

## The Impact of Board Diversity on Firm's Financial Performance: Evidence from Pakistan Stock Exchange 100 Index

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### **Abstract**

*This research paper examines the effects of board diversity (BD) on firm FP in Pakistan. It investigates the empirical relationship between gender and nationality diversity, and firm performance (FP). The study population was PSX-100 index firms. However, the final sample for this research was 41 companies of the 100 index firms of the PSX, this sample was selected by implementing different inclusion and exclusion criteria. The data collection period was from 2012 to 2022. In order to test the study's hypotheses, Panel data regression analysis (models) was employed to investigate the relationships between the study's variables. Firm performance was estimated using both a market measure (Tobin's Q) and an accounting measure (ROA). The study findings show that gender and nationality diversity on boards do not significantly influence FP. The results show that BD has no influence on the firm FP of the PSX-listed non-financial 100 Index firms. This is likely due to Pakistan's unique cultural and institutional context. In addition to this, the study reveals no significant relationship between BD and FP. This could be attributed to weak enforcement mechanisms and the influence of personal connections in Pakistan.*

**Keywords:** Board Diversity, Firm Performance, Pakistan Stock Exchange, ROA, National Diversity and Panel Data

### **Introduction**

In the current competitive business world, proper corporate governance (CG) is instrumental in the success of the organization, reduction of organizational inefficiencies and preservation of the investor confidence. CG involves the processes and internal mechanisms in which firms are guided and managed in order to attain their goals (Khan et al., 2025). The main elements of CG are the board of directors (BoD), the structure of ownership, the compensation systems, and the board committees (Khan, 2022; Khan and Kamal, 2024a). Board diversity (BD) is one of them and has gained growing interest due to its possible improvement of decision making, accountability, and firm performance (FP) (Alabdullah et al., 2022). Diversity in the boards, especially gender diversity (GD) and nationality diversity are found to be an influential determinant of firm outcomes. GD does not only affect financial performance, but it also defines corporate environmental, social, and governance (ESG) practices (Mnasri et al., 2025). The BoD is the key bridge between stockholders and the management and therefore its composition is critical to the performance of governance

frameworks (Mnasri et al., 2025). As indicated in previous researches, GD and nationality diversity may positively impact the financial performance of firms (Abotula et al., 2025; I. Khan et al., 2024). BD has become an important component of successful governance in Pakistan, where the corporate framework is changing (Farooq and Ali, 2022). Researchers have increasingly emphasized the need to have more women on traditionally male dominated boards (Pandey et al., 2023). To realize the significance of the diversity and the competency of boards, the regulators in Pakistan have gone an extra mile by conducting significant reforms.

Pakistan Stock Exchange (PSX), Securities and Exchange Commission of Pakistan (SECP) and the State Bank of Pakistan (SBP) have established codes and regulations to reinforce the governance practices. The Code of CG was initially published by the SECP in 2002 and was revised in 2008, 2012, 2017, and 2019 (S. Khan, 2023a). The 2017 Code has been broadly considered the most significant, with additional protections of minority shareholders and a prerequisite of at least one female board director. The existing Listed Companies (Code of Corporate Governance) Regulations, 2019, focus on women involvement and demand superior quality of annual audits to hold them responsible (SECP, 2019). Regardless of such efforts, the majority of PSX listed companies are characterized by dominance of family control, with women directors being frequently family members of the controlling shareholders (S. Khan et al., 2025). Simultaneously, in 2021, the SBP reinforced its regulatory framework to be consistent with international standards and increased the roles of boards and external auditors (SBP, 2021). These reforms imply the outcome of Pakistan moving in line with the global practices as they focus on board diversity, transparency, and accountability.

There is evidence that female representation on boards in Pakistan has improved since the 2017 reforms, which is similar to the trend in the global workforce, i.e. an increase in female boardroom participation in U.S. companies since 2018 (Abotula et al., 2025; Khan, 2022). It is against this background that the current paper evaluates how gender and national diversity affect the board of non-financial companies listed in the PSX. To be more precise, measurements of BD are determined by the presence of female directors and international directors as an indicator of the strategy that can be a driver of innovation, market familiarity, and company performance (Abotula et al., 2025; Chang et al., 2020; Gavana et al., 2025; I. Khan et al., 2024; Mnasri et al., 2025).

The current literature on corporate governance (CG) and firm performance (FP) lacks a comprehensive view of the impact of particular dimension(s) of board diversity (BD) on firms, especially in developing economies like Pakistan. While extensive research has been conducted in advanced economies including the United States, the United Kingdom, and European nations most studies focus on highly industrialized and widely held firms, thereby overlooking the unique institutional, cultural, and ownership dynamics of emerging markets. In the context of Pakistan, where CG mechanisms were first introduced in 2002 and subsequently revised, empirical evidence on the role of BD in firm performance remains limited. Furthermore, research specifically targeting top performing companies, such as those listed in the PSX 100 Index, is largely absent from the prevailing literature. This creates an important gap, as these firms represent the backbone of Pakistan's capital market and corporate landscape. The present study seeks to address these gaps by examining the influence of gender diversity (GD) and nationality diversity on the boards of non-financial firms listed in the PSX 100 Index. By utilizing panel data from 2012 to 2022, this research contributes to the existing literature on accounting, agency theory, and CG by highlighting how

board composition, in terms of female representation and international directors, shapes firm performance within an evolving economic and institutional environment.

### 1.1 Research Questions

1. How does BD, including nationality and gender diversity, affect a firm's ROA?
2. How does BD, including nationality and gender diversity, affect companies' Tobin's Q?
3. What is the relationship positive or negative between the BD including female directors in BoD and the FP of the firm?

### 1.2 Research Objectives

1. To inspect the influence of the board nationality diversity on FP, as measured by ROA.
2. To study the influence of the nationality diversity in the BoD on FP, as calculated by Tobin's Q.
3. To explore the relationship in the PSX listed non-financial companies between GD on BoD and firm FP.
4. To analyze the role of the female directors in the BoD on firm FP.

### 1.3 Research Hypothesis

**H1a:** There will be a positive and statistically significant relationship between BD and ROA.

**H1b:** There will be a positive and statistically significant relationship between BD and Tobin's Q.

**H2a:** There will be a positive and statistically significant relationship between BD (Nationality) and ROA.

**H2b:** There will be a positive and statistically significant relationship between BD (Nationality) and Tobin's Q.

**H3a:** There will be statistically positive and significant relationship among the PSX listed non-financial between the BD (Nationality) on board and ROA.

**H3b:** A positive relationship exists between the presence of BD (Nationality) and Tobin's Q.

## Literature Review

### 1.4 Board Diversity

The concept of diversity has been widely discussed in management and governance literature, yet it remains challenging to define due to its multiple dimensions. Broadly, diversity refers to organizational policies and practices that promote the inclusion of individuals from backgrounds and experiences differing from those of the traditionally dominant group (S. Khan, 2023a). Milliken and Martins (1996) classified diversity into two categories: observable, which includes demographic factors, and unobservable, which encompasses cognitive attributes (Beji et al., 2021). Building on this distinction, Martins and Sohn (2022) explained that demographic diversity relates to visible characteristics such as age, ethnicity, and gender, whereas cognitive diversity reflects differences in education, functional expertise, personal values, and thought processes. This study specifically focuses on demographic diversity, examining the impact of nationality diversity and gender diversity (GD) on the boards of directors (BoD) and their influence on firm performance (FP). Over the past two decades, the importance of board diversity has gained increasing recognition among scholars, regulators, and policymakers as a vital element of effective corporate governance (CG). Policymakers across various jurisdictions have emphasized that diverse boards can enhance oversight, decision making, and ultimately firm outcomes (Fleischer, 2021). Beyond normative considerations, board diversity is increasingly assessed through a cost benefit lens,

aligning with evidence based approaches to governance (Pacheco, 2021; Sarhan et al., 2018). While many organizations are committed to establishing diverse board structures, the empirical evidence regarding their impact on FP remains inconclusive (Daniel & McConnell, 2023). Early studies highlighted potential benefits. As an illustration, in a research study of 240 organizations, Siciliano (1996) came up with a board diversity index and discovered a positive relationship between professional diversity and social performance and fundraising success. Likewise, Nepal et al. (2025) noted that although the world is trying to enhance inclusiveness, male directors still dominate the boards of directors in all companies across the world. Their results emphasized the need to employ female directors as a mechanism of enhancing not only the quality of governance but also FP. This view is further supported by more recent empirical studies. Sarhan et al. (2018) examined 600 firm year observations in the Middle East and North African nations between 2009 and 2014 and found that BD, specifically in relation to gender and nationality, enhanced FP significantly. Further, companies where governance practices were more robust were observed to gain more significantly with board diversity. Their findings also revealed that diversity promoted the implementation of performance based executive compensation frameworks, which replaced fixed remuneration frameworks. Altogether, in the literature, the authors emphasize the possibility of gender diversity and nationality to improve the performance of the firm especially with effective governance systems. Nevertheless, the degree and degree of these advantages are context specific and still demand the additional empirical confirmation in the emerging economies like Pakistan.

### **1.5 Nationality Diversity**

Globalization has broadened the business operations, which leads to more foreign investing in industries all over the world (Baker et al., 2021). Regardless of this international trend, there is still a gap in the literature that studies the relationship between board diversity (BD) with specific reference to nationality diversity and firm performance (FP), especially in the context of the emerging economies (Belkacemi et al., 2021). Diversity in nationality on corporate boards is both an opportunity and a challenge. On the one hand, it may improve international networks, empower the rights of shareholders, and decrease managerial entrenchment (Hosny and Elgharbawy, 2022). Conversely, it can instill cross cultural communication barriers and consensus challenges (Shania and Soetanto, 2022; Gokulan, 2021). Empirical findings on the impact of nationality diversity on FP are mixed. Some studies report no significant influence of demographic diversity (Mohd Idris, 2021), while others highlight positive effects. For instance, Overland and Samani (2023) found that Norwegian and Swedish firms with Anglo American board representation performed better, with similar patterns observed in the UK, Netherlands, and Switzerland. Nationality diversity appears particularly beneficial in complex and uncertain environments, where diverse perspectives improve strategic adaptability.

Conversely, board homogeneity may be advantageous in contexts requiring rapid, unstructured decision making (Hudson, 2022). An and Lee (2022) similarly demonstrated that the inclusion of foreign directors improved the FP of Korean firms, underscoring the potential monitoring and networking benefits of internationally diverse boards. However, several studies caution that the benefits of nationality diversity are context dependent. Frijns et al. (2016), in their study of European firms, reported that nationality diversity negatively affected FP, as measured by Tobin's

Q and ROA. Eulerich et al. (2014) reached similar conclusions within the German two tier system, where highly internationalized boards were hampered by communication barriers. Ciavarella (2017) also posited that BD has a multifaceted impact on FP, and can depend on the attributes of a firm, its form of governance, and industry contingencies. The inconsistency is also reflected in findings of emerging markets. Khan and Subhan (2019) reported a negative relationship between nationality diversity and FP in Pakistan, which they explained by the cultural differences and language barriers.

On the other hand, the Chinese experience shows some encouraging results: Bin Khidmat, Ayub, and Ullah (2020) discovered that foreign directors in A listed companies improved FP, which can be viewed as a resource based perspective and an agency theory perspective of efficient monitoring and expanded managerial networks. Most recently, the study by Khan et al. (2024) found that nationality diversity was positively correlated with FP in PSX 100 firms in 2009-2020, which explained their importance in attracting investors and enhancing the legitimacy of firms. Combined, these results depict the dualistic aspect of the nationality diversity. Although a diversified board can offer the benefit of strategy in a globalized market, it also can lead to inefficiencies caused by communication barriers and cultural differences. This supports the necessity of more context specific study, especially in developing economies like Pakistan where institutional structures, governance enforcement and cultural expectations play a major role in the influence of board composition on FP.

### **1.6 Gender Diversity**

Female representation in boards has emerged as a policy option and a research topic of growing importance among policymakers and scholars (Safari, 2022). The reason is that having more women on boards provides wider views and may improve the performance of firms (Jabari and Muhamad, 2021). Most nations, such as Pakistan, have also presented codes of corporate governance that recognize the need to have women on boards to deal with not only governance but also other social and labor challenges (Hussain et al., 2023). In spite of such efforts, the female board representation is not as high as it should be. There is no clear empirical data on the connection between gender diversity (GD) and firm performance (FP), which changes in different contexts. The female representation in South Africa had a positive impact on the ROA and ROE but a negative impact on the Q of Tobin (Khan et al., 2025; Willows and van der Linde, 2016). Equally, an analysis of the Bombay Stock Exchange in India found a negative relationship between female directorship and ROA, and a positive relationship between female directorship and ROE (Dankwano and Hassan, 2018).

Conversely, the study of FTSE 100 companies in the UK showed that higher female representation, especially beyond two women, positively affected FP measures including ROA and Q (Khan et al., 2024a). Evidence on Turkey also indicates that gender diversity is positively related to FP, as reflected by ROA, ROE and return on sales (Kılıç & Kuzey, 2016). In Spain, female board quotas have increased women directors in non-financial companies by 98% over 2005-2009, with greater governance and economic performance (Reguera Alvarado, de Fuentes, & Laffarga, 2019). In a

meta-analysis study that assessed 140 studies, a positive association between female board representation and accounting returns (ROA, ROE) was observed, but it was generally positive especially in countries where shareholder protection was high (Post and Byron, 2015). In Pakistan, results are also not consistent. As an example, a positive correlation between GD and FP was found by Khan and Subhan (2019) and Khan and Suplata (2025) who studied 395 non-financial PSX firms (2004-2009). Nevertheless, Mirza et al. (2012) found no significant correlation, which implied that female representation had no effect on FP and in certain instances, it actually decreased it.

## **1.7 Theoretical Framework**

### **Agency Theory**

The agency theory is the most prevalent in corporate governance (CG), earnings management (EM), and board governance (BG) literature. It is a worthwhile perspective through which to analyze the role of board diversity (BD) and audits in firm performance (FP). The theory highlights the conflict of interest between principals (shareholders) and agents (managers) (Jensen and Meckling, 1976). Although managers are supposed to perform in the best interest of the shareholders, they are likely to pursue their own interests in cases where they have varying risk preferences and information asymmetry (Fama and Jensen, 1983). Mechanisms like BD and audits will help to mitigate these conflicts. According to recent research, two prominent categories of agency problems may be identified (Type I and Type II) (S. Khan, 2022, 2023a, 2023b; S. Khan et al., 2024, 2025; S. Khan, Kamal, Hussain, et al., 2022; S. Khan and Kamal, 2021).

The type I agency conflict, between management and shareholders, is more widespread in developed economies that have dispersed ownership (S. Khan, 2022, 2023a; S. Khan et al., 2025). In comparison, Type II agency conflict occurs between majority and minority shareholders, which is prevalent in the developing economies such as in Pakistan, where ownership is highly concentrated (S. Khan & Kamal, 2022b, 2024b). Board diversity has been proven to diminish agency conflicts because it enhances the level of diversity in terms of knowledge, experiences, and perspectives during decision making (Carter et al., 2003). Heterogeneous boards stimulate stronger debates, which may contribute to a stronger strategic decision-making process and risk management (Adams and Ferreira, 2009). Greater monitoring lowers managerial opportunism and keeps decisions in line with long term shareholder value (Alslaibi et al., 2025). Furthermore, diverse boards reflect the interests of wider stakeholder groups, strengthening relationships, improving reputation, and attracting investment (Hillman & Dalziel, 2003; Li, 2024). Audits also play a crucial role in aligning managerial actions with shareholder interests. High quality audits discipline management by strengthening internal controls and ensuring adherence to accounting standards (Dechow & Skinner, 2003). They act as a credibility signal, reducing information asymmetry between managers and investors (Watts & Zimmerman, 1986). By enhancing the reliability of financial statements, audits can lower borrowing costs and attract investors, thereby improving firm valuation (Leuz & Wysocki, 2016). Nonetheless, the effectiveness of BD and audits is context dependent. The impact of BD on FP can vary with board composition, leadership dynamics, and cultural or industry settings (Westphal & Stern, 2007). Similarly, the value of audits depends on their perceived independence and quality; weak auditor oversight may undermine credibility and even exacerbate agency conflicts (Palmrose, 2000). In summary, agency theory highlights the complementary roles of BD and audits in mitigating agency problems. While both

mechanisms have contextual limitations, they collectively promote responsible decision making, enhance financial reporting credibility, and support sustainable firm performance.

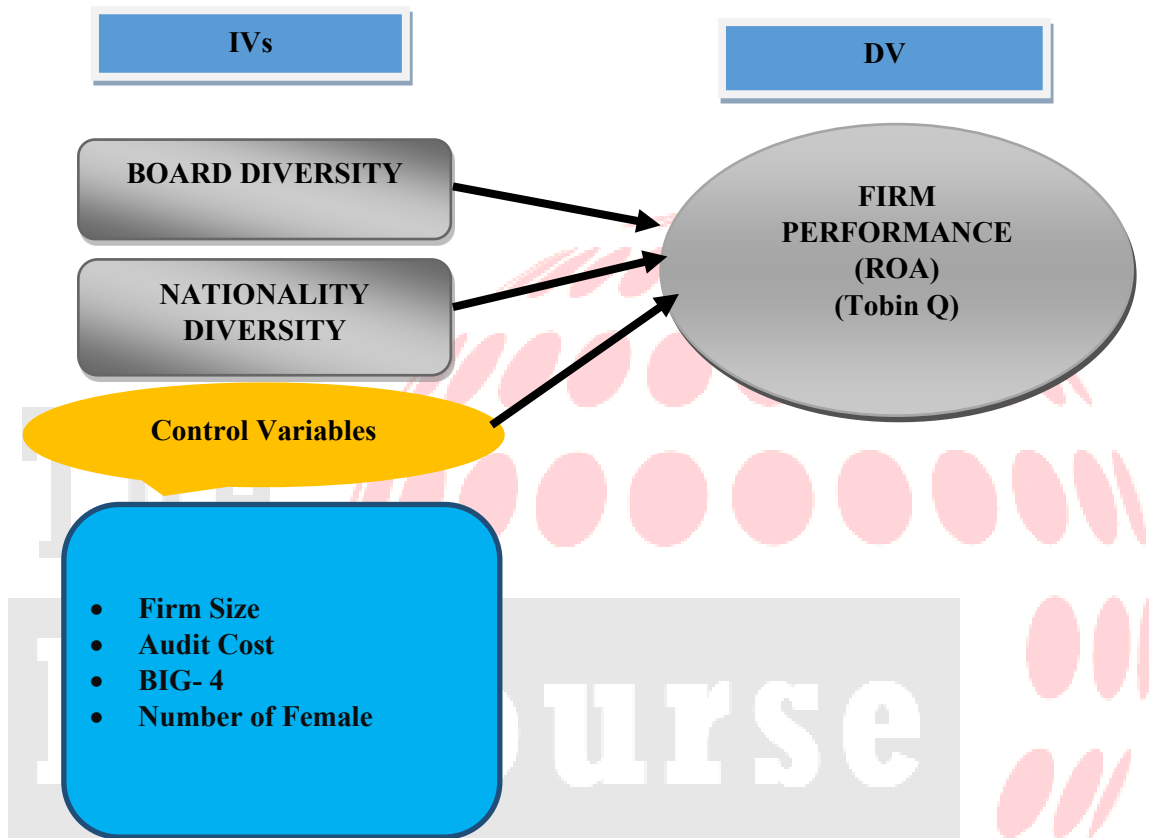
### **Signaling Theory**

Signaling theory is an explanation of how the management activities, including the selection of external auditors, influence the market beliefs about firm performance (FP). Firms employ signals to convey their potentials to investors and boards of directors (BoD) are at the center of this process. Brigham (2011) argues that audited financial statements are always used by businesses to send positive messages to the market. Financial information audits enhance the level of credibility of financial information, which minimizes information asymmetry between managers and investors (Beaver, 1988). They yield a better market reaction when compared to unaudited statements since investors believe they are more trustworthy. This reputation will reduce the cost of borrowing because it decreases perceived risk (Schipper and Smith, 1986) and will help to draw in a wider range of investors, which will drive up firm valuation, in the end (Leuz and Wysocki, 2016). Therefore, the signaling theory highlights the importance of audits in enhancing FP through increasing credibility, reducing information asymmetry, and strengthening sound financial practice (Nepal et al., 2025). The success of such signals however is contextual and requires considering contextual aspects including market conditions, quality of regulation, and independence of auditors which should be taken in to consideration when evaluating firm results.

### **Resource Dependency Theory**

Resource Dependence Theory (RDT) is the theory according to which organizations demand the services of their external environment that can provide them with the necessary resources to live and succeed (Pfeffer and Salancik, 1978). In this context, board diversity (BD) and audits serve as tools to increase resource access, and thus, affect firm performance (FP) (Mohapatra et al., 2025). The corporate board is the key player in establishing linkage with the external organizations to reduce environmental dependency and to obtain essential resources (Pfeffer and Salancik, 1978). The advantages of these linkages include access to information, expertise, communication routes, support of stakeholders, as well as legitimacy, which enhance FP. These advantages are further enhanced with directors who have different backgrounds and traits contributing to better results (Hillman, Cannella, and Paetzold, 2000). On the same note, diversity offers firms a wider perspective and resource that assists in solving complex environmental issues (Terjesen et al., 2009). Specifically, gender diversity (GD) has been attributed to closer relationships with female customers, employees, and a wider society, allowing effective communication and alignment with stakeholder expectations (Liu et al., 2014). By indicating being responsive to social goals, the appointment of diverse directors increases the legitimacy of a firm, which improves the connection between BD and FP even more (Mahadeo et al., 2011; Karaman et al., 2025). The RDT can also be used to offer a helpful perspective on the role of audits. It is because high quality audits minimize information asymmetry, enhance transparency and legitimacy. It makes it easier to access external resources, enhances reputation, and enhances internal controls which altogether help to improve FP to the highest level (Hillman et al., 2007; Carter et al., 2010). In general, RDT has highlighted that the existence of diverse boards and credible audits enhances organizational legitimacy, access to resources and trust of investors, which will positively influence firm performance.

**Conceptual Framework**



**Research Methodology**

The research design explains the procedures and approaches employed in the collection and analysis of data according to the objectives of the study. The research design used in this study was an explanatory research design, which explored the relationship between board diversity (BD), audits, and corporate financial performance (FP) in the setting of Pakistan Stock Exchange (PSX)-listed firms. It followed a quantitative method that was based on secondary data which are the financial statements and annual reports of the firms, which were downloaded through the official websites of the companies. Quantitative approaches facilitate testing of formulated theories and allow the drawing of general conclusions about the BD and audits impact on FP.

The sample of the study comprised non-financial companies included in the PSX 100 Index because they offer a good representation of the market as a whole and correspond to the findings of previous studies (Khan and Subhan, 2019). Financial companies were not to be included because they have much in common with accounting practices and regulatory needs (Akbar et al., 2020; Falk and

Fransson, 2022; Ullah et al., 2019). The data collection period was, 2012-2022, with the latest and extensive data being used. The data collection process was based on strategies that were used in similar studies (S. Khan, 2024; S. Khan and Kamal, 2022a). The sampling obtained by a judgmental (non-probability) method. The reason why this is the right approach is that the firms in the PSX can be listed or delisted during the course of time, and selection at random was not a suitable technique. Judgmental sampling assured that the sample comprised of firms that have been listed at all times throughout the study. According to this criterion, the sample finalized comprises of 41 non-financial companies of the PSX 100 Index.

## **2.1 Variable Measurement**

The primary outcome variable in this study was firm performance (FP) which is measured both based on accounting and based on market based measures. The accounting based measures e.g. the return on assets (ROA) and the return on equity (ROE) were commonly used in the accounting and corporate governance literature (Sibanda et al., 2013). ROA was especially applicable, as it provides a reflection of financial health in general because of combining both incomes and assets, and was less susceptible to manipulation in the short term (Sibanda et al., 2022). Accounting measures, however, are always backward-looking, attempting to measure previous performance. Market based performance were measured in terms of Q (Tobin) that compares both market and book value of capitalization. This ratio indicates what investors expect investment returns to be in the future, and it acts as an indicator of the value creation and competitive edge of a firm (Butt and Seyyed, 2023; David and Duru, 2022).

One major weakness with TobinQ was that it used market data that were publicly available and therefore, cannot be applied to unlisted companies. As these measures are complementary, both ROA and the Q of Tobin used as proxies of FP are used in this study. ROA gives information on the past performance whereas Q in Tobin gives the market expectations on future performance. By combining both measures, FP can be better understood than when one is used in isolation (Saridakis and Woodside, 2023; Hsu et al., 2021). Board diversity (BD) was the most important independent variable in this research and was measured in three dimensions: Gender diversity (GD): a binary variable (1 female directors on the board and 0 otherwise) (Khan and Subhan, 2019). Female directors: the board measures the number of women in total (Khan et al., 2019). Nationality diversity: a binary variable, value 1 in case of at least one director of foreign nationality and 0 in case of no such individual (Arslan et al., 2023).

The dimensions aligned with previous empirical research on board diversity and firm performance. All of the variables and their measures were listed in a summary in Appendix 1. In testing the hypotheses, the analysis of panel data was employed with the use of the STATA 14. It was considered suitable in the analysis of the relations among the dependent and independent variables over the period chosen, and it helps to deal with unobserved heterogeneity among firms.

**Results and Analysis****3.1 Descriptive Statistics**

Variable	N	Average	SD	MIN	MAX
Year	451	20173.166		2012	2022
ROA	451	10.2819.512		41.36	70.26
Tobin Q	451	1.5781.6		0	22.529
No Female Directors	451	0.7450.802		0	4
Female Directors	451	0.5590.497		0	1
big4	451	0.7320.444		0	1
Audit Cost	451	6566.0587507.102		1.275	42979
Foreign Director	451	0.3060.503		0	4
Firm Size	451	17.4271.348		14.209	20.845
ID	451	2111.845		1	41

The dataset comprises 451 firm year observations from 41 non-financial firms listed in the PSX 100 Index, covering the period 2012–2022. Descriptive statistics for all variables are reported in Table 2, including the number of observations (Obs), mean, standard deviation (Std. Dev.), minimum (Min), and maximum (Max) values.

The primary dependent variables are return on assets (ROA) and Tobin's Q. For ROA, the dataset contains 451 observations, consistent with the sample size and period. The mean ROA is 10.28, which aligns with prior studies (Faisal et al., 2021; S. Khan & Kamal, 2021, 2022a, 2024a, 2024b). The standard deviation is 9.50, with values ranging from –41.36 to 70.26. Tobin's Q has a mean of 1.50, comparable to findings in Averio (2020) and Nepal et al. (2025). Among the independent variables, the average number of female directors is 0.55, which is notably higher than values reported in earlier studies (S. Khan, 2023a; S. Khan et al., 2025; S. Khan, Kamal, Abbas, et al., 2022), where the mean was less than 15 percent. Similarly, the mean for foreign directors is 0.30, which is relatively high due to the presence of multinational firms in the PSX 100 Index. For control variables, the mean values are as follows: firm size (17.42), BIG 4 auditors (0.73), and audit cost (6566). These statistics provide an overview of the dataset and demonstrate consistency with prior literature.

**Correlation Matrix**

Variables	ROA	Tobin Q	No Female Directors	Female Directors	big4	Audit Cost	Foreign Director	Firm Size
ROA	1.000							
Tobin Q	0.309	1						
No Female Directors	0.026	0.042	1					
Female Directors	0.123	0.073	0.826	1				
big4	0.150	0.134	0.068	0.135	1			
Audit Cost	0.173	0.070	0.115	0.059	0.252	1		
Foreign Director	0.039	0.115	0.252	0.277	0.170	0.029	1	
Firm Size	0.036	0.161	0.120	0.082	0.301	0.585	0.023	1

In Table 2, the correlation matrix of the study variables is given. The values of Table show that all the values are under the rule of thumb values, which indicate that there is no issue of multicollinearity in data. Moreover, the correlation matrix results show that there is negative relationship between ROA and number of female directors and female director’s presence in the board. Moreover, there is positive relationship between foreign directors and ROA /Tobin’s Q.

**3.2 Regression Diagnostics Tests for Model 1**

Variable	VIF
Female Directors	3.281
No Female Directors	3.254
Firm Size	1.59
Audit Cost	1.547
BIG4	1.169
Foreign Director	1.11
Mean VIF	1.992

**Multicollinearity**

To test study’s hypotheses and to run regression of panel data it is necessary to assess the presence of multicollinearity among the independent variables. Multicollinearity occurs when there's a high degree of correlation between independent variables, potentially inflating standard errors and distorting the significance of their respective coefficients. We can assess multicollinearity using VIFs. As a standard value, VIF values exceeding 5 indicate potential multicollinearity issues. The outcome of the VIF analysis shows that there is some level of multicollinearity for Female Directors and No Female Directors, the overall multicollinearity in the regression model is within acceptable limits as the VIF value is below 5.

**Heteroscedasticity**

**Breusch Pagan / Cook Weisberg test for heteroscedasticity**

Ho: Constant variance Variables: fitted values of roa  $\chi^2(1) = 0.00$   
 Prob >  $\chi^2 = 0.9961$

The Breusch Pagan/Cook Weisberg test for heteroscedasticity has been performed to evaluate whether there is any indication of non-constant variance in the fitted values of the dependent variable, ROA. The null hypo paper (Ho) posits the absence of heteroscedasticity, while the alternative hypo paper suggests the presence of heteroscedasticity. The p value is 0.9961, which signifies no heteroscedasticity in the regression model for ROA. The assumption of constant variance is upheld, supporting the robustness of the model's estimates and inferences.

**Hausman Test**

Coef. Chi square test value 17.306
P value .004

The Hausman test is used to decide between random effect and fixed effect model (Hausman,1978).

### Breusch Pagan / Cook Weisberg test for heteroscedasticity

Ho: Constant variance Variables: fitted values of TobinQ Chi2(1) 56.33  
Prob>chi2 = 0.000

The test revealed a significant difference and p value is less than .05, indicating that the fixed effects model is the preferred choice for this analysis.

### 3.3 Regression Results (Model 1 for ROA (Fixed Effect Model))

ROA	C.	SR	t Stat	p Stat	[95% Conf.Inter]	Sig
No Female Directors	.203	.995	0.20	.838	2.159 1.753	
Female Directors	.183	1.548	0.12	.906	3.225 2.86	
big4	1.763	1.564	1.13	.26	4.837 1.311	
Audit Cost	0	0	5.43	0	.001 0	***
Foreign Director	.222	1.239	0.18	.858	2.658 2.215	
Firm Size	1.63	.887	1.84	.067	3.373 .113	*
Constant	43.067	15.169	2.84	.005	13.246 72.888	***
Mean DV		10.281	SD DV		9.512	
R S		0.114	N		451	
F test		8.644	F		0.000	
<u>AIC</u>		3000.734	<u>BIC</u>		3029.514	

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

This model inspects the influence of BD on FP, as gauged by ROA. The findings of the study/paper reported that neither the presence nor the number of female BoD members display a statistically significant correlation with ROA, a result similar with the study of with Ararat et al.'s (2015). Likewise, the analysis reveals that nationality diversity exerts no discernible impact on ROA, mirroring the conclusions drawn by Rose (2007). However, audit cost displayed a positive and significant coefficient, implying a positive association with FP, as observed by Francis (2009). In contrast, audit quality did not yield significant results. Interestingly, firm size also lacked a significant relationship with ROA in this model.

### 3.4 Regression Results (Model 2 for Tobin's Q)

#### Heteroscedasticity

The Breusch Pagan/Cook Weisberg test for heteroscedasticity was conducted with the null hypothesis (Ho) positing constant variance in the context of the fitted values of Tobin's Q. The test yielded a chi squared statistic of 56.33 with one degree of freedom, resulting in a p value of 0.0000. The low p value, below conventional significance levels, provides evidence to reject the null hypothesis of constant variance. Therefore, the results suggest the presence of heteroscedasticity in the model.

*Variable of Inflation Factors (VIF) for Model 2*

<b>Variable</b>	<b>VIF</b>
Female Directors	2.342
No Female Directors	3.452
Firm Size	1.33
Audit Cost	1.98
BIG4	1.670
Foreign Director	1.32
Mean VIF	1.809

**Multicollinearity**

Before moving to the regression analysis, it's crucial to assess the presence of multicollinearity. Multicollinearity occurs when there's a high degree of correlation between independent variables, potentially inflating standard errors and distorting the significance of their respective coefficients. We can assess multicollinearity using VIFs. As a rule of thumb, VIF values exceeding 5 indicate potential multicollinearity issues. This section provides the outcomes of the VIF analysis. It evaluates the extent of multicollinearity among the independent variables incorporated in the regression model. Table 4 displays the VIF values for each variable.

**Hausman Test**

The Hausman test was conducted, yielded a p value of 0.071, providing inconclusive evidence regarding the preference between fixed and random effects models. Given this ambiguity and the presence of heteroscedasticity, a random effects model with robust standard errors was employed to mitigate potential biases in standard errors and t-statistics.

**Table 6 Hausman Test**

Coef. Chi square test value 10.167

P value .071

**3.5 Regression Results for Model 2 Tobin's Q as proxy for firm's financial performance and Board Diversity**

The results show random effect model of the panel data regression after the test results as reported above in the Hausman test. Within the random effects model, only Firm Size emerged as a statistically significant predictor of Tobin's Q (p value = 0.03), demonstrating a negative relationship. Other variables, including No Female Directors, Female Directors, Big4, Audit Cost, and Foreign Director, did not exhibit significant associations with Tobin's Q. The model's overall explanatory power was relatively modest, with an overall R squared of 0.043.

<b>Tobin Q</b>	<b>Coef.</b>	<b>St.Err.</b>	<b>t value</b>	<b>p value</b>	<b>95% Conf. interval</b>	<b>Sig.</b>
No Female Directors	.117	.174	0.67	.503	.459 .225	
Female Directors	.226	.254	0.89	.374	.723 .272	
big4	.257	.175	1.47	.142	.085 .599	
Audit Cost	0	0	0.64	.52	0 0	
Foreign Director	.101	.158	0.64	.524	.411 .209	

Firm Size	.286	.132	2.17	.03	.545	.027	**
Constant	6.653	2.315	2.87	.004	2.115	11.191	***
Mean DV		1.585	SD DV			1.596	
Overall r squared		0.043	Number of obs			451	
Chi square		37.697	Prob > chi2			0.000	
R squared within		0.052	R squared between			0.039	

\*\*\*  $p < .01$ , \*\*  $p < .05$ , \*  $p < .1$

### 3.6 Main Findings and Discussions

The findings reveal no significant effect of gender and nationality diversity on firm performance, which contrasts with much of the diversity literature. This discrepancy likely reflects the cultural, economic, and regulatory environment of Pakistan, where CG practices differ from those in Western economies. Simply increasing the number of female or foreign directors does not automatically translate into improved performance without considering board dynamics and organizational culture. In Pakistan, female board appointments often result from quota requirements rather than merit based selection, while foreign directors are rare and may face challenges such as cultural differences and language barriers. These contextual factors may limit the financial benefits of board diversity. This aligns with prior studies suggesting that the impact of diversity depends heavily on the institutional and cultural environment (Adams & Ferreira, 2009; Carter et al., 2003).

The analysis also shows a positive relationship between audit cost and firm performance. This suggests that higher investment in audit processes strengthens the credibility of financial reporting and enhances investor confidence, consistent with findings from Ghana (Awinbugri & Prince, 2019) and Vietnam (Phan et al., 2020). However, the expected benefits of associating with Big 4 auditors are less evident in Pakistan. Weak legal enforcement, limited litigation risks, and the influence of business groups reduce the pressure on auditors to deliver high quality audits. As a result, the global reputation of Big 4 firms does not necessarily translate into measurable performance gains in this context. This indicates that audit quality depends more on audit practices and firm specific engagement than on brand reputation alone. This study contributes to the literature by testing whether board diversity and audit attributes serve as valid proxies for audit quality and governance effectiveness in the context of PSX listed non-financial firms. Using data from 41 firms over 2012–2022, the study addressed gaps in existing literature by examining how gender and nationality diversity, alongside audit costs and auditor type, influence firm performance measured by ROA and Tobin's Q. Overall, the results highlight that while rigorous auditing is associated with stronger financial outcomes, the influence of board diversity is more complex and context dependent. These findings suggest that board diversity and audit attributes should not be studied in isolation but rather in conjunction with other governance mechanisms. Supporting this view, Pandey et al. (2023) found that female board diversity alone did not significantly affect firm performance in Indian firms, but its interaction with other board features did.

### 3.7 Practical Implications

Theoretically, this study contributes to the CG literature by providing empirical evidence from the Pakistani capital market, which is widely recognized for weak governance structures and remains relatively underexplored in CG research. The findings suggest that the effectiveness of governance

practices, such as board diversity, is not universal but may vary across different cultural, institutional, and economic contexts. This highlights the importance of contextualized approaches in testing and extending existing theories of CG. From a practical perspective, the results offer valuable insights for policymakers, regulators, and board members in emerging markets. The observed positive association between board diversity and firm performance underscores the importance of well-structured and inclusive boards in enhancing financial outcomes. However, the absence of a significant direct effect of gender and nationality diversity on performance implies that policymakers and firms should broaden the definition of diversity. Beyond demographic attributes, attention should also be directed toward diversity in skills, expertise, and professional backgrounds, which may strengthen board effectiveness and strategic decision making. For regulators, these findings reinforce the need to refine quota based diversity policies to ensure appointments are not merely symbolic but contribute meaningfully to governance quality. For practitioners, the study highlights the value of adopting a holistic view of board composition, integrating demographic diversity with experiential and functional diversity to optimize performance outcomes.

### **3.8 Limitations**

Like similar empirical studies, this research is subject to several limitations. First, the analysis focuses exclusively on non-financial firms listed on the PSX 100 Index, which may restrict the generalizability of the findings to the broader population of firms on the Pakistan Stock Exchange. Additionally, reliance on secondary data and the inherent challenges in accurately measuring constructs such as firm performance and board diversity may have influenced the results. Second, the study considers only two proxies of board diversity—gender and nationality. Future research could incorporate additional dimensions of diversity, such as age, education, professional background, and tenure, to provide a more comprehensive understanding of how board composition affects firm outcomes. Similarly, firm performance was measured using ROA and Tobin's Q, which, while widely applied, capture only certain aspects of financial health. Employing alternative or complementary measures, such as stock returns, economic value added (EVA), or market to book ratios, may yield richer insights. Third, this study employed fixed and random effects models due to time constraints and the complexity of applying more advanced econometric techniques. Future research may adopt methods such as two stage least squares (2SLS) or generalized method of moments (GMM) to address endogeneity concerns and strengthen causal inferences. Finally, the scope of the study was limited in terms of sample size, population, and time frame. Expanding the dataset to include a larger sample of firms, a longer time horizon, or cross country comparisons would enhance the robustness and external validity of the findings.

### **3.9 Recommendations**

Building on the limitations noted above, this study can be extended in several ways. First, while the sample included only non-financial firms from the PSX 100 Index, future research may incorporate financial firms to examine whether the relationship between board diversity (BD) and firm performance (FP) differs across sectors. Second, the present study covered the period 2012–2022. Extending the timeframe to more recent years, such as 2025 and beyond, would allow researchers to capture evolving governance practices and market dynamics. Third, future research can broaden the scope by employing longitudinal designs, cross industry comparisons, and qualitative approaches to gain deeper insights into how BD influences FP. In particular, examining

the moderating role of cultural and regulatory factors in Pakistan would provide valuable contextual understanding. Fourth, this study employed fixed and random effects models. Future studies could apply more advanced econometric techniques such as ordinary least squares (OLS), feasible generalized least squares (FGLS), two stage least squares (2SLS), and generalized method of moments (GMM) to address endogeneity and enhance causal inference. Finally, FP in this study was proxies by ROA and Tobin's Q. Future research may adopt additional measures such as stock returns, market to book ratio, or economic value added (EVA) to provide a more comprehensive evaluation of firm outcomes in relation to BD.

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## Appendix

### Appendix 1 Study's Variables and their measurement

Variable	Abbreviation	Definitions and Measurement	Source
Return on Asset	ROA	ROA is measure by dividing net income over total assets.	(M. A. Khan et al., 2019; S. Khan & Kamal, 2021, 2022a)
Tobin's Q	TQ	Tobin's Q is the market value of the firm.	Ararat et al. (2015)
Nationality diversity	NAT	Nationality diversity is measured using two categories: foreigners and Pakistanis and it is a dummy variable.	Khan et al. (2019)
Gender Diversity	GEN	GD is the female representation in the BoD. It is calculated by dividing number of female directors in BoD over the strength of the BoD.	Subhan & Khan (2019)
No of Female Board Members	NOFBM	The number of female board members is measured by the total number of female directors present on the board.	Hassan et al. (2014) (Khan and Kamal, (2024a) Subhan & Khan (2019)
BIG-4 Audit Firms	BIG-4	An indicator variable taken the value of 1 if an audit firm is from BIG-4 auditors otherwise 0.	(S. Khan, 2023b; S. Khan, Kamal, Abbas, et al., 2022; S. Khan

Audit Cost/FEE	AFEE	The total fee/cost paid to the auditors for auditing the company's annual reports.	& Kamal, 2021, 2022a) (Gandía & Huguet, 2021; Tessema & Abou-El-Sood, 2022; Tran et al., 2023)
Firm Size	FS	Firm size is computed by taking the log Of the firm's total assets.	(S. Khan & Kamal, 2022a; Ma & Ahmad, 2024)

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