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The Asymmetric Effect of Board Diversity on Firm Risk and Working Capital Policies: Evidence from Panel Quantile Regression

Ammar Nawaz Khan[1] | Farzan Yahya[2*] | Muhammad Waqas[3]

1. Department of Business Administration, Institute of Southern Punjab, Multan, Pakistan. Email: niazi.ammar@gmail.com
2. Corresponding Author, Department of Business Administration, Institute of Southern Punjab, Multan, Pakistan. Email: farzan.yahya@yahoo.com
3. Department of Economics and Management, Jiangsu University of Science and Technology, China. Email: mwaqas@ujs.edu.cn

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ABSTRACT

The present study aimed to investigate the asymmetric effects of board gender diversity (BGD) and board financial expertise (BFE) on firm performance, riskiness, and working capital management (WCM). Using panel quantile regression and unbalanced panel data of energy firms in Pakistan over the period 2010 to 2020, the findings suggest that female directors on boards are weak monitors and their presence is merely symbolic. There is no significant effect of BGD on firm performance or WCM. Their incapability to restrict managerial opportunism promotes excessive risk-taking in the firm. On the other hand, financial experts on board uplift low- and moderate-performing firms and restrict the risk-taking behavior when the riskiness of the firm reaches a certain level. Furthermore, they improve the working capital of the firms when aggressive WCM policies are pursued by firms' managers.

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1. Introduction

The inability of firms to cope with the financial crisis due to weak corporate governance systems has turned the attention of policymakers to strengthening board structures (Aloui & Jarboui, 2018). Thus, the idea to evaluate the leading board characteristics to improve decision-making effectiveness has become one of the organizational goals. One of the commonly addressed topics in corporate governance literature is board diversity. Optimally diverse boards based on gender, expertise, skills, age, and experience perform the better supervisory role and eventually improve the firm performance (Aggarwal et al., 2019; Shehata et al., 2017). Among other aspects, board gender diversity (BGD) is the most discussed characteristic in the previous literature as gender equality and women empowerment is the fifth case in the 17 Sustainable Development Goals (SDGs) (Agarwal, 2018).

Women's underrepresentation in top management positions has gained ample attention from academicians and practitioners. Especially in Asian countries, women are still encountering a glass ceiling when they thrive to achieve the board position (Yahya et al., 2020). There is a dire need to increase the representation of women on board due to their ability to make effective decisions, improve board monitoring (Conyon & He, 2017), reduce the firm's excessive risk (Qayyum et al., 2021; Yahya et al., 2020), mitigate tax aggressiveness (Yahya et al., 2021), improve earnings quality (Orazalin, 2020), and reduce excessive cash holdings of the firm (Atif et al., 2019). Nonetheless, there is also empirical evidence that suggests negative or no significant effect of female directors' presence on board (Marinova et al., 2016; Matsa & Miller, 2013). Additionally, a strand of literature asserted the positive effect of female directors on a firm's decisions or performance only when they achieve a critical mass (Qayyum et al., 2021; Tleubayev et al., 2020; Wiley & Monllor-Tormos, 2018).

In the light of this mixed evidence, we based our argument in line with Conyon and He (2017) and posited that unique qualities and viewpoints of women remain underrepresented in low-performing firms due to the changes in group dynamics that emerge from the chaos provoked by declining firm performance. Nonetheless, the study of Conyon and He (2017) explored the asymmetric effect of board gender diversity only on firm performance. To further contribute to the existing literature, we evaluated the effect of BGD on a firm's risk and working capital management (WCM) policy at different quantiles. Since female directors are generally risk-averse (Palvia et al., 2015; Yahya et al., 2020), choose conservative working capital strategies (Nastiti et al., 2019), prevent managers from overinvestment (Shin et al., 2020), and are less likely to use debt financing (Wang et al., 2021), we assume that female directors increase the working capital of firms with aggressive WCM policies and mitigate the risk of high-risk firms.

While discussing board diversity, studies have also highlighted the essence of financial experts on board. Their presence on board strengthens the corporate governance structures as they mitigate agency conflicts (Sarwar et al., 2018), improve capital decisions (Gilani et al., 2021), reduce excessive cash holdings (MengYun et al., 2021), mitigate earnings management (Zalata et al., 2018), attract external financing (Ali et al., 2021; Güner et al., 2008), and lead to increase in firm's profitability (Darmadi, 2013; Kagzi & Guha, 2018). However, there is also evidence that financial experts on board take excessive risk and lead a firm to a financial crisis (Minton et al., 2014). Again, there is inconclusive evidence on the relationship between board financial expertise, firm performance, and risk-taking decisions.

Since the previous literature is more inclined toward the effective monitoring of BFE and suggests that a certain level of risk-taking is important for profitability, we purport that they take the moderate risk and improve firm performance (Liu & Sun, 2021; Nguyen, 2021). Accordingly, we assume that financial experts on board elevate the risk of low-risk firms and perform better in high-performance firms. Additionally, they decrease the working capital of firms with conservative WCM policies.

The contributions of this study are threefold. First, it is the first attempt to investigate the non-linear effect of BFE and BGD on firm risk-taking and WCM efficiency. Second, our data is based on energy firms from an emerging market. Energy supply is one of the important determinants of economic and sustainable prosperity. Nonetheless, poor energy policies in Pakistan lead the country to an extreme power crisis and declining economic growth (Rehman & Deyuan, 2018). Therefore, improving the efficiency of the energy sector in Pakistan may alleviate poverty and improve economic growth. Third, a novel technique, i.e., quantile regression, is utilized to test the hypotheses of the study. Especially in

management literature, this econometric technique is relatively new and rarely utilized in corporate governance studies.

The study is divided into several sections. Section 2 includes the literature review and hypotheses development. Section 3 discusses the research methodology including measurements of the variables, data collection process, and econometric technique. Section 4 includes empirical results and findings. Lastly, the study is concluded with a discussion of limitations and policy implications.

2. Literature Review and Hypotheses Development

The advisory and monitoring role of the diverse board is important and has been empirically established in previous studies. A growing number of studies have favored the inclusion of female directors on board due to their positive influence on a firm's strategic decisions (Hambrick, 2007; Tleubayev et al., 2020; Ullah et al., 2019). Compared to a homogenous male board, gender-diverse boards are linked with better strategic decisions as they bring unique perspectives, backgrounds, risk attitudes, and core values to the firm (Perryman et al., 2016; Yahya et al., 2020). Female directors possess advanced degrees, have better academic qualifications, and pay more attention to optimal risk-taking and CSR (Carter et al., 2010; Nadeem et al., 2019; Post & Byron, 2015). Compared to their male counterparts, women on board (WOB) are more likely to enhance the social networks of the firm (Simpson et al., 2010). Nonetheless, the BGD may differ when firm-level, market, and group dynamics change.

For instance, Post and Byron (2015) argued that WOBs perform better in countries where shareholder protection is high. These countries not only protect their shareholders but also utilize the unique capabilities of their female directors efficiently. Similarly, Triana et al. (2014) revealed that gender-diverse boards may not be able to positively influence strategic change when the threat of low performance is high. Aggarwal et al. (2019) posited a negative effect of BGD on firm value when business group affiliations are high. Solakoglu (2013) analyzed the effect of BGD on firm performance in Turkish firms and argued that the effect differs across the points of the conditional distribution. Similarly, Conyon and He (2017) examined the effect of BGD on firm performance using novel quantile regression. They argued that BGD improves the performance of high-performing firms only. High-performing firms better utilize their human and social capital and are less likely to hire female directors symbolically. Women directors perform more proactively in these firms as they have better human resource management systems and entail the ability to retain talent.

From the risk-taking perspective, a wide range of studies has labeled WOB as risk-averse (Loukil et al., 2019; Yahya et al., 2020). Nonetheless, Nadeem et al. (2019) held the view that female directors are not risk-averse. They restrict managers from taking excessive risks to avoid financial distress. Similarly, Shin et al. (2020) revealed that the presence of female directors on boards restricts managers from overinvestment and accordingly improves the investment efficiency of the firm. In tandem with the view that BGD is associated with optimal decision making, Nastiti et al. (2019) postulated that BGD opts for a conservative WCM approach without compromising a firm performance. Nonetheless, Atif et al. (2019) maintained the view that BGD is negatively associated with cash holdings. Thus, we believe that BGD may reduce excessive cash holdings but may not increase the liquidity risk of the firm. As a consequence, they influence their managers to choose a moderate level of WCM policies. Following previous literature, we theorize that firms with female directors perform better in high-performing firms. Furthermore, they reduce excessive risk of high-risk firms and increase the working capital of firms with aggressive WCM policy. Accordingly, the following hypotheses are developed:

H_1: Board gender diversity increases the firm performance of high-performing firms.
H_2: Board gender diversity decreases the risk of high-risk firms.
H_3: Board gender diversity increases the working capital of firms with the aggressive WCM policy.

Board financial expertise is another strong corporate governance mechanism. A strand of literature supports the inclusion of financial experts on board due to their superior monitoring competence and ability to increase firm value (Gaur et al., 2015; Johl et al., 2015). Nonetheless, the adverse impact of BFE is also highlighted in the literature. For instance, Minton et al. (2014) argued that the financial experts of the board were one of the reasons for excessive risk-taking before the financial crises of 2007-

2008. Although the asymmetric effects of BFE on firm performance, risk-taking, and WCM efficiency are not explored, we purport that the effectiveness of BFE is also contingent upon several factors.

Gilani et al. (2021) found a positive association of financial stability with BFE in US banks. Financial experts optimally manage the capital requirement of the firm and adjust their capital structure faster only when firms are below their targets. Another study by Güner et al. (2008) argued that BFE attracts external funding and debt financing only for the firms with good credit and poor investment opportunities. MengYun et al. (2021) revealed that cash holdings are negatively linked with BFE. Board financial expertise reduces excessive cash to mitigate managerial opportunism, resulting in a lower level of agency conflicts.

The study of DeFond et al. (2005) strongly supports our proposition of asymmetric BFE effect. They argue that only firms with stronger corporate governance structures may translate BFE into the market value of the firm. These firms have the ability to utilize the individuals' expertise for enhancing shareholder value. Since more profitable firms have stronger corporate governance structures, BFE may influence more proactively the firm performance in high-performing firms. Nonetheless, low- or moderate-performing firms may also appoint financial experts on board to seek better advice on financial decisions (Faleye et al., 2011). Thus, they may also exercise their power in low- or moderate-performing firms to execute value-enhancing policies. Furthermore, the risk attitude of financial experts differs from that of female directors. They may not decrease the risk of low-risk firms. As they reduce the cash holdings of the firm and avoid liquidity risk, they increase the working capital of firms with aggressive WCM approaches. Thus, based on the existing literature, we hypothesize that:

H_4: Board financial expertise increases the firm performance of high-performing firms only.
H_5: Board financial expertise decreases the risk of both moderate-risk and high-risk firms.
H_6: Board financial expertise increases the working capital of firms with aggressive WCM policy.

3. Methodology

This section is comprised of measurement of variables, data collection process, sample description, model specification, and description of non-linear econometric technique used in the study.

3.1 Measurement of Variables

There are three dependent variables in the study, i.e., firm performance, risk-taking, and working capital management efficiency. To measure firm performance, return on assets (ROA) is used. ROA is a widely utilized proxy to assess a firm's profitability or performance in previous literature (Dalci, 2018; Tleubayev et al., 2020). The risk-taking of the firm is measured with the standard deviation (S.D.) of the company's daily stock returns over a calendar year. Consistent with previous literature, annualized S.D. is utilized in our study. The annualized S.D. = $\sigma \times \sqrt{N}$, where N is the number of trading days. There are several proxies utilized in previous studies to assess working capital management efficiency. However, the cash conversion cycle (CCC) is one of the widely used measurements (Fernández-López et al., 2020) and can be computed using the following formula:

CCC = (average collection period + inventory conversion period – average payment period).

Here, higher CCC indicates conservative WCM policy while lower CCC shows an aggressive approach.

Board gender diversity and board financial expertise are independent variables of this study. They were measured as the percentage of female directors and financial experts (holding finance or accounting degrees) on board respectively (García-Sánchez et al., 2017; Yahya et al., 2021). To control the omitted variables bias, board size (natural log of the number of members on board), firm size (natural log of total assets), firm age (natural log of the number of years since the firm has been listed on the stock exchange), financial leverage (debt to equity ratio), time fixed-effects, and industry fixed-effects were used as control variables.

3.2 Data and Sample

The data of 29 energy firms over the period 2010 to 2020 was collected from the annual reports of respective firms. Although 33 energy firms are listed on the Pakistan stock exchange, the data of 4 firms were not available. The data on stock prices were collected from investing.com. Based on the available data, 268 firm-year observations were retained for the analysis.

3.3 Estimation Technique and Model

Quantile regression is utilized to examine the asymmetric relationship between our underlying variables. Quantile regression estimates conditional quantile functions and provides a more holistic view of the relationship between independent and dependent variables (Koenker & Bassett Jr, 1978; Koenker & Hallock, 2001). It also accounts for possible outliers, which is one of the problems for conventional estimation methods like ordinary least square (OLS). Linear econometric methods only predict the conditional mean between dependent and independent variables. Nonetheless, quantiles regression estimates the relationship at different quantiles and predicts the smallest (10^{th}) to largest (90^{th}) percentile (Yu et al., 2003). Previous studies that employed linear regression assumed that the effect of board characteristics are constant across the risk, performance, or WCM distribution (Khan et al., 2022; Yahya et al., 2022). Nonetheless, as proposed by previous studies (Bruna et al., 2021; Conyon & He, 2017), there is a significant parameter heterogeneity in the impact of BGD or BFE on performance measures, it is important to examine the nonlinearity between the target variables. Following previous studies, we first estimated the OLS model to compare it with the quantile regression. Accordingly, the following model was developed:

$$E(Y_{it}|E_{it}) = y_{it} = \alpha + \beta BD_{it} + \gamma_1 x_{1,it} + \ldots + \gamma_k x_{k,it} + \varepsilon_{it} \quad (1)$$

where y_{it} is the set of dependent variables (firm performance, risk-taking, and WCM efficiency) in year *t*. BD is board diversity (i.e., BFE and BFE). x1 … xk indicates the set of control variables. *t* indicates time while *i* denotes firm. The model for quantile regression is given below:

$$Q_\tau(Y_{it}|E_{it}) = y_{it} = \alpha + \beta BD_{it} + \gamma_1 x_{1,it} + \ldots + \gamma_k x_{k,it} + \varepsilon_{it} \quad (2)$$

where $Q_\tau(Y_{it}|E_{it})$ is the τ^{th} quantile regression function. We divided the quantile distribution from the 10^{th} percentile to the 90^{th} percentile. The lowest quantiles, i.e., 10^{th} to 30^{th} percentiles were considered low-performing firms, low-risk firms, and aggressive WCM policy firms. Moderate quantile (30^{th} to 60^{th}) were considered moderate-performing, moderate-risk, and moderate WCM policy firms. Lastly, the highest quantile (70^{th} to 90^{th}) were categorized as high-performing, high-risk, and conservative WCM policy firms respectively.

4. Results and Discussion

The descriptive statistics of the study show mean, standard deviation (S.D.), and Shapiro-Wilk normality test statistics along with its *p*-values (see Table 1). Overall, it was found that the energy sector of Pakistan has a lower level of gender-diverse boards (M = 4.7%), but the number of financial expertise on board are comparatively high (M = 33%). On average, the firm's profitability is around 10 percent, indicating a moderate level of firm performance over the selected period. The average annualized volatility of energy firms in Pakistan (M= 38.5%) is substantially higher than reported by previous studies (Akbar et al., 2021; Shaikh et al., 2019). The WCM efficiency measured by the cash conversion cycle indicates a moderate level of WCM policy in the sector. Initial evidence from the correlation matrix (see Table 2) indicates a low level of profitability when the firm's riskiness is high. The presence of female directors and financial expertise on board are negatively and positively associated with firm performance respectively, suggesting that BFE better monitors energy firms than WOB. Additionally, BGD increases a firm's volatility whereas financial experts thrive to mitigate riskiness.

Table 1. Descriptive Statistics

Variable	Mean	Std. dev.	W-stat	*p*-values
BGD	0.047	0.077	0.913	0.000
BFE	0.329	0.191	0.973	0.000
ROA	0.102	0.125	0.931	0.000
Firm risk	0.385	0.292	0.567	0.000
WCM efficiency	46.041	298.797	0.705	0.000
Board size	9.622	2.337	0.981	0.001
Firm age	3.457	0.817	0.962	0.000
Firm size	17.897	2.166	0.834	0.000
Financial leverage	0.300	0.393	0.765	0.000

(Source: authors' calculations)

Table 2. Correlation Matrix

Variables	ROA	Risk	BGD	BFE	WCM	BSIZE	AGE	SIZE
Risk	-0.402	1.000						
BGD	-0.121	0.210	1.000					
BFE	0.171	-0.196	-0.343	1.000				
WCM	0.043	0.156	0.158	0.073	1.000			
BSIZE	0.020	-0.267	-0.277	0.150	-0.397	1.000		
AGE	-0.055	-0.073	-0.225	0.261	-0.234	0.550	1.000	
SIZE	0.032	-0.346	-0.150	-0.066	-0.172	0.297	0.148	1.000
FINL	0.015	-0.138	0.096	-0.022	0.144	0.053	-0.411	0.004

(Source: authors' calculations)

Note: ROA is the return on assets, Risk is the annualized S.D., BGD is the board gender diversity, BFE is the board financial expertise, WCM is the working capital management efficiency, BSIZE is the board size, AGE is the firm age, SIZE is the firm size, and FINL is the financial leverage.

The results of quantile regression (in Table 3) show that female directors do not significantly influence firm performance in the energy sector. Even their presence further hurts the low-performing firms as the coefficient at the 20^{th} percentile is negative and significant. This evidence is consistent with Qayyum et al. (2021) and Simionescu et al. (2021). With the call to increase gender diversity on board, firms in emerging markets have appointed female directors on their board. Nonetheless, their appointment is merely symbolic and they perform no value-adding activities on the board (Hoobler et al., 2018; Main & Gregory-Smith, 2018). Following Usman et al. (2018), we argue that female directors are weak monitors and CEOs gain more power in their presence to expropriate shareholders' wealth. The weak monitoring argument can be further confirmed by the asymmetric effects of BGD on a firm's risk (see Table 4). In almost all quantiles (20^{th} to 90^{th}), BGD is positively associated with firm risk.

Since Pakistan has a masculine culture, women are not expected to be competitive, assertive, and focused on material success. In such cultures, the risk reduction attribute of WOB is attenuated by their male counterparts (Mohsni et al., 2021). As women are merely given symbolic positions on board, CEOs gain power in these firms and take excessive risk by manipulating the weak corporate governance mechanisms (Lewellyn & Muller-Kahle, 2012). Our results also reveal no significant effect of BGD on WCM in any quantile except the 90^{th} quantile (see Table 5). Since the 90^{th} quantile is an indication of excess cash flows, our results further confirm managerial opportunism in the presence of female directors. Thus, the null hypothesis for H_1, H_2, and H_3 cannot be rejected. Evidence from all these firm-level variables prove that female directors on energy firms' boards are weak monitors and do not actively participate in the firm-level decisions.

On the other hand, the results of quantile regression provide strong support for the inclusion of financial experts on board. Table 6 shows the significant and positive effect of BFE on firm performance in all quantiles (except 80^{th} and 90^{th} quantiles). Financial experts on board uplift weak firms and increase their value. However, once they reach a certain level of profitability, they do not intervene in the firm decisions, if the executive managers are already opting for value-enhancing projects. This evidence is in line with the linear studies of Johl et al. (2015) and Gaur et al. (2015). In Table 7, our results reveal evidence against the study of Minton et al. (2014). There is a significant negative relationship between BFE and firm risk from 30^{th} to 80^{th} quantiles. This evidence is an indication that BFE reduces excessive risk-taking when the riskiness reaches a certain level. Lastly, our results (see Table 8) demonstrate that BFE increases the working capital of the firms with conservative WCM policies only, as the effect is significant for 20^{th} and 30^{th} quantiles only. Thus, the results partially support the H_4, H_5, and H_6 of the study. This evidence is an indication that financial experts are strong monitors and strengthen corporate governance systems in energy firms.

Table 3. Quantile Regression Results (BGD and ROA)

Variables	**Quantile levels**								
	10th	**20th**	**30th**	**40th**	**50th**	**60th**	**70th**	**80th**	**90th**
BGD	-0.293	-0.293**	-0.137	-0.118	-0.103	-0.024	-0.136	-0.148	-0.160
	(0.190)	(0.131)	(0.086)	(0.087)	(0.098)	(0.112)	(0.114)	(0.203)	(0.243)
Board size	0.167**	0.090*	0.035	0.034	0.028	0.014	-0.034	-0.038	0.035
	(0.080)	(0.055)	(0.036)	(0.037)	(0.041)	(0.047)	(0.048)	(0.086)	(0.102)
Firm age	-0.060**	-0.059***	-0.042***	-0.044***	-0.047***	-0.045***	-0.028**	-0.011	0.027
	(0.024)	(0.017)	(0.011)	(0.011)	(0.012)	(0.014)	(0.015)	(0.026)	(0.031)
Firm size	0.003	0.007	0.009**	0.005*	0.002	-0.003	-0.002	-0.001	0.003
	(0.007)	(0.005)	(0.003)	(0.003)	(0.004)	(0.004)	(0.004)	(0.007)	(0.009)
Financial leverage	-0.038	-0.020	0.010	-0.003	-0.017	-0.022	-0.013	-0.014	-0.037
	(0.042)	(0.029)	(0.019)	(0.019)	(0.021)	(0.024)	(0.025)	(0.044)	(0.053)
Constant	-0.214	-0.080	-0.042	0.051	0.162**	0.309***	0.362***	0.330*	0.057
	(0.163)	(0.112)	(0.074)	(0.075)	(0.084)	(0.096)	(0.098)	(0.174)	(0.209)

(Source: author's elaborations)

Note: *, **, *** represents significance at 10%, 5%, and 1% levels respectively. Values in parenthesis are standard errors

Table 4. Quantile Regression Results (BGD and Firm Risk)

Variables	**Quantile levels**								
	10th	**20th**	**30th**	**40th**	**50th**	**60th**	**70th**	**80th**	**90th**
BGD	0.013	0.247**	0.442***	0.408***	0.644***	0.760***	0.831***	1.408***	1.358***
	(0.094)	(0.106)	(0.104)	(0.112)	(0.117)	(0.121)	(0.262)	(0.368)	(0.565)
Board size	-0.012	-0.039	-0.035	-0.031	-0.065	-0.070	-0.122	-0.169	-0.400*
	(0.040)	(0.045)	(0.044)	(0.047)	(0.049)	(0.051)	(0.110)	(0.155)	(0.238)
Firm age	0.002	0.015	0.015	0.005	0.015	0.015	0.028	0.022	0.013
	(0.012)	(0.013)	(0.013)	(0.014)	(0.015)	(0.015)	(0.033)	(0.047)	(0.072)
Firm size	0.001	-0.012***	-0.012***	-0.008**	-0.011***	-0.016***	-0.020**	-0.046***	-0.059
	(0.003)	(0.004)	(0.004)	(0.004)	(0.004)	(0.004)	(0.009)	(0.013)	(0.020)
Financial leverage	-0.023	-0.024	-0.026	-0.060**	-0.054**	-0.064**	-0.058	-0.061	-0.058***
	(0.021)	(0.023)	(0.023)	(0.025)	(0.026)	(0.026)	(0.057)	(0.080)	(0.124)
Constant	0.209***	0.496***	0.492***	0.503***	0.604***	0.731***	0.909***	1.566***	2.458***
	(0.081)	(0.091)	(0.089)	(0.096)	(0.100)	(0.104)	(0.225)	(0.316)	(0.485)

(Source: author's elaborations)

Note: *, **, *** represents significance at 10%, 5%, and 1% levels respectively. Values in parenthesis are standard errors

Table 5. Quantile Regression Results (BGD and WCM)

Variables	Quantile levels								
	10th	20th	30th	40th	50th	60th	70th	80th	90th
BGD	223.826	96.664	42.529	17.414	-0.839	111.979	126.188	441.902	1166.016***
	(706.278)	(241.099)	(82.787)	(75.426)	(98.389)	(128.119)	(200.585)	(335.563)	(413.577)
Board size	-325.317	-117.570	-70.285**	-81.646***	-126.215***	-180.638***	-199.226***	-272.968**	-291.037*
	(297.378)	(101.515)	(34.857)	(31.758)	(41.427)	(53.944)	(84.456)	(141.288)	(174.136)
Firm age	63.592	5.053	-12.483	-16.446*	-18.207	-15.372	-24.640	-23.094	-59.458
	(89.921)	(30.696)	(10.540)	(9.603)	(12.527)	(16.312)	(25.538)	(42.723)	(52.655)
Firm size	34.372	5.789	3.844	1.546	-4.475	-5.483	-14.398**	-20.647*	-57.600***
	(25.241)	(8.616)	(2.959)	(2.696)	(3.516)	(4.579)	(7.169)	(11.992)	(14.781)
Financial leverage	95.241	73.836	43.466**	43.845***	44.836**	64.942**	65.574	55.749	-33.062
	(154.644)	(52.790)	(18.127)	(16.515)	(21.543)	(28.052)	(43.919)	(73.473)	(90.555)
Constant	-280.045	90.713	116.946*	211.066***	452.505***	593.656***	859.463***	1184.836***	2142.386***
	(606.783)	(207.135)	(71.125)	(64.801)	(84.529)	(110.070)	(172.328)	(288.291)	(355.315)

(Source: author's elaborations)

Note: *, **, *** represents significance at 10%, 5%, and 1% levels respectively. Values in parenthesis are standard errors

Table 6. Quantile Regression Results (BFE and ROA)

Variables	**Quantile levels**								
	10th	**20th**	**30th**	**40th**	**50th**	**60th**	**70th**	**80th**	**90th**
BFE	0.173***	0.111**	0.096**	0.099***	0.129***	0.077*	0.097**	0.090	0.070
	(0.053)	(0.051)	(0.043)	(0.036)	(0.038)	(0.043)	(0.048)	(0.079)	(0.106)
Board size	0.175***	0.126***	0.055	0.047	0.033	0.017	0.005	-0.015	0.085
	(0.055)	(0.052)	(0.044)	(0.037)	(0.039)	(0.044)	(0.049)	(0.081)	(0.108)
Firm age	-0.071***	-0.069***	-0.060***	-0.053***	-0.057***	-0.050***	-0.039***	-0.010	0.024
	(0.017)	(0.016)	(0.014)	(0.012)	(0.012)	(0.014)	(0.016)	(0.026)	(0.034)
Firm size	0.002	0.006	0.009**	0.007**	0.004	-0.001	-0.002	0.000	0.004
	(0.005)	(0.005)	(0.004)	(0.003)	(0.003)	(0.004)	(0.004)	(0.007)	(0.009)
Financial leverage	-0.052*	-0.054**	-0.039*	-0.030	-0.035*	-0.029	-0.025	0.006	-0.035
	(0.029)	(0.027)	(0.023)	(0.020)	(0.021)	(0.023)	(0.026)	(0.043)	(0.057)
Constant	-0.252**	-0.153	-0.053	0.005	0.108	0.244***	0.281***	0.211	-0.095
	(0.108)	(0.102)	(0.087)	(0.074)	(0.077)	(0.087)	(0.097)	(0.160)	(0.214)

(Source: author's elaborations)

Note: *, **, *** represents significance at 10%, 5%, and 1% levels respectively. Values in parenthesis are standard errors

Table 7. Quantile Regression Results (BFE and Firm Risk)

Variables	Quantile levels								
	10th	20th	30th	40th	50th	60th	70th	80th	90th
BFE	0.000	-0.004	-0.005***	-0.008***	-0.008***	-0.011***	-0.014**	-0.025***	-0.025
	(0.002)	(0.002)	(0.002)	(0.003)	(0.003)	(0.004)	(0.006)	(0.009)	(0.019)
Board size	-0.001	-0.002	-0.002	-0.005**	-0.005	-0.007	-0.012*	-0.018**	-0.038**
	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)	(0.004)	(0.007)	(0.010)	(0.019)
Firm age	0.000	0.001	0.001*	0.002**	0.001	0.002	0.002	0.002	0.004
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.003)	(0.006)
Firm size	0.000	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.002***	-0.002***	-0.004**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.002)
Financial leverage	-0.001	-0.002	-0.002*	-0.002	-0.003	-0.002	0.000	0.001	0.004
	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.002)	(0.004)	(0.005)	(0.010)
Constant	0.014***	0.036***	0.042***	0.040***	0.048***	0.056***	0.079***	0.116***	0.181***
	(0.004)	(0.005)	(0.004)	(0.005)	(0.007)	(0.008)	(0.013)	(0.019)	(0.038)

(Source: author's elaborations)

Note: *, **, *** represents significance at 10%, 5%, and 1% levels respectively. Values in parenthesis are standard errors

Table 8. Quantile Regression Results (BFE and WCM)

Variables	Quantile levels								
	10th	20th	30th	40th	50th	60th	70th	80th	90th
BFE	382.569	184.561***	117.449***	56.178*	-14.741	-49.014	-67.588	-118.522	-47.941
	(287.383)	(68.527)	(42.152)	(39.366)	(44.177)	(54.085)	(61.265)	(141.461)	(194.713)
Board size	-400.530	-187.106***	-158.120***	-100.875***	-128.594***	-174.054***	-219.679***	-253.334*	-451.030*
	(294.681)	(70.267)	(43.223)	(40.366)	(45.299)	(55.458)	(62.821)	(145.053)	(199.658)
Firm age	-0.697	-0.151	-2.500	-17.028*	-17.362	-16.073	-19.847	-26.501	-62.363
	(92.996)	(22.175)	(13.640)	(12.739)	(14.295)	(17.502)	(19.825)	(45.776)	(63.008)
Firm size	25.174	12.536**	4.840	2.113	-5.041	-5.610	-15.184***	-26.850*	-53.459***
	(25.615)	(6.108)	(3.757)	(3.509)	(3.938)	(4.821)	(5.461)	(12.609)	(17.355)
Financial leverage	80.660	75.422**	61.464***	45.561**	47.861**	65.572**	65.517**	51.291	-15.930
	(156.318)	(37.274)	(22.928)	(21.413)	(24.029)	(29.419)	(33.324)	(76.945)	(105.912)
Constant	191.432	70.583	208.508***	227.275***	469.659***	605.749***	932.067***	1310.247***	2510.892***
	(582.159)	(138.816)	(85.389)	(79.745)	(89.491)	(109.561)	(124.106)	(286.560)	(394.436)

(Source: author's elaborations)

Note: *, **, *** represents significance at 10%, 5%, and 1% levels respectively. Values in parenthesis are standard errors

5. Conclusion

This study was conducted to investigate the asymmetric effects of board gender diversity and board financial expertise on firm performance, riskiness, and working capital management. Unlike previous studies, the current study utilized panel quantile regression to examine the non-linear relationship among underlying variables. Using unbalanced panel data of Pakistani listed energy firms, the findings of the study reveal that BGD is a weak corporate governance mechanism that does not influence firm performance or working capital management policies. Their presence of board increases the riskiness of the firm even in high-risk firms. This is an indication of the inability of female directors to restrict managerial rent-seeking behavior. On the other hand, financial experts on board strengthen the corporate governance systems and restrict managers from the expropriation of shareholders' wealth. Their presence of board increases the firm's profitability of low- and moderate-performing firms. They also discourage risk-taking behavior when firms reach a certain level of riskiness. Furthermore, they increase the working capital of firms with aggressive WCM strategies.

In the light of our results, several practical implications can be derived from the study. Especially in the energy sector of Pakistan, the symbolic position of female directors on board should be discouraged and they should be given certain opportunities where the unique skills of WOB can be utilized. In addition, financial experts on board should be encouraged to uplift the weak-performing firms. Since they do not intervene unnecessarily in firm decisions, their inclusion on board will strengthen the corporate governance systems.

There are also certain limitations of the study which can be addressed in future studies. For example, only gender diversity and financial expertise are considered in this study to assess board diversity. Pakistan is diversified based on nationalism, ethnicity, political differences, and culture. Employing culture and religious beliefs in the model may provide new insights into board diversity and corporate governance literature. Additionally, to confirm if the issue related to BGD exists due to symbolic position, it should be measured by the shorter tenure of female directors. We also acknowledge that one of the main theoretical propositions by critical mass theory is not tested in the study due to the inadequate proportion of female directors on board. Examining this theory using the non-linear framework will provide better insight into the position of WOB in Pakistan.

References

Agarwal, B. (2018). Gender equality, food security and the sustainable development goals. *Current opinion in environmental sustainability, 34*, 26-32.

Aggarwal, R., Jindal, V., & Seth, R. (2019). Board diversity and firm performance: The role of business group affiliation. *International Business Review, 28*(6), 101600.

Akbar, A., Akbar, M., Nazir, M., Poulova, P., & Ray, S. (2021). Does working capital management influence operating and market risk of firms? *Risks, 9*(11), 201.

Ali, S., Rehman, R. U., Sarwar, B., Shoukat, A., & Farooq, M. (2021). Board financial expertise and foreign institutional investment: The moderating role of ownership concentration. *Review of International Business and Strategy, ahead-of-print.* Advance online publication. https://doi.org/10.1108/RIBS-02-2021-0032

Aloui, M., & Jarboui, A. (2018). The effects of corporate governance on the stock return volatility. *International Journal of Law and Management, 60*(2), 478-495. https://doi.org/10.1108/IJLMA-01-2017-0010

Atif, M., Liu, B., & Huang, A. (2019). Does board gender diversity affect corporate cash holdings? *Journal of Business Finance & Accounting, 46*(7-8), 1003-1029.

Bruna, M. G., Đặng, R., Ammari, A., & Houanti, L. H. (2021). The effect of board gender diversity on corporate social performance: An instrumental variable quantile regression approach. *Finance Research Letters, 40*, 101734. https://doi.org/10.1016/j.frl.2020.101734

Carter, D. A., D'Souza, F., Simkins, B. J., & Simpson, W. G. (2010). The gender and ethnic diversity of US boards and board committees and firm financial performance. *Corporate Governance: An International Review, 18*(5), 396-414.

Conyon, M. J., & He, L. (2017). Firm performance and boardroom gender diversity: A quantile regression approach. *Journal of Business Research, 79*, 198-211.

Dalci, I. (2018). Impact of financial leverage on profitability of listed manufacturing firms in China. *Pacific Accounting Review, 30*(4), 410-432. https://doi.org/10.1108/PAR-01-2018-0008

Darmadi, S. (2013). Board members' education and firm performance: Evidence from a developing economy. *International Journal of Commerce and Management, 23*(2), 113-135. https://doi.org/10.1108/10569211311324911

DeFond, M. L., Hann, R. N., & Hu, X. (2005). Does the market value financial expertise on audit committees of boards of directors? *Journal of Accounting Research, 43*(2), 153-193.

Faleye, O., Hoitash, R., & Hoitash, U. (2011). The costs of intense board monitoring. *Journal of Financial Economics, 101*(1), 160-181.

Fernández-López, S., Rodeiro-Pazos, D., & Rey-Ares, L. (2020). Effects of working capital management on firms' profitability: Evidence from cheese-producing companies. *Agribusiness, 36*(4), 770-791.

García-Sánchez, I.-M., Martínez-Ferrero, J., & García-Meca, E. (2017). Gender diversity, financial expertise and its effects on accounting quality. *Management Decision, 55*(2), 347-382. https://doi.org/10.1108/MD-02-2016-0090

Gaur, S. S., Bathula, H., & Singh, D. (2015). Ownership concentration, board characteristics and firm performance. *Management Decision*, …

Gilani, U., Keasey, K., & Vallascas, F. (2021). Board financial expertise and the capital decisions of US banks. *Journal of Corporate Finance, 71*, 102091.

Güner, A. B., Malmendier, U., & Tate, G. (2008). Financial expertise of directors. *Journal of Financial Economics, 88*(2), 323-354.

Hambrick, D. C. (2007). Upper echelons theory: An update. *Academy of Management Review, 32*(2), 334-343. https://doi.org/10.5465/amr.2007.24345254

Hoobler, J. M., Masterson, C. R., Nkomo, S. M., & Michel, E. J. (2018). The business case for women leaders: Meta-analysis, research critique, and path forward. *Journal of Management, 44*(6), 2473-2499.

Johl, S. K., Kaur, S., & Cooper, B. J. (2015). Board characteristics and firm performance: Evidence from Malaysian public listed firms. *Journal of Economics, Business and Management, 3*(2), 239-243.

Kagzi, M., & Guha, M. (2018). Does board demographic diversity influence firm performance? Evidence from Indian-knowledge intensive firms. *Benchmarking: An International Journal, 25*(3), 1028-1058. https://doi.org/10.1108/BIJ-07-2017-0203

Khan, A. N., Yahya, F., & Waqas, M. (2022). Board diversity and working capital management strategies: evidence from energy sector of Pakistan. *Journal of Economic and Administrative Sciences*.

Koenker, R., & Bassett Jr, G. (1978). Regression quantiles. *Econometrica: Journal of the Econometric Society, 46*(1), 33-50.

Koenker, R., & Hallock, K. F. (2001). Quantile regression. *Journal of Economic Perspectives, 15*(4), 143-156.

Lewellyn, K. B., & Muller-Kahle, M. I. (2012). CEO power and risk taking: Evidence from the subprime lending industry. *Corporate Governance: An International Review, 20*(3), 289-307.

Liu, G., & Sun, J. (2021). Independent directors' legal expertise, bank risk-taking and performance. *Journal of Contemporary Accounting & Economics, 17*(1), 100240.

Loukil, N., Yousfi, O., & Yerbanga, R. (2019). Does gender diversity on boards influence stock market liquidity? Empirical evidence from the French market. *Corporate Governance: The International Journal of Business in Society, 19*(4), 669-703. https://doi.org/10.1108/CG-09-2018-0291

Main, B. G., & Gregory-Smith, I. (2018). Symbolic management and the glass cliff: Evidence from the boardroom careers of female and male directors. *British Journal of Management, 29*(1), 136-155.

Marinova, J., Plantenga, J., & Remery, C. (2016). Gender diversity and firm performance: Evidence from Dutch and Danish boardrooms. *The International Journal of Human Resource Management, 27*(15), 1777-1790.

Matsa, D. A., & Miller, A. R. (2013). A female style in corporate leadership? Evidence from quotas. *American Economic Journal: Applied Economics, 5*(3), 136-169.

MengYun, W., Husnain, M., Sarwar, B., & Ali, W. (2021). Board financial expertise and corporate cash holdings: Moderating role of multiple large shareholders in emerging family firms. *Complexity, …*

Minton, B. A., Taillard, J. P., & Williamson, R. (2014). Financial expertise of the board, risk taking, and performance: Evidence from bank holding companies. *Journal of Financial and Quantitative Analysis, 49*(2), 351-380. https://doi.org/10.1017/S0022109014000283

Mohsni, S., Otchere, I., & Shahriar, S. (2021). Board gender diversity, firm performance and risk-taking in developing countries: The moderating effect of culture. *Journal of International Financial Markets, Institutions and Money, 73*, 101360. https://doi.org/10.1016/j.intfin.2021.101360

Nadeem, M., Suleman, T., & Ahmed, A. (2019). Women on boards, firm risk and the profitability nexus: Does gender diversity moderate the risk and return relationship? *International Review of Economics & Finance, 64*, 427-442.

Nastiti, P. K. Y., Atahau, A. D. R., & Supramono, S. (2019). Working capital management policy: Female top managers and firm profitability. *Journal of Management and Business Administration. Central Europe, 27*(3), 107-127.

Nguyen, Q. K. (2021). Oversight of bank risk-taking by audit committees and Sharia committees: Conventional vs Islamic banks. *Heliyon, 7*(8), e07798.

Orazalin, N. (2020). Board gender diversity, corporate governance, and earnings management. *Gender in Management: An International Journal, 35*(1), 37-60. https://doi.org/10.1108/GM-03-2018-0027

Palvia, A., Vähämaa, E., & Vähämaa, S. (2015). Are female CEOs and chairwomen more conservative and risk averse? Evidence from the banking industry during the financial crisis. *Journal of Business Ethics, 131*(3), 577-594.

Perryman, A. A., Fernando, G. D., & Tripathy, A. (2016). Do gender differences persist? An examination of gender diversity on firm performance, risk, and executive compensation. *Journal of Business Research, 69*(2), 579-586.

Post, C., & Byron, K. (2015). Women on boards and firm financial performance: A meta-analysis. *Academy of Management Journal, 58*(5), 1546-1571.

Qayyum, A., Rehman, I. U., Shahzad, F., Khan, N., Nawaz, F., Kokkalis, P., & Sergi, B. S. (2021). Board gender diversity and stock price crash risk: Going beyond tokenism. *Borsa Istanbul Review, 21*(3), 269-280. https://doi.org/10.1016/j.bir.2020.10.010

Rehman, A., & Deyuan, Z. (2018). Pakistan's energy scenario: A forecast of commercial energy consumption and supply from different sources through 2030. *Energy, Sustainability and Society, 8*(1), 1-5.

Sarwar, B., Xiao, M., Husnain, M., & Naheed, R. (2018). Board financial expertise and dividend-paying behavior of firms. *Management Decision, 56*(9), 1839-1868. https://doi.org/10.1108/MD-11-2017-1111

Shaikh, S. A., Ismail, M. A., Ismail, A. G., Shahimi, S., & Mohd. Shafiai, M. H. (2019). Comparative analysis of -compliant portfolios: Evidence from Pakistan. *Journal of Islamic Accounting and Business Research, 10*(3), 466-487. https://doi.org/10.1108/JIABR-10-2016-0121

Shehata, N., Salhin, A., & El-Helaly, M. (2017). Board diversity and firm performance: Evidence from the UK SMEs. *Applied Economics, 49*(48), 4817-4832.

Shin, Y. Z., Chang, J.-Y., Jeon, K., & Kim, H. (2020). Female directors on the board and investment efficiency: Evidence from Korea. *Asian Business & Management, 19*(4), 438-479.

Simionescu, L. N., Gherghina, Ș. C., Tawil, H., & Sheikha, Z. (2021). Does board gender diversity affect firm performance? Empirical evidence from Standard & Poor's 500 Information Technology Sector. *Financial Innovation, 7*(1), 1-45.

Simpson, W. G., Carter, D., & D'Souza, F. P. (2010). What do we know about women on boards? *Journal of Applied Finance, 20*(2), …

Solakoglu, M. N. (2013). The role of gender diversity on firm performance: A regression quantile approach. *Applied Economics Letters, 20*(17), 1562-1566. https://doi.org/10.1080/13504851.2013.829184

Tleubayev, A., Bobojonov, I., Gagalyuk, T., & Glauben, T. (2020). Board gender diversity and firm performance: Evidence from the Russian agri-food industry. *International Food and Agribusiness Management Review, 23*(1030-2020-236), 35-54.

Triana, M. D. C., Miller, T. L., & Trzebiatowski, T. M. (2014). The double-edged nature of board gender diversity: Diversity, firm performance, and the power of women directors as predictors of strategic change. *Organization Science, 25*(2), 609-632.

Ullah, I., Fang, H., & Jebran, K. (2019). Do gender diversity and CEO gender enhance firm's value? Evidence from an emerging economy. *Corporate Governance: The International Journal of Business in Society, 20*(1), 44-66. https://doi.org/10.1108/CG-03-2019-0085

Usman, M., Zhang, J., Farooq, M. U., Makki, M. A. M., & Dong, N. (2018). Female directors and CEO power. *Economics Letters, 165*, 44-47. https://doi.org/10.1016/j.econlet.2018.01.030

Wang, X., Deng, S., & Alon, I. (2021). Women executives and financing pecking order of GEM-listed companies: Moderating roles of social capital and regional institutional environment. *Journal of Business Research, 136*, 466-478. https://doi.org/10.1016/j.jbusres.2021.07.055

Wiley, C., & Monllor-Tormos, M. (2018). Board gender diversity in the STEM&F sectors: The critical mass required to drive firm performance. *Journal of Leadership & Organizational Studies, 25*(3), 290-308.

Yahya, F., Meiling, L., Lee, C. C., Waqas, M., & Shaohua, Z. (2022). Gender diversity, sustainability reporting, CEO overconfidence, and efficient risk-taking: Evidence from South Asian agri-food industry. *Canadian Journal of Agricultural Economics/Revue canadienne d'agroeconomie*, *70*(3), 219-238.

Yahya, F., Abbas, G., Ahmed, A., & Hashmi, M. S. (2020). Restrictive and supportive mechanisms for female directors' risk-averse behavior: Evidence from south Asian health care industry. *SAGE Open, 10*(4), 2158244020962777.

Yahya, F., Manan, A., Khan, M. W. J., & Hashmi, M. S. (2021). The moderating role of board gender diversity between power-based corporate governance and tax aggressiveness. *Economics and Business Letters, 10*(2), 104-147.

Yu, K., Lu, Z., & Stander, J. (2003). Quantile regression: Applications and current research areas. *Journal of the Royal Statistical Society: Series D (The Statistician), 52*(3), 331-350.

Zalata, A. M., Tauringana, V., & Tingbani, I. (2018). Audit committee financial expertise, gender, and earnings management: Does gender of the financial expert matter? *International Review of Financial Analysis, 55*, 170-183. https://doi.org/10.1016/j.irfa.2017.11.002

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