

Naz, Fadia; Hisham Bin Mohammad; Chai Aun Ooi

Article

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Board Characteristics, Firm Performance, and Institutional Ownership: Evidence from Listed Companies of Pakistan

Fadia Naz ¹, Hisham Bin Mohammad ², Chai-Aun Ooi ³

¹ School of Economics, Finance and Banking, Universiti Utara Malaysia
& The Islamia University of Bahawalpur, Pakistan

² School of Economics, Finance and Banking, Universiti Utara Malaysia

³ Economic & Financial Policy Institute (ECoFI), School of Economics, Finance and Banking, Universiti Utara Malaysia

*Corresponding author's email: fadia.naz@iub.edu.pk

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Abstract

This study endeavors to scrutinize the impact of board characteristics on firm performance directly as well as through the moderating influence of institutional ownership. Tobin' Q and market-to-book ratio are the proxies of firm performance as dependent variable. The analytical approach involves unbalanced panel data comprising 883 firm year observations of 75 textile manufacturing firms listed on Pakistan Stock Exchange from 2012 – 2023 by using fixed effect regression and system GMM estimation techniques through STATA software. Notably, findings indicate that board size and female directors demonstrate significant positive influence, whereas, outside directors and director ownership shows significant negative influence on firm performance. Furthermore, findings also indicate that institutional ownership has a significant positive moderating influence on the relationship between board characteristics and firm performance. This contribution to the scholarly literature provides certain important theoretical insights and practical implications for practitioners and policy makers.

Keywords: Board characteristics, ownership structure, institutional ownership, firm performance, Pakistan Stock Exchange.

1. Introduction

The size of Pakistan stock market is comparatively small, which may be less attractive to foreign investors (Naseem & Zaman, 2025). This may result to insufficient market monitoring to the firms' agency issues. Due to the prevalence of high ownership by

corporate directors, the agency issue between controlling and minority shareholders arises in form of self-serving interests of major shareholders. Role of institutional ownership in corporate governance as a monitoring device is catching more attention in recent years in Pakistan. Balagobei (2024) in Sri Lanka and Naz, Muhammad and Ooi (2024) using Pakistani sample, suggest that institutional ownership positively impacts firm performance.

The prevalent agency problem between controlling and minority owners is intense in Pakistani textile industry. It is the biggest and the multifaceted manufacturing industry of the country. Therefore, it acts like the back bone of economy. Although this giant sector contributes 60% of the total exports of the economy, 8.5% to its GDP and engages 40% of its total labor force, unfortunately, since its inception, it is facing continuous rise and fall in performance due to numerous firm-specific, national and international economic challenges (Memon, Aziz & Qayyum, 2020; Nasir, Ali, Irshad, Arshadullah, Wazir & Islam, 2025). Furthermore, controlling or founding families dominate the ownership structure of textile firms of Pakistan through high director ownership (Fatima et al., 2018; Naz et al., 2024).

In this regard, the existence of external control mechanism in form of institutional ownership brings equilibrium in the firm's ownership structure on basis of their voting power, expertise, skills and ability to influence the governing body. Institutional owners not only monitor the management but also play a very effective role in the construction of governing body through their power of vote. Notably, institutional ownership is in mounting trend in Pakistan in response to financial reporting scandals and frauds in corporations (Naz et al., 2024). Despite of growing share of diverse groups of institutional ownership in ownership structure of Pakistan, it is facing the challenge of inadequate legislation to protect the rights of institutional owners (Fatima et al., 2018; Hameed, Nazeer, Mehmood & Khan, 2024).

This study is motivated because of the fact that there are substantial differences in corporate governance practices between Pakistan and most developing economies. In Pakistan, majority manufacturing firms' display concentrated ownership structures where most ownership stake is owned by directors and their family members (Fatima, Mortimer & Bilal, 2018). Therefore, there prevails power asymmetries among controlling shareholders and minority shareholders in favor of the controlling shareholders. This insider expropriation ignores the benefits of minority shareholders. However, formal institutional arrangement and regulations in developing economies are not as effective as in the developed economies to protect the minority shareholders against insider expropriation (Hasan, Riaz & Nakpodia 2023). It then raises an imperative question of protecting the rights of minority shareholders in the wake of institutional voids in case of developing economies.

Furthermore, due to the prevalence of one-tier board structure, controlling directors with major ownership dominate the board decisions because of which the monitoring role of outside directors becomes more difficult which ultimately influences the firm performance.

Specifically, numerous past studies relating to board structure components including appropriate board size, presence of female directors and composition of board regarding inside directors and outside directors produce contradictory findings. Furthermore, substantial work is done to investigate the individual effect of institutional ownership and board characteristics on the firm performance but how these two phenomena interact with each other and affect firm performance is largely inconclusive. Therefore, this study covers the research gap as it extends the research framework on the relationship between board characteristics and firm performance by incorporating the moderating role of institutional ownership.

It is therefore, the focus of this study is two-folds: one is to identify the influence of board characteristics (board size, female directors, outside directors) on firm performance. Second is to identify the moderating influence of institutional ownership on the relationship between board characteristics and firm performance specifically considering the listed textile sector firms of Pakistan. This study thus addresses the following research questions;

- RQ1: What is the impact of board characteristics (board size, female directors, outside directors) on firm performance?
- RQ2: What is the impact of director ownership on firm performance?
- RQ3: Does institutional ownership moderate significantly between the relationship of board characteristics and firm performance?

The findings of this study contribute to the prevailing literature in several ways. First, although several earlier studies have investigated the individual effects of board characteristics and institutional ownership on firm performance, there is less understanding of how these board characteristics interact with institutional ownership. This study addresses this important research gap within the context of Pakistan, which is particularly relevant because of dearth of external monitoring of corporate boards. Second, findings relating to the moderating influence of institutional ownership also offer certain practical implications for firm directors, financial institutions, regulatory authorities and academicians for theory building and upgradation regarding corporate governance practices and legislations.

The remainder of the paper is organized as follows. Section 2 presents the literature review relating to the developing as well as developed countries. Section 3 discusses the theoretical and conceptual framework on basis of hypotheses development. Section 4 elaborates the research methodology. Section 5 presents the empirical findings of data analysis and discussion. Last section presents the conclusion including research implications, limitations and the future research recommendations.

2. Literature Review

2.1. Theoretical Framework

Theoretical literature demonstrates a widespread debate on corporate governance theories to comprehend the theoretical relationship among various corporate governance measures and firm performance. Widely held agency theory is one of the most prominent corporate governance theories. Agency theory (Jensen and Meckling, 1976) highlights the traditional agency conflict between agent and principal and the ways to alleviate it. Min (2018) identifies that corporate board is a fundamental part of the corporate governance mechanisms which is strongly interested to protect principals' interests through reduced influence of professional management. Theoretically, it is supposed that corporate board performs the agency as well as resource dependence roles (Ntim, Opong & Danbolt, 2012). However, evidence indicates that not only the institutional ownership directly influences firm performance, but also, after increasing beyond a certain level it starts affecting the firm performance by affecting the corporate governance mechanisms (Hameed et al., 2024; Javeed, Ong, Latief, Muhamad & Soh, 2021; Naz et al., 2024; Waheed & Malik, 2019; Waheed & Malik, 2021). Furthermore, Stewardship theory (Donaldson and Davis, 1991) deliberates that internal directors are more appropriate because they serve as good alternative to external directors because they possess superior knowledge of the firms and its strengths and weaknesses.

2.2. Board Size and Firm Performance

Agency theory states that board size must be reasonable (Jensen & Meckling, 1976). Whereas, resource dependence theory (Donaldson and Davis, 1991) postulates that larger boards are more appropriate because they empower firm with imperious resources (Ntim et al., 2012). They argue that larger boards have more directors who possess diverse knowledge and skills which proves to be valuable resource for firm. This shows that larger boards with more resources have more capability to monitor the risk which is an important concern of shareholders. They can suggest different risk tackling strategies to the management. Empirically, the relationship between board size and firm performance is still inconclusive in case of developed and developing countries (Adem & Dsouza, 2024; Akbar, Hussain, Ahmad & Hassan, 2020; Al-Matari, 2024; Athar, Chughtai & Rashid, 2023; Azhar & Mehmood, 2018; Bansal & Singh, 2021; Daniyal & Rafique, 2024; Hassan, Ullah, Khalil, Khan & Usama, 2023; Khan, Al-Jabri & Saif, 2021; Khan, Saha, Kamal & Islam, 2025; Naz et al., 2024; Waheed & Malik, 2021).

Empirical study by Adem and Dsouza (2024) demonstrates positive impact of board size on performance. In consistence to their study, Gull, Asif and Abid (2013) in their study on Pakistani textile firms, whereas, Hassan et al. (2023) and Husnain, Anwar, Hameed and Khan (2021) in manufacturing firms also find significant positive relationship between board size and firm performance. Khan et al. (2025) in Bangladesh also find positive impact of board size on TQ by controlling the effect of total assets, industry and year. Similarly, board size is found to be positively related with ROE because of effective

monitoring due to the presence of more outside directors (Akbar et al., 2020), with TQ (Husnain et al., 2021; Naz et al., 2024; Waheed & Malik, 2019; Waheed & Malik, 2021) and with market-to-book ratio (Sheikh & Wang, 2013). However, Naz et al. (2024) also find its insignificant relationship with MTB in textile firms of Pakistan by considering firm size and leverage as control variables. Similarly, Azhar and Mehmood (2018), Wang, Abbasi, Babajide and Yekini (2020) in case of ROA, ROE, TQ, MTB and Yasser, Mamun and Seamer (2017b) in case of TQ also demonstrate insignificant results by considering firm size, age, leverage, institutional ownership and foreign ownership as control variables. However, Yasser et al. (2017b) also shows positive influence on ROA. Whereas, Al-Matari (2024) and Akbar et al. (2020) find its negative significant impact on firm performance. The above discussion shows that large sized boards generate positive results for firm including diversity in ideas, skills and resources and leads to the following hypothesis;

- H1: There is significant positive impact of board size on firm performance

2.3 Female Directors and Firm Performance

Agency theory of Jensen and Meckling (1976) gives the viewpoint that gender diversity supports to mitigate agency conflict. Similarly, resource dependence theory (Donaldson and Davis, 1991) also favors gender diversity more specifically female directors as an important resource to enhance firm performance because it brings diversity of knowledge, skills and experience. In the recent amendments in codes of corporate governance of 2017 and 2019 in Pakistan, the presence of at least one female directors on corporate boards is accentuated in listed companies.

Empirical studies also show varying influence of female directors in context of developing and developed countries (Adem & Dsouza, 2024; Al-Matari, 2024; Athar et al., 2023; Chen, Chen, Kot, Zhu & Wu, 2021; Hardan, Daas, Nour & Abudiak, 2026; Husnain et al., 2021; Naz et al., 2024; Okoyeuzu, Ujunwa, Ujunwa & Onah 2021; Wang et al., 2020; Yaseer et al., 2017b). Hardan et al. (2026) find significant positive relationship between gender diversity and financial sustainability in a study on 113 listed firms of Palestine and Jordan by controlling the effects of firm size, liquidity and assets efficiency. Al-Matari (2024) in Saudi Arabia, whereas, Naz et al. (2024) in case of TQ and market-to-book ratio, Yaseer et al. (2017a) in case of TQ and ROA, Yasser et al. (2017b) in case of EPS, TQ, ROA and Wang et al. (2020) in case of ROE find positive significant influence of female directors on firm performance because their presence enhance the board monitoring role and reduce the agency costs. Similarly, Khan et al. (2025) in case of Bangladeshi firms find that FD have positive and significant relationship with TQ by using fixed effect regression and 2SLS methods of estimation and by controlling the effect of total assets, industry and year. It is because the presence of female directors enhance the quality of board discussions which improve the firm performance. Contrary to it, Adem and Dsouza (2024) in Ethiopia and Wang et al. (2020) in case of TQ and market-to-book ratio in Pakistan find that female directors remain insignificant in determining firm performance.

Following hypothesis is thus suggested for this study on basis of presence of female directors in corporate boards as an important resource;

- H2: There is significant positive impact of female directors on firm performance

2.4. Outside Directors and Firm Performance

Agency theory encourages more outside directors to resolve the agency issue through their skillful monitoring abilities and experience (Jensen & Meckling, 1976; Shleifer & Vishny, 1997). Resource dependence theory (Donaldson and Davis, 1991) also encourages more outside directors as diverse resource of firm. Contrarily, stewardship theory considers the inside directors as better substitute because of their greater knowledge of firm affairs and its strengths and weaknesses. Recent amendments in the codes of corporate governance emphasize that the proportion of executive directors in listed companies of Pakistan must not exceed 1/3rd of total board size.

Empirical evidence suggests varying results in different countries (Adem & Dsouza, 2024; Azhar & Mahmood, 2018; Bansal & Singh, 2021; Hassan et al., 2023; Khan et al., 2021; Naz et al., 2024; Okoyeuzu et al., 2021; Puni & Anlesinya, 2020; Waheed & Malik, 2019). Adem and Dsouza (2024) illustrate positive impact of outside directors on performance of Ethiopian firms. Whereas, Al-Matari (2024) in Saudi Arabia and Daniyal and Rafique (2024) in Pakistani textile firms find its significant negative impact on performance. Whereas, Hardan et al. (2026) find significant positive relationship between outside directors and financial sustainability in a study on 113 listed firms in three non-financial sectors of Palestine and Jordan by using pooled OLS method of estimation and by controlling the effects of firm size, liquidity and assets efficiency. Yasser et al. (2017a) also finds that board independence shows negative significant impact on ROA and positive insignificant impact on TQ. They report that this negative impact is due to the prevalence of one-tier board structure where outside directors are not in a position to perform their supervisory role efficiently. Yasser et al. (2017b), in another study, also find that outside directors on board show insignificant influence on ROA, EPS and TQ by controlling the effects of firm size, age, leverage, institutional ownership and foreign ownership. It is because of their lack of adequate qualification and expertise due to insufficient legislation regarding their qualification and expertise.

Similarly, Waheed and Malik (2019) find that outside directors negatively influence ROA and TQ due to passive role of non-executive directors which is because of concentrated ownership of controlling shareholders. In another study by Waheed and Malik (2021), outside directors show significant negative influence on TQ in Pakistan. Their findings are further confirmed by (Naz et al., 2024) in case of insignificant negative relation with TQ and significant negative with market-to-book ratio because of passive role of non-executive directors due to concentrated ownership of controlling owners. Contrarily, Khan et al. (2025) find that outside directors have positive significant impact on TQ in Bangladesh by using fixed effect regression and 2SLS method and by controlling the effect of total assets, industry and year. This is because outside directors have diverse backgrounds which

provide various perspectives to the board. They have their reputation and career at stake because of which they force executive directors to work for the benefit of shareholders. On basis of conflicting theoretical and empirical findings, following hypothesis is suggested in this research;

- H3: There is significant negative impact of outside directors on firm performance

2.5. Director Ownership and Firm Performance

Agency theory (Jensen and Meckling, 1976) advocate that concentrated ownership help to lessen agency conflicts. In the emerging economies including Pakistan, concentrated ownership in form of high director ownership dominates the board decisions (Fatima et al., 2018; Hasan et al., 2023; Naz et al., 2024; Waheed & Malik, 2021). This insider ownership consequent in expropriation of the rights of minority shareholders (Burkart & Panunzi, 2001) which results in principal–principal agency conflicts. Although, Chinese firms also hold concentrated state ownership (Bryson, Forth & Zhou, 2014), but their nature of concentration is different from Pakistani firms which focus only on self-serving interests.

Boshnak (2023) in Saudia Arabia finds that director ownership shows significant positive influence on ROA, ROE, TQ and market-to-book ratio because of diversity in competencies of directors. Similarly, Din et al. (2022) also document that insider ownership shows significant positive relationship with firm performance in Pakistan because inside directors possess more knowledgeable and valuable information about the aspects of firm which help in making crucial decisions of firm. Whereas, Hasan et al. (2023) finds that family board of directors in Pakistan show significant negative influence on ROA, ROE, TQ and market-to-book ratio because they attempt to prioritize their personal interests over the interests of all shareholders. Yasser et al. (2017a) also find that family directorship shows negative impact on TQ and positive insignificant impact on ROA in Pakistan. In another study by Yasser et al. (2017b), family directorship is negative insignificant with TQ. However, Khan et al. (2025) finds family firms to impact negatively the performance measures of TQ and market-to-book ratio in Bangladesh. On the other side, Waheed and Malik (2019) and Javeed et al. (2021) find significant moderating influence of ownership concentration between board characteristics and firm performance and positive insignificant influence of family directorship on ROA. They find that concentrated owners attempt to dominate the firm decisions because of their strong voting power. Boachie (2021) also examines moderating influence of director ownership in Ghana and find negative influence on performance. Naz et al. (2024) also find significant moderating influence of director ownership in textile firms of Pakistan and find that concentrated directors attempt to expropriate the interests of small shareholders. This discussion leads to the formation of following hypothesis;

- H4: There is significant negative impact of director ownership on firm performance

2.6. Institutional Ownership and Firm Performance

Corporate governance theories present differing perspectives of the presence of institutional ownership (IO) in the ownership structure of firms. Notable, institutional ownership in the advanced economies like America and United Kingdom has swiftly amplified in past decades and interestingly, it is also in mounting trend in the developing economies (Baker & Jabbouri, 2017). Agency theory proponents favor high institutional ownership in ownership structure as an effective external control mechanism. They argue that their enhanced monitoring skills lessen the need of capital markets as external monitoring system (Shleifer & Vishny, 1997). On the other side, signaling theory proponents believe that the positive signal of presence of institutional owners specifies slighter need to pay additional dividends as a measure of good firm performance.

Empirically, numerous previous studies identify varying influence of institutional ownership on firm performance and other corporate governance mechanisms (Akbar et al., 2020; Din et al., 2022; Farooq, Noor & Ali, 2021; Hassan et al., 2023; Meilanda, Syalwa, Adhilah & Mukhtaruddin, 2025; Naz et al., 2024; Ozdemir, 2020; Udin, Khan & Javid, 2017; Waheed & Malik, 2019; Waheed & Malik, 2021; Wang et al., 2020; Yahaya & Yusuf, 2025). Meilanda et al. (2025) find that institutional ownership performs either active monitoring, passive monitoring or exploitation roles in different contexts. Yahaya and Yusuf (2025) in a study on 150 Nigerian firms from 2014-2023 and Balagobei (2024) in Sri Lanka find a positive significant relationship between institutional ownership and firm performance due to their enhanced ability, skills and knowledge. Similarly, Din et al. (2022) uses GMM analysis technique and finds that institutional ownership shows significant positive impact on ROE and market-to-book ratio. This positive relationship supports the “active monitoring” perspective and is consistent with other studies (Yan & Zhang, 2009; Yeh, 2019). Contrary to it, Rashid (2020) in manufacturing firms and Hameed et al. (2024) on accounting measures of performance in textile firms of Pakistan find insignificant impact of institutional ownership. Whereas, Wang et al. (2020) find that institutional ownership in Pakistan shows significant negative influence on TQ and market-to-book ratio. Hardan et al. (2026) also find that institutional ownership negatively influences the financial sustainability in listed firms of Palestine Jordan with the possible reason of economic and political situation prevalent in those countries. Similarly, Abedin, Haque, Shahjahan and Kabir (2022) also mention that institutional ownership influences firm performance negatively through abnormal stock returns. Boshnak (2023) in Saudi Arabia, Yasser et al. (2017a) and Akbar et al. (2020) also show consistent findings. Whereas, Khan et al. (2025) finds mixed results of relationship of IO with ROA, ROE, TQ and market-to-book ratio in Bangladesh by applying 2SLS method and find IO to influence TQ negatively. These evidences support “passive monitoring” perspective.

Elyasiani and Jia (2010) find that institutional ownership influences several corporate governance variables. For instance, Nkem (2014) identifies negative relationship between board size and institutional ownership. Whereas, Hassan et al. (2023) and Yasser et al.

(2017a) find board size and outside directors to be positively related and female directors to be negatively related to institutional ownership. Yaseer et al. (2017a) find that female directors have negative relationship with institutional ownership. Whereas, Wang et al. (2020) find female directors to be positively related to institutional ownership. Waheed and Malik (2021) in context of Pakistan also find that higher level of institutional ownership shows significant and negative moderating relationship between board size and TQ. They suggest that large institutional owners attempt to discourage larger boards in order to enhance the decision-making efficiency. Furthermore, Waheed and Malik (2021) also find positive moderating impact of institutional ownership on relationship between independent directors and TQ. They suggest that large institutional owners encourage the presence of more outside directors in order to enhance transparency and supervision of board decisions. Similarly, Naz et al. (2024) also find significant moderating influence of institutional ownership on relationship of board characteristics with TQ and market-to-book ratio. They suggest that institutional ownership is found to discourage larger boards, encourage female directors and outside directors on firm performance in Pakistan. On the basis of above discussion regarding crucial role of institutional ownership in enhancing firm performance, this study formulates the following hypothesis;

- H5: Institutional ownership significantly moderates between the relationship of board characteristics and firm performance

3. Methodology

The research design of this study is based on panel data design. Sample of this study is based on the biggest manufacturing sector companies of Pakistan. All Pakistan stock exchange (PSX) listed firms which are involved in textile manufacturing from 2012 to 2023 are considered as population of study. Total number of these companies is 139 which are listed under 6 sectors. Default, merged, delisted and incomplete data firms are excluded from final sample and sample of 858 firm year observations of 75 firms are finally considered for analysis. Majority secondary data is collected manually from annual reports of firms. Pakistan stock Exchange (PSX) websites, SBP financial statements analysis reports and company websites are the other sources of data collection.

3.1 Analysis Model

The panel data analysis models are divided into three forms, which include pooled OLS (ordinary least square) model, random effects (RE) model and fixed effects (FE) model. This is the main issue in panel data sets to choose an appropriate regression model because incorrect model can lead to biased estimates. Therefore, firstly, Breusch and Pagan Lagrange Multiplier Test (LM test) is used to choose between pooled OLS method or the random effects (RE) model. Secondly, Hausman specification test is used to choose from FE model or RE model.

Baum (2006) argue that results of pooled OLS become unrealistic in models facing the issue of heteroskedasticity or/and serial correlation. The current study confronts the issue of heteroskedasticity and autocorrelation so pooled OLS is not considered appropriate. Consequently, the Hausman specification test is used to choose from RE and FE model. Stock and Watson (2011) recommend to choose FE model when p-value is significant at 1% level. Therefore, the fixed effects model is used to estimate the effect of the independent and moderating variables on the dependent variables in this study.

In order to deal with the dynamic nature of CG and performance relationship, the dynamic panel estimation through generalized method of moments estimator (Roodman, 2009) is used. In addition to fixed effect regression, the dynamic estimator of GMM is preferable for numerous reasons. Since the analyzed data in the current study is both cross sectional and time series in nature, so in order to address the troubles of unobserved heterogeneity, simultaneous and dynamic endogeneity, the study uses the advanced panel data estimation technique of system GMM.

In particular to this study, fixed effect regression in equation 3.1 and equation 3.2 considered appropriate where firm performance is measured through Tobin' Q and Market-to-book ratio. Econometric model for the study is as follows;

$$Firmperform_{it} = \alpha_0 + \beta_1 Boardsize_{it} + \beta_2 Femaledir_{it} + \beta_3 Outsidedir_{it} + \beta_4 Directorown_{it} + \beta_5 Firmsize_{it} + \beta_6 Lev_{it} + \varepsilon_t \quad (\text{equation 3.1})$$

$$Firmperform_{it} = \alpha_0 + \beta_1 Boardsize_{it} + \beta_2 Femaledir_{it} + \beta_3 Outsidedir_{it} + \beta_4 Directorown_{it} + \beta_5 Instiown_{it} + \beta_6 Firmsize_{it} + \beta_7 Lev_{it} + \beta_8 Boardsize \times Instiown_{it} + \beta_9 Femaledir \times Instiown_{it} + \beta_{10} Outsidedir \times Instiown_{it} + \varepsilon_t \quad (\text{equation 3.2})$$

In the above equation, firm performance ($Firmperform_{it}$) is measured through TQ_{it} and *Market-to-Book ratio* (MTB_{it}). Tobin's Q (TQ_{it}) is the "book value of debt plus market value of common stock equity divided by the book value of assets". MTB_{it} is "ratio of market value of share to book value of share of common stock equity". Board size ($Boardsize_{it}$) is "total number of directors on board". Female directors ($Femaledir_{it}$) is considered as dummy variable with value of 1 if female directors are present on board otherwise 0. Outside directors ($Outsidedir_{it}$) is the "ratio of sum of non-executive and independent directors divided by board size". Institutional ownership ($Instiown_{it}$) is measured as the "shares owned by institutional shareholders". Director ownership ($Directorown_{it}$) is measured as the "ratio of shares owned by directors, their spouse and minor children divided by total number of outstanding shares".

Firm size and leverage are taken as control variables in this study. Firm size ($Firmsize_{it}$) is measured as "log of net sales". Many studies consider firm size as control variables with the concept that size of firm can impact the performance of firm (Hardan et al., 2026; Karim et al., 2023; Naz et al, 2024; Waheed & Malik, 2021; Yasser et al., 2017). Leverage (Lev_{it}) is measured as "ratio of total debt to total assets". Many previous studies use leverage as

control variable because presence of debt in firm can enhance firm performance if utilized efficiently (Karim et al., 2023; Naz et al, 2024; Waheed & Malik, 2019; Waheed & Malik, 2021; Yasser et al., 2017).

4. Results and Discussion

4.1. Descriptive Statistics

Table 1 shows the descriptive statistics of variables after winsorization of certain variables in order to treat the outliers. Mean value of TQ_{it} is 0.7906 with standard deviation of 0.2277. Mean value of MTB_{it} is 0.5404 with standard deviation of 0.4051. Boardsize_{it} shows mean value of 7.667 with minimum value of 6 and maximum value of 11. Female_{it} has mean value of 0.6444 and is a dummy variable with minimum value of 0 and maximum value of 1. Outsided_{it} shows mean value of 0.7027 with standard deviation of 0.1279. It shows minimum value of 0.2857 and maximum value of 0.9. Directorown_{it} has mean value of 0.4548 with minimum value of 0.00003 and maximum value of 0.9844. Instown_{it} shows average value of 0.0667 with minimum value of 0 and maximum value of 0.3211. Firmsize_{it} shows mean value of 22.2672 and Lev_{it} has mean value of 0.5496.

Table 1: Descriptive Statistics

Symbol	Obs	Mean	Std. Dev.	Minimum	Maximum
TQ _{it}	876	0.7906	0.2277	0.409	1.3093
MTB _{it}	876	0.5405	0.4051	0.062	1.595
Boardsize _{it}	883	7.667	1.0091	6	11
Female _{it}	883	0.6444	0.479	0	1
Outsided _{it}	883	0.7027	0.1279	0.2857	0.9
Directorown _{it}	883	0.4548	0.2771	0.00003	0.9844
InstOwner _{it}	883	0.0667	0.0676	0	0.3211
Firmsize _{it}	865	22.2672	1.6158	14.3751	25.9896
Lev _{it}	883	0.5496	0.2195	0.0325	1.3544

4.2 Correlation Analysis and Multicollinearity

Table 2 below presents the results of correlation matrix and multicollinearity. Correlation matrix illustrates the relationship of TQ_{it} and MTB_{it} with CG variables. Board size is positively related with TQ_{it} and MTB_{it} whereas female directors and outside directors are negatively related with TQ_{it} and MTB_{it}. Director ownership is positively related with TQ_{it} and negatively related with MTB_{it}. Institutional ownership is positively related with TQ_{it} and MTB_{it}. Control variables including firm size and leverage are positively related with

TQ_{it} and MTB_{it}. However, correlation result indicates that there is no problem of multicollinearity, because correlation coefficient of all variables is below the threshold of 0.80 and the VIF values of each independent variable is also below 5 as suggested by Gujarati (2009).

Table 2: Correlation Matrix and Variance Inflation Factor

	TQ _{it}	MTB _{it}	Boardsize _{it}	Female dir _{it}	Outside dir _{it}	Director own _{it}	Instiown _{it}	Firmsize _{it}	Lev _{it}	VIF
TQ _{it}	1									
MTB _{it}	0.7177	1								
Boardsize _{it}	0.0034	0.0697	1							1.12
Femaledir _{it}	-0.1378	0.1627	0.0316	1						1.05
Outsidedir _{it}	-0.0585	0.0253	0.1619	0.1135	1					1.12
Director own _{it}	0.0218	-0.0086	0.0059	0.0916	-0.2321	1				1.27
Instiown _{it}	0.004	0.0132	-0.0328	0.1704	0.0706	-0.4077	1			1.26
Firmsize _{it}	0.0799	0.0991	0.2394	0.0561	0.0805	-0.1397	0.2009	1		1.13
Lev _{it}	0.5991	0.0802	-0.1464	-0.0012	-0.0913	-0.0329	0.0654	0.0714	1	1.04

4.3 Panel Data Regression

Table 3 below shows the results of analysis on panel data. Analysis is performed firstly by using fixed effect regression in case of baseline model. Boardsize_{it} is insignificant in case of TQ_{it} (coefficient = -0.0045, standard error = 0.0076) and MTB_{it} (coefficient = -0.0179, standard error = 0.0189) and is consistent with (Abdoush et al., 2022; Akbar et al., 2020). It shows that board size has insignificant impact on firm performance. Femaledir_{it} shows significant positive impact on TQ_{it} (coefficient = 0.0281*, standard error = 0.0148) and insignificant impact on MTB_{it} (coefficient = 0.0578, standard error = 0.0368). Positive impact of female directors is consistent with agency theory and resource dependence theory. It is also consistent with (Husnain et al., 2021; Wang et al., 2020). This positive impact shows that female directors contribute positively towards firm performance enhancement in Pakistani firms. Outsidedir_{it} shows insignificant impact on TQ_{it} (coefficient = -0.0221, standard error = 0.0484) and MTB_{it} (coefficient = -0.0023, standard error = 0.12). It shows consistency with the findings of (Ali et al., 2019; Talalwa et al., 2024). This insignificant impact of outside directors shows passive role of outside directors in Pakistani firms. Directorown_{it} shows significant negative impact on TQ_{it} (coefficient = -0.109***, standard error = 0.0416) and MTB_{it} (coefficient = -0.173*, standard error =

0.103). Significant negative impact of director ownership shows the presence of type-II agency issue and is consistent with previous studies (Farooq & Manzoor, 2019; Im & Chung, 2017). Director ownership shows significant negative impact on TQ at 1% level of significance which confirms the expropriation effect of directors and shows that controlling shareholders (directors) prioritize their personal interests over the interests of minority shareholders.

Firm size and leverage are used as control variables in this study. Firm size shows significant negative impact on TQ_{it} (coefficient = -0.0406***, standard error = 0.0089) and MTB_{it} (coefficient = -0.0972***, standard error = 0.0221) at 1% level of significance and is consistent with (Daniyal & Rafique, 2024; Waheed & Malik, 2021). It shows that larger firms have significant detrimental impact on market performance of textile firms of Pakistan. Lev_{it} shows significant positive impact on TQ_{it} (coefficient = 0.641***, standard error = 0.0336) and MTB_{it} (coefficient = 0.0862, standard error = 0.0836) and is consistent with (Waheed & Malik, 2021). Significant positive impact of leverage on firm market performance at 1% level of significance shows that firms efficiently use the debts to enhance their performance.

Table 3: Fixed Effect Regression

Variable	TQ _{it}	MTB _{it}
Boardsize _{it}	-0.0045	-0.0179
	(0.0076)	(0.0189)
Femaledir _{it}	0.0281*	0.0578
	(0.0148)	(0.0368)
Outsidedir _{it}	-0.0221	-0.0023
	(0.0484)	(0.12)
Directorown _{it}	-0.109***	-0.173*
	(0.0416)	(0.103)
Firmsize _{it}	-0.0406***	-0.0972***
	(0.0089)	(0.0221)
Lev _{it}	0.641***	0.0862
	(0.0336)	(0.0836)
Constant	1.335***	2.623***
	(0.197)	(0.49)
Observations	858	858
No. of firms	75	75
R-squared	0.409	0.15

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

4.3.1 System Generalized Method of Moments

The advanced panel data estimation technique of system GMM allows for lagged dependent variable and unobserved individual-specific effects in the specification which contributes towards consistent and unbiased estimates of other parameters and leads to a more influential model (Lucey and Zhang, 2011). In developing the GMM estimation, it is commonly assumed that the error terms in the model are uncorrelated with a set of explanatory variables (Arellano and Bond, 1991). This method efficiently picks the estimator of parameters so that the correlations between error terms and the explanatory variables are nearly close to zero.

Table 4 below shows the results of system GMM analysis. System generalized method of moments (Roodman, 2009) is used to analyze baseline model as a robustness test. Lagged value of TQit is significant at 1% level of significance with positive coefficient value (coefficient = 0.722***, standard error = 0.0808). Lagged value of MTBit is significant at 1% level of significance with positive coefficient value (coefficient = 0.684***, standard error = 0.081). Boardsizeit shows significant positive impact on TQit (coefficient = 0.0324***, standard error = 0.0112) and MTBit at 1% level of significance (coefficient = 0.0672***, standard error = 0.0202). It shows that board size has significant positive impact on firm market performance. It shows that larger boards help to enhance performance of Pakistani manufacturing firms. It shows consistency with the resource dependence theory. It is consistent with previous studies in Pakistan (Athar et al., 2023; Chandani & Ahmed, 2021; Gull et al., 2013; Husnain et al., 2021; Naz et al., 2024). Similarly, Ramadan and Hassan (2021) in Egypt in case of TQit, Mishra and Kapil (2017) in India, Puni and Anlesinya (2020) in Ghana and Queiri et al. (2021) in Oman show consistent results. Whereas, Al-Shaer et al. (2024) in Qatar and Al Farooque et al. (2020) in Thailand identify insignificant impact.

Femaledirit shows significant positive impact on TQit at 10% level of significance (coefficient = 0.117*, standard error = 0.0684) and insignificant impact on MTBit (coefficient = -0.0674, standard error = 0.136). Significant positive impact of presence of female directors is consistent with the agency theory and resource dependence theory. It is also consistent with previous studies in Pakistan (Al-Matari, 2024; Husnain et al., 2021; Naz et al., 2024; Wang et al., 2020). Both of these theories encourage gender diversity. It is also consistent with (Abdullah et al., 2024) in Bangladesh. Whereas, Talalwa et al. (2024) in case of Palestine find negative impact of female directors on firm performance. Whereas, Fatma and Chouaibi (2023) identify in case of European financial firms that presence of female directors is positively related to Tobin' Q. Outsidedirit shows insignificant impact on TQit (coefficient = -0.0931, standard error = 0.0583) and significant negative impact on MTBit at 5% level of significance (coefficient = -0.231**, standard error = 0.102). Significant negative impact of outside directors shows consistency with stewardship theory and is consistent with previous studies in Pakistan (Abdullah et al., 2024; Karim et al., 2023; Husnain et al., 2021; Muhammad et al., 2016; Naz et al.,

2024). It highlights the dominance of inside directors in corporate boards of Pakistani manufacturing firms and the recessive role of outside directors. It shows that outside directors do not perform the supervisory role efficiently in one-tier board structure in Pakistan. This finding is also consistent in a study in Bangladesh (Abdullah et al., 2024). Whereas, Boachie (2023) in Ghana and Al Farooque et al. (2020) in Thailand report positive impact of outside directors on firm performance due to the difference in economic and institutional arrangements.

Directorownit shows significant negative impact on TQit (coefficient = -0.0399*, standard error = 0.0208) at 10% level of significance and shows insignificant results with MTBit (coefficient = -0.053, standard error = 0.0384). Insignificant impact of director ownership is consistent with previous study in Ghana (Boachie, 2023). It indicates that in Ghana, director ownership does not contribute significantly towards firm performance. Significant negative impact of director ownership shows that concentrated directors discourage the firm performance. It indicates the presence of type-II agency conflict between concentrated directors and minority shareholders. Significant negative impact of director ownership is consistent with previous studies (Farooq & Manzoor, 2019; Im & Chung, 2017; Muttakin et al., 2012). Similarly, Karim et al. (2023) also report negative but insignificant impact on firm performance in Malaysia and confirm the entrenchment effect of director ownership. Whereas, McConnell and Servaes (1990) in a study of U.S. firms, confirm the positive relationship under 5% insider ownership. Firmsizeit shows significant negative impact on TQit (coefficient = -0.0139***, standard error = 0.0044) and MTBit at 1% level of significance (coefficient = -0.0302***, standard error = 0.0066). It indicates that larger firms are showing poor performance and is consistent with previous studies in Pakistan (Husnain et al., 2021; Naz et al., 2024; Waheed & Malik, 2021). Levit shows significant positive impact both on TQit (coefficient = 0.292***, standard error = 0.0469) and MTBit (coefficient = 0.113**, standard error = 0.0526). It indicates that the manufacturing firms of Pakistan make good use of debt to enhance their performance and is consistent with previous studies in Pakistan (Naz et al., 2024; Waheed & Malik, 2021).

The consistency and reliability of S-GMM estimator procedures are tested using two standard diagnostic tests. The over-identifying restriction is tested using Sargan's test misspecification test. Afterward, the Arellano and Bond (1991) tests for first-order serial correlation (AR (1)) and second-order serial correlation (AR (2)) of the residuals are applied to verify the efficiency of model estimations using GMM approach. Arellano-Bond test for AR1 in this study reports the results of first order autocorrelation ($z = -4.55$, $Pr > z = 0.000$) in case of TQit and ($z = -3.70$, $Pr > z = 0.000$) in case of MTBit. Arellano-Bond test for AR2 reports the results of second order autocorrelation ($z = 1.19$, $Pr > z = 0.235$) in case of TQit and ($z = -0.26$, $Pr > z = 0.796$) in case of MTBit. Sargan test of overidentification restriction 13.45 (0.705) report the results of instrument validity and indicate that the instruments used in this study are valid.

Table 4: Generalized Method of Moments (GMM)

Variable	TQ _{it}	MTB _{it}
<i>L.TQ_{it} / L.MTB_{it}</i>	0.722***	0.684***
	(0.0808)	(0.081)
<i>Boardsize_{it}</i>	0.0324***	0.0672***
	(0.0112)	(0.0202)
<i>Femaledir_{it}</i>	0.117*	-0.0674
	(0.0684)	(0.136)
<i>Outsidedir_{it}</i>	-0.0931	-0.231**
	(0.0583)	(0.102)
<i>Directorown_{it}</i>	-0.0399*	-0.053
	(0.0208)	(0.0384)
<i>Firmsize_{it}</i>	-0.0139***	-0.0302***
	(0.0044)	(0.0066)
<i>Lev_{it}</i>	0.292***	0.113**
	(0.0469)	(0.0526)
Constant	0.194**	0.396*
	(0.0925)	(0.202)
Observations	780	780
No. of firms	75	75
Year effect	Yes	Yes
Firm effect	Yes	Yes
Arellano-Bond test for AR1	$z = -4.55$	$z = -3.70$
	$pr > z = 0.000$	$pr > z = 0.000$
Arellano-Bond test for AR2	$z = 1.19$	$z = -0.26$
	$pr > z = 0.235$	$pr > z = 0.796$
Sargan test of overid. Restrictions	Chi 2(17) = 20.25	Chi 2(17) = 13.45
	Pr>Chi2=0.262	Pr>Chi2=0.705

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

4.3.2 Moderating Influence of Institutional ownership

Table 5 below relates to the results of moderating influence of institutional ownership. Institutional ownership is considered as moderating variable between the relationship of board characteristics and firm performance. Robustness analysis is performed by replacing TQit with MTBit as dependent variable. Instiownit shows significant negative moderating impact on relationship between Boardsizeit and Instiownit (coefficient = -0.187**, standard error = 0.0935) at 5% level of significance. It indicates that institutional owners discourage larger boards and follow agency theory postulate. It is consistent with the findings of (Naz et al., 2024; Waheed & Malik, 2021). They also show negative moderating influence of institutional ownership between board size and firm performance. It is because, in most manufacturing firms of Pakistan, controlling families dominate the corporate boards (Javid & Iqbal, 2008) which results in increase in board size. Institutional ownership, in this regard, decreases their authoritative power. Instiownit shows insignificant moderating impact on relationship between Boardsizeit and MTBit (coefficient = 0.0364, standard error = 0.233).

Instiownit shows insignificant moderating impact on relationship between Femaledirit and TQit (coefficient = 0.128, standard error = 0.159). It is consistent with (Naz et al., 2024) in Pakistan. Instiownit shows significant positive moderating impact on relationship between Femaledirit and MTBit (coefficient = 0.686*, standard error = 0.396) at 10% level of significance. This shows that institutional owners encourage the presence of female directors and is consistent with agency theory and resource dependence theory perspective. Significant impact in case of MTBit is also consistent with (Naz et al., 2024) in case of Pakistan. Instiownit shows insignificant moderating impact on relationship between Outsidedirit and TQit (coefficient = -0.186, standard error = 0.541). Furthermore, Instiownit shows significant positive moderating impact on relationship between Outsidedirit and MTBit (coefficient = 2.280*, standard error = 1.344) at 10% level of significance. It shows that institutional owners encourage the presence of outside directors and favor agency theory and resource dependence theory perspective. It is because in Pakistan, family firms hold a significant portion in ownership and directorship (Fatima et al., 2018; Hasan et al., 2023) and outside directors perform supervisory and monitoring role to ensure that decisions taken by executive directors are in the best interest of all shareholders. These findings are also consistent with other studies in Pakistan (Naz et al., 2024; Waheed & Malik, 2021).

The moderating analysis shows that institutional ownership is a significant moderating variable for the relationship between board characteristics and firm performance. It is found to have significant moderating impact on relationship between board characteristics including board size, female directors and outside directors and is consistent with the perspective of agency theory and resource dependence theory. Considering the agency theory (Jensen & Meckling, 1976), institutional owners discourage larger boards,

encourage presence of female directors and encourage the presence of outside directors. The certain findings of this study are in consistence to the agency theory postulates and certain other findings are consistent with Resource dependence theory. Resource dependence theory (Donaldson and Davis, 1991) favors larger boards, presence of female directors and outside directors in corporate boards.

Table 5: Moderating Influence of Institutional Ownership

Variable	TQ _{it}	MTB _{it}	TQ _{it}	MTB _{it}	TQ _{it}	MTB _{it}
Boardsize _{it}	0.0090	-0.0197	-0.0045	-0.0191	-0.0040	-0.0176
	(0.01)	(0.025)	(0.0076)	(0.0189)	(0.0076)	(0.0189)
Femaledir _{it}	0.0282*	0.0513	0.015	-0.0027	0.0254*	0.0481
	(0.0148)	(0.037)	(0.0195)	(0.0484)	(0.0148)	(-0.0368)
Outsidedir _{it}	-0.0144	0.0258	-0.0098	0.0176	0.0026	-0.112
	(0.0483)	(0.121)	(0.0484)	(0.12)	(0.0582)	(0.145)
Directorwn _{it}	-0.113***	-0.192*	-0.122***	-0.208**	-0.120***	-0.179*
	(0.0414)	(0.103)	(0.0416)	(0.104)	(0.0415)	(0.103)
Instiown _{it}	0.955	-1.166	-0.494***	-1.129***	-0.333	-2.333**
	(0.715)	(1.786)	(0.153)	(0.382)	(0.37)	(0.921)
Boardsize _{it} x Instiown _{it}	-0.187**	0.0364				
	(0.0935)	(0.233)				
Femaledir _{it} x Instiown _{it}			0.128	0.686*		
			(0.159)	(0.396)		
Outsidedir _{it} x Instiown _{it}					-0.186	2.280*
					(0.541)	(1.344)
Firmsize _{it}	-0.0395***	-0.0948***	-0.0400***	-0.0984***	-0.0391***	-0.0979***
	(0.0088)	(0.022)	(0.0089)	(0.0221)	(0.0089)	(0.0221)
Lev _{it}	0.646***	0.104	0.649***	0.099	0.651***	0.0862
	(0.0336)	(0.0838)	(0.0336)	(0.0835)	(0.0338)	(0.0841)
Constant	1.245***	2.649***	1.364***	2.764***	1.326***	2.789***
	(0.201)	(0.502)	(0.199)	(0.494)	(0.2)	(0.497)
Observations	858	858	858	858	858	858
No. of firms	75	75	75	75	75	75
R-squared	0.419	0.157	0.417	0.16	0.416	0.16

Standard errors in parentheses *** p<0.01, ** p<0.05, * p<0.1

5. Conclusion

This study serves three main purposes. Firstly, this study reinvestigates the relationship between board characteristics, ownership structure and firm performance in light of agency theory, resource-dependence theory and stewardship theory due to inconsistent previous findings. Majority findings of this study are consistent with the perspective of agency theory and resource dependence theory. In general, the findings indicate that larger boards and female directors are encouraged in manufacturing firms of Pakistan. Whereas, the outside directors impact the firm performance negatively. It indicates the dominance of inside directors and passive role of outside directors in manufacturing firms of Pakistan. Due to the prevalence of one-tier board structure and the dominance of inside directors, the supervisory role of outside directors remains passive. The passive role of outside directors is also documented in previous literature on Pakistani manufacturing firms.

Secondly, this study is related to the influence of director ownership on firm performance. The results indicate that the director ownership in Pakistani manufacturing companies is high and director ownership has significant negative impact on firm performance in these manufacturing companies. This indicates the presence of agency issue related to director ownership. Concentrated directors work to benefit themselves. This involves expropriation effect because concentrated directors prioritize their personal interests over the interests of minority owners. Some of the previous studies in context of Pakistan also report expropriation effect of director ownership.

Thirdly, this study investigates the moderating influence of institutional ownership on relationship between board characteristics and firm performance due to the importance of institutional owners as important external control mechanism and limited work done in context of developing countries. The study confirms the postulates of agency theory regarding the ownership of institutional owners. The presence of more institutional owners in the corporate ownership structure help to mitigate the agency issue created by high director ownership. This study highlights that institutional owners help to enhance the corporate governance practices in manufacturing firms of Pakistan and their presence in ownership structure has a significant moderating influence on board characteristics – firm performance relationship. The role of institutional ownership as important external control mechanism is also highlighted in previous literature related to Pakistan.

5.1 Theoretical Implications

Findings of this study embrace strong theoretical support from agency theory and resource dependence theory. Theoretically, this study is important because it enhances the existing body of literature by highlighting the role of important concepts of board characteristics, director ownership and institutional ownership in manufacturing firms of Pakistan. Influence of board size and female directors support the postulates of agency theory and resource dependence theory, whereas, the findings of influence of outside directors on firm

performance do not support the perspective of agency theory and resource dependence theory. Furthermore, Institutional ownership acts as external control mechanism to monitor the management and force them to take decisions which are in the best interest of all shareholders. Agency theory postulates that institutional owners through their strong voting right can influence the management for favorable firm decisions.

This study is conducted in context of a developing country where limited work is done in context of role of institutional ownership in enhancing firm performance with the contradictory findings. Furthermore, moderating influence of institutional ownership between board characteristics and firm market-based performance is least explored. Therefore, this study fills this important research gap of moderating influence of institutional ownership regarding implication of agency theory in such a developing economy which is attributed with weak legislation and minimal protection of investors' rights. Furthermore, institutional ownership acts as external control mechanism to monitor the management and force them to take decisions which are in the best interest of all shareholders. Agency theory postulates that institutional owners through their strong voting right can influence the management for favorable firm decisions.

5.2 Practical Implications

Practically, this study has implications especially for corporate directors, government and the regulatory institutions of Pakistan. On basis of findings of this study, the regulatory institutions including Securities and Exchange Commission of Pakistan can devise sound policies and regulations for effective functioning of corporate boards and protecting rights of institutional owners. The regulatory authorities especially Securities and Exchange Commission of Pakistan should pass amendments in codes of corporate governance to increase the ownership of institutional owners in the firm ownership structure. Specific guidelines regarding ownership structure are lacking in codes of corporate governance of Pakistan. It is because the institutional owners are an important component of firm ownership structure and is found to be the significant external control mechanism to mitigate the agency conflict created by high director ownership. Furthermore, the regulatory authorities must also take steps and devise sound policies to reduce the director ownership in manufacturing firms of Pakistan. So that concentrated directors may not harm the benefits of minority owners. In addition, regulatory authorities must also devise a sound mechanism and amendments in codes of corporate governance regarding the business of non-executive directors on basis of their directorship in more firms. It will help to enhance the supervisory function of outside directors and they will find sufficient time to counter check and monitor the performance of executive directors. The regulatory authorities also need to monitor the effective compliance of corporate governance mechanisms practiced by the listed firms.

Furthermore, the other emerging economies can also relish these findings regarding ownership structure variable. Like, the emerging economies can reduce the concentrated ownership of directors and can increase the institutional ownership as an effective external

control mechanism. Additionally, emerging economies can also enhance the proportion of female directors who belong to different ethnicities in order to bring diverse set of skills and experiences to the boardrooms.

5.3 Limitations and Future Research

In spite of great theoretical and practical contribution, this study is not free from limitations. The sample size is limited and represents only one developing country. This study is also restricted to the manufacturing firms only. Ownership structure is an important component of corporate governance and only director ownership and institutional ownership is included in this study. Future studies are encouraged to enhance the scope of their study by enhancing the sample size, incorporating more corporate governance variables and also analyze their impact on the accounting-based firm performance variable. Furthermore, director ownership is found as a significant variable in this study. The future studies are encouraged to consider director ownership as moderating variable. Other ownership structure variable like foreign ownership should also be taken as moderator to elaborate their impact on relationship between board characteristics and firm performance. Furthermore, the impact of percentage of shares held by executive directors on firm performance should also be assessed. Family ownership is dominating more specifically in manufacturing firms of Pakistan. Therefore, family ownership and family directorship can also be included as important variables in future researches.

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Availability of Data

The dataset is available from the corresponding author upon reasonable request.

Declaration of AI Use

In this research paper no AI tool is used in either generating or rephrasing the text. No AI tool was used for generating data, analysis, or the core intellectual content of the study. The theoretical arguments, methodology, results, and interpretations were entirely developed by the authors.

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