

Board Attributes and Firm Value: The Moderating Role of Board Meeting Frequency

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Abstract

Purpose: The aim of this research is to look at the relationship of board attributes to firm value. This research adopts board size (BS) and board independence (BI) as board attributes. Most importantly, the study investigates whether board meeting frequency (BMF) moderates board size and board independence in improving firm value (FV).

Design/methodology/approach: This research uses a panel dataset over a period of 4 years, i.e., 2016-17 to 2019-2020 of 23 selected engineering companies listed on Dhaka Stock Exchange Ltd. (DSE) of Bangladesh. The study adopts panel data regression model to test the undertaken hypotheses using two econometric models. After passing several diagnostic tests and model selection tests, random effect model has been used for examining the econometric model 1, and fixed effect model for examining the econometric model 2. The study adopts Tobin's Q ratio as the proxy of firm value, total number of directors on a corporate board as board size, proportion of total number of independent director(s) as relation to total number of directors on a corporate board as board independence, and total number of board meetings held in a year by a firm as board meeting frequency. The research also performs a number of robustness tests through using alternate regression methods, along with alternate proxy of firm value for further confirmation of the empirical findings.

Findings: The study finds that BS has positive insignificant relationship to FV, whereas BI has negative significant relationship to FV. Further, the study documents that board meeting frequency moderate the association of BS and BI to firm value. It is evident that the interaction impact of BS and board meeting frequency has negative significant association with FV, while the interaction impact of BI and board meeting frequency has positive significant association with FV.

Research limitations/implications: This research only focuses on engineering companies listed on DSE of Bangladesh. Besides, it only considers a few board attributes, i.e., BS, BI, and BMF. Thus, there is further scope to examine other board attributes on firm value in the same context.

Practical implications: The results generated from this study will be a policy dialogue for the decision makers of business firms in Bangladesh as well as the similar economies.

Originality/value: The major contribution of this research is that it tests both individual effects as well as moderating impacts of board attributes on firm value in the setting of an emerging economy like Bangladesh.

Keywords: Firm Value, Board Size, Board Meeting Frequency, Board Independence

Introduction

The capital market of Bangladesh has been in the depression almost throughout the year 2019 in conjunction to shareholders' mistrust (The Financial Express, 2019). However, corporate governance could be an important explanatory factor to address the issues of transparency (Bhuyan, 2018). Enhancements in corporate governance may increase investors' trust on companies in developing economies and enhance these companies' entry to new funds (Rajagopalan & Zhang, 2008), which can ultimately aid in decreasing inefficiencies in the business sector (Bhat et al., 2018). Further, corporate governance plays a vital role to maximize the firm value and acts as a form of protection to the owners (Navarro & Urquiza, 2015). Board of directors is an imperative constituent in corporate governance (CG) instruments that supervises the conduct of business and make sure that the firm is being well managed by the agents, i.e., managers (Qa'dan & Suwaidan, 2019). However, prior literature has found inconsistent results on the connection of board attributes, namely BS and BI to company performance (Pucheta-Martínez & Gallego-Álvarez, 2020; Arayssi & Jizi, 2019; Bhat et al., 2018; Merendino & Melville, 2019; Mishra & Kapil, 2018; Yasser et al., 2017; Singh et al., 2018). Further, Mishra and Kapil (2018) comment that board meetings are seems to be referring optimistic indication to market generating firm value, while Alsartawi (2019) recommends for minimizing board meetings to decrease the cost of producing information as well as information unevenness, and thus enhancing performance. As a consequence, the relationship of board features, for instance BS, BI and BMF to firm performance is not conclusive yet.

However, having a poor framework of corporate governance causes anomalies, which necessitates reforms to enhance the corporate governance system, which in turn can reduce inefficiencies in the business sector (Li & Li, 2022; Ciftci et al., 2019). In the last two decades, corporate board reforms have proliferated all over the world, with the goal of increasing company value by mandating or proposing increased board independence, board size, board meetings, audit committee and auditor independence, and split-up of chairman and chief executive officer's responsibilities (Mai & Hamid, 2021; Ngatno et al., 2021; Hosain, 2020; Huang et al., 2020; Pucheta-Martínez & Gallego-Álvarez, 2019; Lemmon & Lins, 2003). Besides, Existing study on board composition and performance (Dawson et al., 2022; Mai & Hamid, 2021; Qureshi et al., 2020; Fernandez & Thams, 2019; Li & Chen, 2018; Yasser et al., 2017; Su & Sauerwald, 2018) are not focused on the moderating impact of BMF on the association of BS and BI with firm value. Therefore, studies are left with two critical issues that remain unresolved: How do the board attributes affect firm value? Does board meeting frequency moderate board attributes to contribute firm value?

Furthermore, in current literature, very few researches have observed the association of board attributes to FV in the setting of an emerging economy like Bangladesh. This study addresses two important questions in the local context of Bangladesh: How do the board attributes affect FV? Does board meeting frequency moderate BS and BI in improving FV? The present study emphases on board attributes, as boards are the fundamental governance instrument of corporations, and board attributes are the key approach to address corporate governance issues. The major contribution of this study is that it examines both individual effects and moderating effects of board attributes on FV in the perspective of an emerging economy like Bangladesh. The next sections of the paper include literature review, theoretical framework and hypotheses development, research methodology, findings and discussion, and conclusion.

Literature Review

Managers are supposed to look out for the best interests of the company's owners (Aggarwal et al., 2019a, 2019b). However, Page (2018) stated that in accordance with agency theory, managers of organisations are more likely to invest even if conditions aren't optimal. In order

to avoid systemic hazards, dishonest managers would take risks and invest when there are signs that it might not be the best option (Trinh et al., 2021). A corporate governance strategy can be utilised to modify the norms under which the agent acts and restore the principal's interests (Zaid et al., 2020). However, if both parties, i.e. principals and agents are utility maximizers, it is reasonable to anticipate that managers will not continually behave to the principal's best interest, necessitating principals' supervision of managers' conduct (Pucheta-Martínez & Gallego-Álvarez, 2020).

In agency theory view, corporate governance aims to ensure that agents are performing their best for maximizing the shareholders' wealth (Shleifer & Vishny, 1997). Further, due to more vigilance, board including a higher number of directors function better monitor of the agent, and thus reduces agency problem (Singh et al., 2018). Moreover, monitoring by independent directors is thought to be effectual as it will not encompass the conflict of interest between the shareholders and management (Mishra & Kapil, 2018). Thus, board comprising of independent directors lessens the agency cost that arises due to clash between principal and agent (Bhat et al., 2018). Furthermore, board meetings play an important role in effective functioning of the board (Zahra & Pearce, 1989). In practice, board of directors accomplishes monitoring function through board meetings (Vafeas, 1999). However, a firm is made up of a management as the agent, and shareholders as the principals (Brahma et al., 2021). Shareholders, as the firm's owners, could need a trustworthy party (agent) for operating the firms. Hence, it is crucial to measure how the firms are performing. Firm value may represent a firm's success as it might indicate how well the firm is performing.

Theoretical Framework and Hypotheses Development

In practice, board of directors (BODs) is thought as a setting up to alleviate the consequence of agency conflicts among shareholders and agents (Drakos & Bekiris, 2010). In the literature, the question of what board size is best for a company's performance is keenly contested (Mishra & Kapil, 2018; Singh et al., 2018). Some research suggests that just a small number of board members should be involved (Kabir & Thai, 2017). Because, larger boards may produce additional coordination costs and reduce their capability of effective monitoring (Fauzi & Locke, 2012). Consequently, a large board has negative effect on firm value (Hosain, 2020; Pillai & Al-Malkawi, 2018; Yasser et al., 2017; Nguyen et al., 2016). According to Rashid (2020), smaller boards are better for decision-making since they allow for more effective communication and monitoring. However, Delis et al. (2017), and Wintoki et al. (2012) find an insignificant linkage of BS to company performance. Further, there is an opposing opinion that believes having a larger board is beneficial for process monitoring and decision-making effectiveness (Arayssi & Jizi, 2019). Pucheta-Martínez and Gallego-Álvarez (2020), Bhat et al. (2018), and Singh et al. (2018), document that an increase in board size has considerable influence on profitability. In addition, larger boards could be valuable as they offer more monitoring resources, take along more experience and knowledge as well as upkeep diversity which aids firms to lessen environmental uncertainties and attain crucial resources, and thus enhance firm performance (Mangena et al., 2012; Adams & Ferreira, 2007; Ramdani & Witteloostuijn, 2010; Pearce & Zahra, 1992; Choi et al., 2007; Goodstein et al., 1994). Thus, the study presumes the following hypothesis.

H1: There is a positive association between BS and FV.

Furthermore, agency theory views that external directors will perform their responsibilities to supervise top management as they have spurs to build status for decision control (Fauver et al., 2017). Executive members provide importance on short-term economic performance of a firm, while independent members provide importance on long-term performance of a firm (Rossi et

al., 2015). Besides, external directors enhance firm performance with their capability to deliver better monitoring performance (Chung et al., 2003). Further, a board with majority of outside independent directors might decrease conflict of interest and enhance its monitoring potential (Mishra & Kapil, 2016). A greater percentage of external directors on board might reduce the likelihood of managerial collaboration and expropriation of shareholder capital, which would reduce the agency costs (Merendino & Melville, 2019). Accordingly, corporate governance restructurings are ever more emphasizing on outside directors, and/ or independent external directors, believing that they would take along better transparency, responsibility as well as proficiency to corporate governance (Aguilera, 2005). Moreover, it's been found that the performance of a company is unaffected by the presence of outside board members (Sikarwar, 2022; Karkowska & Acedański, 2020). However, agency theorists suggest that a larger percentage of outside directors have a favourable impact on a company's success (Alsartawi, 2019; Merendino & Melville, 2019). A majority of the members on a corporate board, who are not employees of the company, are expected to put the benefits of shareholders above anything else (Bird et al., 2018). Hence, in consistent with agency theory view and the notion that independent director(s) result in an enhanced influential board in emerging economies (Kao et al., 2019), this study presumes that existence of more independent directors in a BODs is linked to improved business performance, and favourable market reaction.

H2: There is a positive association between BI and FV.

Basically, the efficiency of a board depends on the conduct of directors during board meetings (Aggarwal et al., 2019a, 2019b). Directors of a board ensure their supervising functions and contribution by means of active involvement in the board meetings (Mishra & Kapil, 2018). In addition, board meetings are essential to the proper functioning of the board (Alsartawi, 2019). The engagement of board members might rely on their participation in the meeting that includes participation in debates and the implementation of decisions made during board meetings (Mishra & Kapil, 2018). Besides, the dedication of board members is significantly added essential to board demographics to predict board performance (Alsartawi, 2019). Frequent board meetings could improve firm performance as well (Wincent et al., 2010). Thus, frequent board meetings as well as an active involvement of directors in the board meetings could influence company performance favourably (Mishra & Kapil, 2018). Further, board of directors accomplishes monitoring by means of board meetings; therefore frequency of meetings might an appropriate representation intended for supervising outcomes of the directors (e.g., Vafeas, 1999). Recurring meetings of a corporate board encourage managers for working to the benefit of investors through effective monitoring (Qiu et al., 2021). Regular and frequent board meetings are also believed as an imperative sign of board members' capability to supervise executive managers, as well as to safeguard owners' equity (Ntim et al., 2017). Furthermore, regular meetings contribute in attaining real control by a board to entire transactions performed by a firm, that assist in constructing balanced decisions which impact performance positively (Ntim et al., 2017; Mangena & Tauringana, 2008). In view of that, the present research presumes that BMF could contribute to enhance the positive effect of BS and BI with firm value.

H3: BMF strengthens the positive association between BS and FV.

H4: BMF strengthens the positive association between BI and FV.

Based on above discussion, the study has formed the following framework (Figure 1).

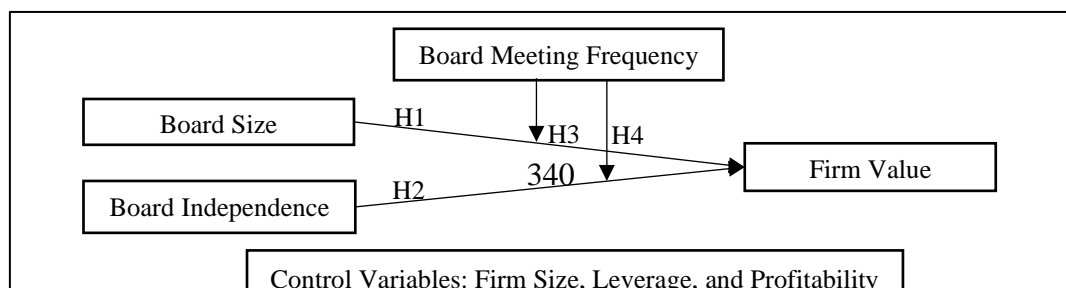


Figure 1. Research framework

Research Methodology

Data and Sample

This research investigates the linkage between board attributes and firm value. Moreover, moderating influences of BMF have been tested. The research uses a balanced panel data set with a span of four recent years, i.e., 2016-17 to 2019-2020. Engineering companies listed on DSE have been chosen as the sample of the study. Engineering sector is one of the largest business sectors in Bangladesh. There are 42 engineering companies listed on DSE of Bangladesh (Dhaka Stock Exchange Ltd., 2023). Out of them, 10 engineering companies do not cover the entire study period. Further, 9 engineering companies are found with incomplete information. Thus, because of limited availability of data, this research gathers 23 engineering companies, over a four year study period. The research uses panel data regression model, i.e., random effect (RE) model, and fixed effect (FE) model to make the estimations, using STATA software. The study passes model selection procedures, multicollinearity tests, autocorrelation test, heteroscedasticity test, and presents main outcomes. In this research, all variables (except firm size as logged variable) are winsorized at 5% at both ends of the distribution to mitigate the problem of outliers (e.g., Tejedo-Romero & Araujo, 2022). The regression results (p-value) are presented in one-tailed, as the hypotheses are stated in directional form (e.g., Inekwe, 2021).

Operational Definition and Measurement of Variables

Dependent Variable

Firm value is adopted as output variable of this research. Firm value is obtained by Tobin's Q ratio which is measured by the ratio of market value of equity plus book value of liabilities to book value of total assets, per year (Shan, 2019). Tobin's Q shows the efficiency regarding a company's management to use its assets than its competitors (Charumathi & Ramesh, 2020); it is also an effectual measure of long-term performance (Servaes & Tamayo, 2013). Thus, this research adopts Tobin's Q as firm value from the study of Charumathi and Ramesh (2020), and Shan (2019). In fact, investors consider firm value for making investment decisions as revealed in the market price of a firm (Husnan, 2007), and Tobin's Q represents market value of a firm (Alam & Gupta, 2018). A value greater to 1 of Tobin's Q reveals investors' confidence towards a firm in addition to its growth potentials, and converse in case of value less than 1 (Brahma et al., 2021).

Independent Variables

This research uses two explanatory variable, specifically board size, and board independence as attributes of corporate board. Generally, board size is obtained as a sum of number of directors in BODs (Hidalgo et al., 2011). Similarly, in consistent with earlier researches (Rahman et al., 2019; Sandhu and Singh, 2019), the study uses the sum of number of directors in a BODs to measure BS. Further, in consistent with past studies (Shan, 2019; Othman et al.,

2018), the study measures BI as the ratio of number of independent director(s) corresponding to total number of directors in a board.

Moderating Variable

This research employs BMF as a moderating variable in the research model to investigate whether BMF moderates BS and BI in influencing firm value. BMF is determined as number of board meetings occurred in a year (Alsartawi, 2019). This research expects that the more frequent the board meetings, the better decisions the companies can make. This research has adopted the board meeting variable following the study of Alsartawi (2019), Mishra and Kapil (2018), and Al-Musali and Ku Ismail (2015).

Control Variables

The study incorporates three control variables. Firm size (FS), leverage (LV), and profitability (PR) are the control items. Firm size is determined by natural logarithm of total assets at the end of each year (Sandhu & Singh, 2019). Leverage is computed by total liabilities to total assets per year (Agyemang-Mintah & Schadewitz, 2019). Profitability is determined by the return on assets per year (Alfraih, 2018). This research has adopted the firm size, leverage, and profitability variable from the study of Arayssi and Jizi (2019), and Ararat et al. (2017).

An outline of the variables of this research is given below.

Table 1. An outline of the research variables

Variables	Measurement	References
Firm value (FV)	FV is computed by Tobin's Q ratio, which is computed as the ratio of market value of equity plus book value of liabilities to book value of total assets, per year.	Charumathi & Ramesh, 2020; Shan, 2019
Board size (BS)	BS is measured by number of directors in the board per year.	Saha & Kabra, 2022; Mishra & Kapil, 2018
Board independence (BI)	BI is computed by the ratio of number of independent director(s) to total number of directors in the board per year.	Saha & Kabra, 2022; Shan, 2019
Board meeting frequency (BMF)	BMF is obtained by the frequency of board meetings held in a year.	Alsartawi, 2019; Mishra & Kapil, 2018
Firm size (FS)	FS is determined by natural logarithm of total assets at the end of each year.	Wijaya, 2020; Ararat et al., 2017
Leverage (LV)	LV is measured by total liabilities to total assets per year.	Arayssi & Jizi, 2019; Larasati et al., 2019
Profitability (PR)	PR is determined by the net income to total assets per year.	Rahman et al., 2019; Ararat et al., 2017

Source: Authors' compilation.

Model Specification

This research includes two econometric models. Research model 1 examines the association of BS and BI to FV. The econometric model 1 is as follows:

$$FV_{it} = \beta_0 + \beta_1 BS_{it} + \beta_2 BI_{it} + \beta_3 FS_{it} + \beta_4 LV_{it} + \beta_5 PR_{it} + \varepsilon_{it} \text{ ----- (1)}$$

Where, FV is the dependent variable that indicates firm value; BS stands for board size, and BI stands for board independence which are the independent variables. FS indicates firm size, LV indicates leverage, and PR indicates profitability, which are the control variables. ε is the error term. i and t indicate firms, and time period, respectively. β_0 is the constant.

Further, research model 2 looks at the moderating impact of BMF on the connection of BS and BI with FV. The econometric model 2 is as follows:

$$FV_{it} = \beta_0 + \beta_1 BS_{it} + \beta_2 BI_{it} + \beta_3 BMF_{it} + \beta_4 BS * BMF_{it} + \beta_5 BI * BMF_{it} + \beta_6 FS_{it} + \beta_7 LV_{it} + \beta_8 PR_{it} + \varepsilon_{it} \text{ ----- (2)}$$

Where, BMF indicates board meeting frequency which is the moderating variable, interaction term BS*BMF stands for interaction between BS and BMF, and interaction term BI*BMF stands for interaction between BI and BMF.

Findings and Discussion

Descriptive Statistics

The descriptive statistics of the employed variables are presented in Table 2. The mean value of firm value is 1.847, while maximum, minimum, and standard deviation (SD) values are 5.709, 0.618, and 1.215, respectively. The maximum number of board members in the sampled engineering companies is 14, while mean, minimum, and SD values are 7.5, 5, and 2.216, respectively. The maximum ratio of board independence is 0.50, and minimum is 0.111 with a mean value of 0.235 and SD of 0.069. The minimum frequency of meetings in the board is 4 times, and maximum is 17 times with a mean value of 7.478 times and SD of 2.646.

Table 2. Descriptive statistics

Variable	Obs	Mean	Std. Dev.	Min	Max
FV	92	1.847	1.215	.618	5.709
BS	92	7.5	2.216	5	14
BI	92	.235	.069	.111	.5
BMF	92	7.478	2.646	4	17
FS	92	22.067	1.478	18.668	24.91
LV	92	.559	.302	.061	1.813
PR	92	.022	.038	-.128	.121

Source: Authors' compilation.

Diagnostic Tests

This research applies two different methods to check whether multicollinearity exists in the research models. First, the study uses VIF analysis for examining the existence of multicollinearity. Table 3 shows the VIF values and 1/VIF values. The VIF value larger than 10 indicates the existence of multicollinearity (Gujarati, 2003). In this research, the maximum VIF value is 1.138, proving that there is no multicollinearity issue.

Table 3. Variance inflation factor

	VIF	1/VIF
LV	1.138	.879
BS	1.130	.885
BI	1.114	.898
PR	1.073	.932
FS	1.059	.944
BMF	1.038	.964
Mean VIF	1.092	

Source: Authors' compilation.

Further, the study applies correlation matrix analysis to test multicollinearity issue. The value of correlation more than 0.80 between independent variables indicates the presence of multicollinearity issue (Gujarati, 2003). Table 4 shows that the maximum value of correlation is 0.184, indicating the absence of multicollinearity issue.

Table 4. Matrix of correlations

Variables	BS	BI	BMF	FS	LV	PR
BS	1.000					
BI	-0.225	1.000				
BMF	-0.097	-0.074	1.000			
FS	-0.145	0.058	-0.002	1.000		
LV	0.103	0.184	-0.147	-0.161	1.000	
PR	-0.173	0.019	0.084	-0.041	-0.183	1.000

Source: Authors' compilation.

The research employs Wooldridge test for autocorrelation to examine the existence of autocorrelation issue in the models (Wooldridge, 2010). In case of model 1, Wooldridge test [$F(1, 22) = 31.114$, and $\text{Prob}>F = 0.0000$] results that there is a presence of autocorrelation issue. In case of model 2, Wooldridge test [$F(1, 22) = 10.709$, and $\text{Prob}>F = 0.0035$] results that there is a presence of autocorrelation issue as well. Thus, the 'robust' option in STATA is applied to overcome the autocorrelation issue (Hoechle, 2007).

This research checks the presence of heteroskedasticity issue with IM-test (Cameron and Trivedi's decomposition of IM-test). In case of model 1, IM-test ($\text{chi}^2 = 38.490$, $p\text{-value} = 0.008$) results that there is a presence of heteroskedasticity issue. In case of model 2, IM-test ($\text{chi}^2 = 66.550$, $p\text{-value} = 0.007$) results that there is a presence of heteroskedasticity issue as well. Thus, the 'robust' option in STATA is applied to overcome the heteroskedasticity issue (Hoechle, 2007).

Model Selection

This research employs Chow test, BP-test, and Hausman test to decide on appropriate regression method. Table 5 shows that according to the Chow test (Model 1: $F\text{-stat}=9.82$, $p\text{-value}=0.000$; and Model 2: $F\text{-stat}=10.16$, $p\text{-value}=0.000$), FE model is better choice to POLS model, whereas BP-test (Model 1: $\text{chi}^2=61.84$, $p\text{-value}=0.000$; and Model 2: $\text{chi}^2=43.95$, $p\text{-value}=0.000$) specifies to select RE model over the POLS model in case of both the research models. Further, this research runs the Hausman test (Model 1: $\text{chi}^2=4.39$, $p\text{-value}=0.495$; and Model 2: $\text{chi}^2=25.29$, $p\text{-value}=0.001$) and the outcome suggests to select RE model for making estimations in research model 1, and FE model for making estimations in research model 2. Therefore, based on the decision criteria (selection of maximum times) RE regression model is the better choice for research model 1, and FE regression model is the better choice for research model 2 of this study.

Table 5. Output of Chow test, BP-test, and Hausman test

Model	Tests	Coef.	p-value
Model 1	Chow test (F-value)	9.82	0.000***
	BP-test (Chi2-value)	61.84	0.000***
	Hausman test (Chi2-value)	4.39	0.495
Model 2	Chow test (F-value)	10.16	0.000***
	BP-test (Chi2-value)	43.95	0.000***
	Hausman test (Chi2-value)	25.29	0.001***

Source: Authors' compilation.

Regression Results

In this section, the research presents the investigated outcomes on board attributes and firm value with the fitted model. As discussed earlier, the RE model and FE model is the better choice to examine research model 1, and research model 2, respectively. However, RE model

and FE model with robust standard error is the better choice, if heteroscedasticity, and autocorrelation issue arises in the model (Hoechle, 2007). Thus, the study runs the RE model and FE model with robust standard error as the heteroscedasticity and autocorrelation issues are present in the models.

Table 6. Regression results of research model 1 and 2

FV (Tobin's Q)	Research Model 1	Research Model 2
BS	.042 (.04)	.157** (.084)
BI	-1.819* (1.247)	-8.569*** (3.323)
BMF		-.068 (.103)
BS*BMF		-.012* (.009)
BI*BMF		.979*** (.356)
FS	-.556*** (.081)	-.931*** (.153)
LV	1.344*** (.239)	.73** (.304)
PR	7.996*** (2.737)	4.158 (3.431)
Constant	13.256*** (1.919)	22.161*** (3.948)
R-squared	0.712	0.527
Chi-square	266.603***	
F-test		52.233***
Number of obs.	92	92

FV (Tobin's Q) indicates firm value that is the dependent variable. The outputs are generated from RE model with robust standard error (Research Model 1), and FE model with robust standard error (Research Model 2). Standard errors are in the parenthesis. The p-values are one-tailed. ***p<.01, **p<.05, *p<.1.

Source: Authors' compilation.

Table 6 shows that in case of research model 1, BS is positively linked to firm value; nevertheless this relation is not statistically significant. Thus, board size has no significant influence on FV. This result is not in line with Pucheta-Martínez and Gallego-Álvarez (2020); Zheng and Tsai (2019); Bhat et al. (2018); Mishra and Kapil (2018); Singh et al. (2018); and Kabir and Thai (2017) who find significant relationships. The study also documents that BI is negatively linked to firm value, and this relation is statistically significant. The result indicates that 1% increase in board independence, will decrease firm value by 1.819%. This outcome is consistent with Zhou et al. (2018), Cavaco et al. (2017), Sheikh et al. (2013), and Mangena et al. (2012) who document that board independence has negative linkage with firm performance; while inconsistent with Black and Kim (2012), Jackling and Johl (2009), Choi et al. (2007), and Dahya and McConnell (2005), who find a positive association to firm performance; and Dahya et al. (2019), Dey and Chauhan (2009), Mishra and Kapil (2016), Black and Kim (2012), Ramdani and Witteloostuijn (2010), and Kumar and Singh (2012) who find an insignificant association of board independence to firm performance.

In research model 1, it is evident that BS is positively connected to FV but this association is not statistically significant. However, Table 6 shows that in case of research model 2, when the moderation effect is applied through BS*BMF on firm value, this research documents negative significant relationship. Thus, the finding proposes a moderating effect. The result reveals that the association of BS to FV changes with the interaction of board meeting frequency. It can be inferred that larger size of board with higher frequent meetings may deteriorate the value of sample engineering firms.

Further, in research model 1, BI is negatively associated to FV. Interestingly, Table 6 shows that in case of research model 2, the interaction term BI*BMF is positively and significantly

linked to FV. Thus, the finding offers a moderating effect. The result has revealed that the association of BI to FV changes with the interaction of BMF. This result indicates that the attendance of maximum number of independent directors in the more/higher frequent meetings, significantly improves the value of sample engineering firms. Thus, the sample companies need to arrange more meetings with a compulsory assurance of extra/more independent directors in the BODs.

Robustness Tests

This study has adopted two robustness checking tests. In first robustness checking test, it has adopted alternate regression methods, and in second robustness checking test it has adopted alternate measurement method of variable, i.e., market capitalization (MCAP) as the proxy of firm value. Market capitalization is a widely used proxy variable of FV, which can be obtained as multiplying a company's outstanding shares by the year-end market price of an outstanding share (Harun et al., 2020).

Robustness Test Using Alternate Regression Methods

Table 7 shows that in case of research model 1, board size has positive insignificant connection to firm value, while board independence has negative significant connection to firm value. These results support the main findings. Table 7 also shows that in case of research model 2, the interaction term BI*BMF has positive significant linkage to firm value, which is consistent with main findings.

Table 7. Regression results using alternate regression methods

FV (Tobin's Q)	Research Model 1	Research Model 2
BS	.057 (.049)	.115* (.084)
BI	-2.272* (1.634)	-6.092*** (2.508)
BMF		-.026 (.131)
BS*BMF		-.009 (.012)
BI*BMF		.657** (.364)
FS	-.906*** (.197)	-.551*** (.083)
LV	.886** (.434)	1.296*** (.216)
PR	5.822* (3.676)	6.99*** (2.922)
Constant	21.269*** (4.657)	13.223*** (2.268)
R-squared	0.446	0.706
F-test	21.585***	
Chi-square		315.567***
Number of obs.	92	92

FV (Tobin's Q) indicates firm value that is the dependent variable. The outputs are generated from FE model with robust standard error (Research Model 1), and RE model with robust standard error (Research Model 2). Standard errors are in the parenthesis. The p-values are one-tailed. ***p<.01, **p<.05, *p<.1.

Source: Authors' compilation.

Robustness Test Using Alternate Measurement Method

Table 8 shows that in case of research model 1, board size has an insignificant positive relationship to firm value (MCAP), while; board independence has significant negative association to firm value (MCAP). These results support the main findings. Table 8 also shows

that in case of research model 2, the interaction term BS*BMF has negative significant association with firm value, which supports main findings.

Table 8. Regression results using alternate measurement method of firm value

FV (MCAP)	Research Model 1	Research Model 2
BS	.016 (.045)	.178** (.072)
BI	-1.867** (1.042)	-4.653 (4.127)
BMF		.07 (.118)
BS*BMF		-.02*** (.006)
BI*BMF		.467 (.573)
FS	.418*** (.071)	-.14 (.164)
LV	.228 (.278)	-.347 (.381)
PR	10.331*** (2.603)	8.636*** (2.766)
Constant	12.647*** (1.719)	24.54*** (3.738)
R-squared	0.652	0.331
Chi-square	51.844***	
F-test		5.084***
Number of obs.	92	92

FV (MCAP) indicates firm value that is the dependent variable. The outputs are generated from RE model with robust standard error (Research Model 1), and FE model with robust standard error (Research Model 2). Standard errors are in the parenthesis. The p-values are one-tailed. ***p<.01, **p<.05.

Source: Authors' compilation.

Conclusion

The study finds that BS has positive insignificant association to firm value. Further, the study reveals that the association of BS to firm value changes with the interaction of BMF. Specifically, lower frequent board meeting support a positive relationship between BS and FV, whereas higher frequent board meeting support a negative relationship between BS and FV.

Besides, it is evident that BI is negatively associated with FV. Most importantly, the study finds positive interaction of BI and BFM with firm value indicating that more independent directors on board and higher frequencies of board meetings collectively improve the value of sample firms, but individually deteriorate the firm value. Thus, this finding creates a positive signal to the policymakers to improve firm value thereon.

A number of policy implications for Bangladeshi engineering firms that can be drawn from this study. First, since this study indicates that independent directors have a negative influence on firm value, it implies the importance of having well-qualified individuals as independent director(s) on the BODs. The absence of qualified independent directors in Bangladesh might be a factor in this outcome. Second, the findings suggest the need for higher board independence with higher frequent board meeting in improving firm value.

However, besides contribution, this research has some shortcomings as well. First, this study only focuses on listed engineering companies on DSE in Bangladesh. A second limitation of this research is that it only looked at a few board attributes, specifically BS, BI, and BMF. There remains further scope to investigate other board attributes on firm value. Third, this research employed board meeting frequency as the moderator in the econometric models. Thus, the future researches may examine the moderating effects of other board attributes in the same context.

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