted in the table. The explanatory variables are also explained/interpreted in the same analogy.

4.2.   Correlation Analysis

Correlation analysis exhibits the strength and direction of relationships among variables. Its value lies between -1 to +1. This table indicates that if values are less than 0.70, it means no multicollinearity issue. The variance inflation factor (VIF) also confirmed our previous opinion as all the variables' values are less than 10. Table-2 indicates correlation analysis and VIF.

Table-2. Correlation Analysis and Variance Inflation Factors (VIFs)

Probability	VIF	ROA	TE	NPL	DEP	LOAN	CAR	BS	BODS	CEOD	WTI	LIW	OS	CSR	SMD	DD
ROA		1.000														
TE		-0.228	1.000													
NPL	1.444	-0.420	0.070	1.000												
DEP	1.634	-0.039	-0.023	0.222	1.000											
LOAN	1.630	-0.456	0.148	0.256	0.097	1.000										
CAR	1.629	0.195	-0.028	-0.151	-0.312	-0.184	1.000									
BS	4.097	0.605	-0.325	-0.238	0.192	-0.376	-0.290	1.000								
BODS	1.214	0.229	-0.139	-0.088	0.041	0.069	0.014	0.178	1.000							
CEOD	2.316	0.283	-0.048	-0.053	-0.003	0.097	-0.202	0.438	0.252	1.000						
WTI	3.797	-0.338	0.191	0.027	-0.062	0.063	0.281	-0.529	-0.146	-0.637	1.000					
LIW	2.144	-0.084	0.031	-0.225	-0.076	-0.155	0.182	-0.033	-0.131	-0.185	0.551	1.000				
OS	1.707	0.430	-0.125	-0.225	0.033	-0.162	0.046	0.486	0.017	0.162	-0.096	0.307	1.000			
CSR	2.487	0.417	-0.192	-0.423	-0.106	-0.206	-0.062	0.510	0.266	0.079	-0.182	-0.056	0.140	1.000		
SMD	1.081	0.000	0.124	-0.070	-0.148	-0.089	-0.013	0.045	0.067	-0.051	0.063	0.085	0.019	0.165	1.000	
DD	2.214	0.030	-0.023	-0.288	-0.375	-0.133	-0.114	0.155	0.145	0.037	0.160	0.200	-0.004	0.516	0.229	1.000

Note: This table indicates the correlation analysis. If the values of correlation are less than 0.75 and VIF values are less than 10, this implies no issue of multi-collinearity among variables.

4.3   Regression Analysis

After the regression, the next step is to test three hypotheses i.e. BP Lagrange Multiplier H0: Pooled is better than random effect model (REM); (ii) Hausman H0: Random effect model (REM) is better than Fixed effect model (FEM); (iii) Likelihood Ratio H0: Pooled is better than fixed-effect model (FEM). The null hypothesis is accepted or rejected based on the p-value. If the p-value is less than .05, reject H0 and vice-versa. After exercising this practice, the Fixed Effect Model is selected as in the case of ROA and Random Effect Model when the dependent variable is technical efficiency. Table 3 presents panel estimation techniques such as pooled, fixed, and random effects.

Table-3. Panel Estimation Techniques

Variable	ROA			TE		
	CEM	FEM	REM	CEM	FEM	REM
NPL	-0.027	-0.046	-0.030	-0.001	-0.006	-0.001
	(0.009)*	(0.016)*	(0.009)*	(0.003)	(0.006)	(0.003)
DEP	-0.003	0.006	-0.003	0.001	0.001	0.001
	(0.006)	(0.006)	(0.005)	(0.002)	(0.002)	(0.002)
LOAN	-0.028	-0.025	-0.028	-0.001	-0.005	-0.002
	(0.009)*	(0.013)***	(0.009)*	(0.003)	(0.004)	(0.003)
CAR	0.052	-0.003	0.047	-0.006	0.001	-0.005
	(0.018)*	(0.024)	(0.016)*	(0.005)	(0.008)	(0.005)
BS	0.287	-0.636	0.313	-0.060	-0.015	-0.059
	(0.092)*	(0.315)**	(0.094)*	(0.026)**	(0.110)	(0.029)**
BoDS	0.427	-0.871	0.355	-0.099	0.065	-0.073
	(0.314)	(0.558)	(0.324)	(0.087)	(0.195)	(0.100)
CEOD	0.431	0.082	0.191	0.132	0.240	0.150
	(0.265)	(0.307)	(0.230)	(0.074)***	(0.107)	(0.076)***
WTI	0.010	0.053	0.008	0.002	0.004	0.003
	(0.008)	(0.016)*	(0.008)	(0.002)	(0.006)	(0.002)
LIW	-0.527	-1.083	-0.600	-0.029	-0.052	-0.046
	(0.184)*	(0.225)*	(0.168)*	(0.051)	(0.079)	(0.055)
OS	0.008	0.021	0.009	0.001	0.006	0.001
	(0.004)**	(0.010)**	(0.004)**	(0.001)	(0.004)	(0.001)
CSR	0.466	-3.159	-0.112	0.019	-0.454	-0.024
	(0.394)	(0.730)*	(0.400)	(0.109)	(0.256)	(0.123)
SMD	-0.009	0.009	-0.008	0.009	0.009	0.009
	(0.020)	(0.016)	(0.015)	(0.005)	(0.006)	(0.005)***
DD	-0.009	0.027	-0.005	0.000	0.002	0.000
	(0.005)***	(0.008)*	(0.005)	(0.001)	(0.003)	(0.002)
C	-2.683	11.418	-2.823	1.573	0.460	1.479
	(1.725)	(4.723)**	(1.659)***	(0.479)*	(1.654)	(0.523)*
R-squared	0.654	0.836	0.488	0.185	0.388	0.149
Adj. R-squared	0.603	0.771	0.412	0.065	0.142	0.023
F-statistic	12.801	12.699	6.447	1.538	1.574	1.181

Prob (F-statistic)	0.000	0.000	0.000	0.120	0.062	0.306
Durbin-Watson stat	1.706	2.477	1.873	2.222	2.586	2.300

Note: *,**,*** at 1%, 5%, 10% respectively. The figure in parenthesis shows standard error. Return on Assets (ROA) and Technical Efficiency (TE) are used as dependent variables. The models represent the impact of the non-performing loans, deposits, loans, capitalization, bank size, the board size, CEO duality, women participation on the board, level of involvement of women on board in other committees, ownership structure, corporate social responsibility index on bank performance. The control variables used in the analysis include demand density (DD) and stock market development (SMD). R-squared is 84% and 15% in the case of ROA and TE. This implies that 84% and 15% variation in our models arises due to explanatory variables. The value of Durbin-Watson lies between 1.5 to 2.5 in the models implies no sign of auto-correlation among the predictors.

Bank-Specific Factors and Performance

This study reports a significant negative relationship of non-performing loans, advances with ROA, however, insignificant positive relationships exist with technical efficiency. They argue that more lending may cause borrowers to default. This implies that banks may face the risk of bankruptcy that increases the financing cost and reduce profitability. The banks may select adverse borrowers due to imperfect information or high competition exists in the market. Previous literature that supports the findings of this study includes Aziz and Knutsen (2019); Batir et al. (2017) and Sufian and Habibullah (2010). The study elaborates a significant negative relationship of bank size with ROA and technical efficiency. The scholars posit that banks' performance may decline due to diseconomies of scale, mismanagement, bureaucratic issues, and engagement in more risky investments. The scholars that are in support of this argument include Bourke (1989); Syafri (2012); Sufian and Habibullah (2010) and Batir et al. (2017).

Corporate Governance and Performance

The findings indicate that CEO duality influences technical efficiency significantly and positively. This is in line with stewardship theory arguing that duality creates managerial monitoring effectively. Previous literature that supports this argument includes Kiel and Nicholson (2003). However, an insignificant and positive relationship exists between CEO duality and ROA. Furthermore, the result exhibits a significant positive relationship of the percentage of women on the board with ROA. This aligns with critical mass theory implies that more than thirty percent of women on board enhance the profitability of banks. The supporters of this argument include Andersson and Wallgren (2018); Beate and Gro (2010) and Riyadh et al. (2019). However, the level of involvement of women in other committees finds a significant negative relationship with ROA. This implies that the more presence of a woman in other committees can adversely affect bank profitability. Furthermore, a significant and positive relationship of ownership structure with ROA. The supporters advocate that

foreign banks may have a comparative advantage of product differentiation, knowledge transfer, modern technology, better risk exposure, and reduction in the cost of capital (Havrylchyk, 2006). Previous scholars that support this argument include Jayati and Subrata (2018).

Corporate Social Responsibility Disclosure Index and Performance

The findings indicate a negative and significant relationship of the CSR disclosure index with ROA. They argue that the manager's main responsibility to increase firm profit and stakeholder's wealth and doing anything else will be the misuse of the authority and brings additional expenses (Friedman, 1970). This is in line with agency theory (Fahad & Busru, 2021; Mravlja, 2017; Maqbool & Zameer, 2018).

System GMM Technique

This study also employs the system GMM estimation technique developed by Arellano-Bover/Blundell-Bond as the above analysis includes the problem of endogeneity, heteroscedasticity, autocorrelation. The condition for the application of GMM is (i) when the time period is shorter than the number of groups (T<N); (ii) Validity of instruments by applying Sargan/Hansen test; (iii) absence of autocorrelation at AR (2) by applying Arellano-Bond test. The insignificance value of the Sargan/Hansen test is an indicator of the validity of the instrument. This implies that instruments are not correlated with residuals. Similarly, the insignificance value of AR (2) means the absence of autocorrelation in the residuals. Table 4 depicts the impact of multiple explanatory variables on ROA and technical efficiency by using the system GMM. The lagged values of dependent variables are used as instruments while conducting the analysis.

Table-4. System GMM

Variable	ROA	TE
	FEM	**REM**
ROA/TE (-1)	-0.109 (0.214)	-0.148 (0.242)
NPL	-0.050 (0.026)***	-0.003 (0.002)
DEP	0.008 (0.004)**	0.000 (0.001)
LOAN	-0.027 (0.012)**	-0.001 (0.002)
CAR	0.005 (0.030)	-0.006 (0.004)
BS	-0.708 (0.150)*	-0.044 (0.034)
BODS	-1.136 (0.174)*	-0.129 (0.060)**
CEOD	0.062 (0.321)	0.202 (0.063)*

WTI	0.060 (0.034)***	0.005 (0.002)*
LIW	-1.277 (0.498)**	-0.081 (0.067)
OS	0.019 (0.015)	0.001 (0.002)
CSR	-3.156 (0.797)*	-0.032 (0.067)
SMD	0.016 (0.023)	0.008 (0.003)*
DD	0.030 (0.005)*	-0.001 (0.001)
C	12.632 (3.689)*	1.583 (0.645)*
R-squared	0.825	0.223
Adj. R-squared	0.728	0.068
Durbin-Watson stat	2.233	1.973
J-statistic	6.116	3.780
Prob (J-statistic)	0.106	0.437
AR (1)	0.745	0.371
AR (2)	0.317	0.072

Note: *,**,*** at 1%, 5%, 10% respectively. The figure in parenthesis reports the standard error. Return on Assets (ROA) and Technical Efficiency (TE) are used as dependent variables. R-squared is 82% and 22% in the case of ROA and TE. This implies that 82% and 22% variation in our models arises due to explanatory variables and the p-value in both cases is also less than 0.05, this implies that the model is statistically fit and significant. The value of Durbin Watson in both models indicates the presence of auto-correlation. As the p-value of J-statistics is greater than 0.10, this implies the validity of the instruments used in the study. Similarly, the p-value of AR (2) is insignificant and greater than 0.05, this hails the absence of auto-correlation in both models.

Bank Specific Factors and Performance

This study finds a significant negative relationship between non-performing loans, advances, and bank size with ROA. However, deposits influence ROA positively and significantly.

Corporate Governance and Performance

Board Size positively and significantly influence profitability and efficiency. This is because a larger board possesses versatile knowledge, skills to make better decisions. The scholars that are in favor of this argument include Herdjiono and Sari (2017); Kiel and Nicholson (2003); Riyadh et al. (2019). CEO duality positively influences technical efficiency. This is in line with stewardship theory. The system GMM results are also matched with panel estimation techniques. This study showed a significant positive relationship of the percentage of women on the board with ROA and technical efficiency, however, an inverse relationship of the level of involvement of

women into other committees with ROA. The result of system GMM matched with the findings of the panel estimation technique as well.

Corporate Social Responsibility Disclosure Index and Performance

The study finds a significant negative relationship of the CSR index with ROA. This is in line with agency theory and matched with the results of the panel estimation technique.

5. Conclusion and Future Recommendations

The crux is to examine the impact of bank-specific factors, governance, and environmental factors on bank performance by employing panel estimation techniques and GMM. The findings contend a negative relationship of non-performing loans, advances, level of involvement of women into other committees, CSR index with ROA; while the percentage of women on board find a positive and significant relationship with ROA. However, the study reveals a positive relationship between CEO duality and technical efficiency. The study finds an inverse relation of bank size with ROA and technical efficiency. It was further observed that deposit influences ROA positively; while board size finds a positive and significant relationship with ROA and technical efficiency.

The findings of the study have a greater implication for various stakeholders as it helps them to understand that how these factors influence the efficiency and profitability of the banking sector. Specifically, it helps the policymakers to understand that how the demographic dynamics, policies regarding asset-financing structure, capitalization levels, borrowers selection, governance, gender diversity, disclosure protocols, up to what extent the banks are involved in social investment (food, education, health, shelter), poverty reduction, sustainable and green financing, charities, etc. affecting bank performance and formulate their policies accordingly.

The authors recommend future researchers do similar research in South Asian countries by employing different techniques to estimate the relationship. Secondly, to include more variables in governance such as audit committees, risk management, board meetings, etc. Thirdly, to examine the moderating effect of institutional factors

References

Adnan, M.A., Htay, S.N., Ab. Rashid, H.M. and Meera, A.K. (2011). A panel data analysis on the relationship between corporate governance and bank efficiency, *Journal of Accounting, Finance and Economics*, 1 (1), pp. 1-15.

Andersson, P. and Wallgren, F.M. (2018). Board Gender diversity and firm financial performance: a study of 100 companies listed on Nasdaq Stockholm.

Athanasoglou, P., and Brissimis, S.N., & Delis, M.D. (2008). Bank-specific, Industry-specific and Macroeconomic Determinants of Bank Profitability. *Journal of International Financial Markets, Institutions and Money,* 18(2), 121–136.

Aziz, O.G., & Knutsen, J. (2019). The Banks Profitability and Economic Freedom Quality: Empirical Evidence from Arab Economies. *Journal of Banking and Financial Economics,* 1(11), 96–110.

Batir, T.E., Volkman, D.A., & Gungor, B. (2017). Determinants of bank efficiency in Turkey: participation banks versus conventional banks. *Borsa Istanbul Review,* 17(2), 86-96.

Beate, E., & Gro, L. (2010). Women on corporate boards: key influencers or tokens? *Journal of Managerial governance.*

Berger, A. N., DeYoung, R., Genay, H., & Udell, G. F. (2000). Globalization of financial institutions: evidence from Cross Border banking performance. *Brookings-Wharton Papers on Financial Services, 3, 23-158.*

Bitar, M. Pukthuanthong, K., & Walker, T. (2018). The effect of capital ratios on the risk, efficiency and profitability of banks: evidence from OECD countries. *Journal of International Financial Markets, Institutions and Money,* 53, 227-262.

Bourke, P. (1989). Concentration and other determinants of bank profitability in Europe, North America and Australia. *Journal of Banking and Finance,* 13(1), 65–79.

Eichengreen, B., & Gibson, H.D. (2001). Greek Banking at the Dawn of the New Millennium. *CEPR Discussion Paper.*

Fahad, P. and Busru, S.A. (2021). CSR disclosure and firm performance: Evidence from an emerging market. Corporate Governance: International Journal of Business in Society

Freeman, R.E. (1984). Strategic Management: A Stakeholder Approach. Pitman, Marshfield.

Friedman, M. (1970). The social responsibility of business is to increase its profits. N. Y. Times Mag., 32–33.

Goddard, J., Liu, H., Molyneux, P. and Wilson, J.O.S. (2013). Do Bank Profits Converge? *European Financial Management,19, pp. 345–65.*

Gitau, P.M., Anyango, W., & Rotich, G. (2017). Effect of Micro Economic Factors On Performance Of Listed Commercial Banks In Kenya. *The Strategic Journal Of Business And Change Management,* 4 (2), 763-778.

Hasanul, B., Rubi, A., & Eric, H.Y.K. (2017). Determinants of Commercial Banks' Efficiency in Bangladesh: Does Crisis Matter? *Journal of Asian Finance, Economics and Business,* 4 (3), 19-26.

Havrylchyk, O. (2006). Efficiency of the polish banking industry: Foreign versus domestic banks. *Journal of Banking and Finance, 30.*

Herdjiono, I., and Sari, I. M. (2017). The Effect of Corporate Governance on the Performance of a Company. Some Empirical Findings from Indonesia. *Journal of Management and Business Administration, 25*(1), 33-523

Iveta, R. (2015). Banking Efficiency Determinants in the Czech Banking Sector. *Procedia Economics and Finance, 23, pp. 191 – 196.*

Jayati, S. and Subrata, S. (2018). Bank Ownership, Board Characteristics and Performance: Evidence from Commercial Banks in India. International Journal of Financial Studies.

Kiel, G.C., & Nicholson, G.J. (2003). Board composition and corporate performance: How the Australian experience informs contrasting theories of corporate governance. *Corporate Governance,* 11 (2), 189-205.

Krause, R., Semadeni, M., & Cannella, A.A. (2014). CEO Duality: A Review and Research Agenda. *Journal of Management,* 40 (1), 256–286.

Majeed, M.T., & Zanib, A. (2016). Efficiency analysis of Islamic banks in Pakistan. Humanomics, 32 (1), 19-32.

Maqbool, S., & Zameer, M.N. (2018). Corporate social responsibility and financial performance: an empirical analysis of Indian banks. *Future Business Journal,* 4, 84–93.

Molyneux, P. and Thornton, J. (1992). Determinants of European bank profitability: A note. *Journal of Banking and Finance, 16(6), pp. 1173–1178.*

Mravlja, L. (2017). The Impact of Corporate Social Responsibility of banks on their financial performance.

Oyewumi, O.R., Ogunmeru, O.A., & Oboh, C.S. (2018). Investment in corporate social responsibility, disclosure practices, and financial performance of banks in Nigeria, *Future Business Journal,* 4, 195-205.

Riyadh, H.A., Sukoharsono, E.G. and Alfaiza, S.A. (2019). The impact of corporate social responsibility disclosure and board characteristics on corporate performance, Cogent Business & Management, 6(1).

Sealey, C. W., & Lindley, J. T. (1977). Inputs, outputs and theory of production cost at depository financial institutions. *Journal of Finance,* 32, 1251–1266.

Sufian, F., & Habibullah, M.S. (2010). Developments in the efficiency of the Thailand banking sector: a DEA approach, *International Journal of Development Issues,* 9(3), 226-245.

Sufian, F., Kamarudin, F., & Nassir, A. (2016). Determinants of efficiency in the Malaysian banking sector: Does bank origins matter? *Intellectual Economics,* 10, 38-54.

Syafri, M. (2012). Factors affecting bank profitability in Indonesia. *International Conference on Business and Management,* 236-242.

Szegedi, K., Khan, Y. and Lentner, C. (2020). Corporate Social Responsibility and Financial performance: Evidence from Pakistani Listed Banks, Sustainability, 12.

Torchia, M., Calabrò, A., & Huse, M. (2011). Women directors on corporate boards: from tokenism to critical mass. *Journal of Business Ethics,* 102(2), 299-317.

Varnita, S., Niladri, D. and Jamini, K.P. (2018). Women on boards in India: a need or tokenism? *Management Decision.*