

BOARD GENDER DIVERSITY AND FIRM PERFORMANCE: ROLE OF ORGANISATIONAL COMPLEXITY, INSTITUTIONAL INVESTORS AND INDUSTRY DOWNTURNS

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ABSTRACT

Prior studies provide mixed evidence on the effects of board gender diversity on firm valuation. To address this gap in the literature, we posit that the association between board gender diversity and firm performance is conditional on contextual factors, such as organisational complexity, institutional ownership and industry downturns. Using a sample of listed firms in Asia from 2015 to 2023, our empirical regressions document that firm valuation is positively associated with the proportion of female directors on a board. More importantly, we find that the positive association between firm valuation and the proportion of female directors on the board is higher in firms with higher organisational complexity, firms with higher equity ownership by institutional shareholders and during industry downturns. Additional analysis shows that firm risk is lower in firms with higher board gender diversity. Moreover, we find that the negative association between firm risk and the proportion of female directors on the board is stronger in firms with higher organisational complexity, firms with higher equity ownership by institutional shareholders and during industry downturns. Our results are robust to alternative measures of firm performance, model specifications and endogeneity concerns. In summary, our results suggest the firm-level characteristics such as organisational structure, ownership structure and industry downturns are important moderators of the board gender diversity and firm performance relationship. Our study contributes to the literature on corporate

governance in Asia and provides practical implications for policymakers, board of directors and investors, emphasising the importance of organisational structure, ownership structure and industry downturns in shaping the relationship between board gender diversity and firm performance.

Keywords: Board gender diversity, Firm performance, Firm risk, Organisational structure, Institutional shareholders, Environmental uncertainty

INTRODUCTION

In recent years, corporate board gender diversity has gained significant attention among the regulators, corporate governance activists and media. Using a sample of 45 countries, Griffin et al. (2021) report that the average proportion of female directors is 8.50%. However, there is significant variation in female board representation: the proportion of women on corporate boards in the US has hovered around 20% whereas the proportion of women on boards in Europe ranges between 30% to 45% (Ye et al., 2019). An important issue is whether increasing the percentage of female directors on the board affects firm performance (Adams & Ferreira, 2009; Bernile et al., 2018).

A central theme underpinning the call for greater gender diversity in corporate boards is the proposition that board gender diversity promotes better decision making and hence increases firm valuation. However, prior studies provide inconclusive evidence on the effects of board gender diversity on firm valuation. Some studies find corporate performance is positively associated with board gender diversity (Campbell & Minguez-Vera, 2008; Liu et al., 2014; Low et al., 2015; Terjesen et al., 2016), whereas other studies report a negative association between corporate performance and board gender diversity (Adams & Ferreira, 2009; García-Meca et al., 2015; Bennouri et al., 2018). In fact, some studies find no significant relationship between corporate performance and board gender diversity (Carter et al., 2010¹; Chapple & Humphrey, 2014).

One of the reasons for these mixed results is that the effect of board diversity on firm performance depends on contextual factors such as the country-level institutions and firm's characteristics (Post & Byron, 2015; Kirsch, 2018; Yang et al., 2019). In their review of board gender diversity and firm financial performance literature, Post and Byron (2015, p. 1561) suggest that future studies should focus on the “search for and identification of

novel moderators of the relationship between upper echelons and firm outcomes. As an example, ... researchers should continue to investigate other information-processing stimuli (e.g., environmental uncertainty, environmental munificence, ownership).” In response to Post and Byron’s (2015) call for future research to examine moderators affecting the board gender diversity and firm performance relationship, we take a preliminary step in this direction by examining three firm-level characteristics that may shape the association between female representation on the board and firm performance. Specifically, we propose that (i) organisational complexity, (ii) ownership by institutional shareholders, and (iii) industry downturns, as three moderators of the association between female representation on the board and firm performance. In essence, our three firm-level characteristics: (i) organisational complexity, (ii) ownership by institutional shareholders, and (iii) industry downturns, are broadly related to Post and Byron’s (2015) three proposed moderators: (i) environmental munificence, (ii) ownership, and (iii) environmental uncertainty, respectively.

We draw on related prior studies to briefly explain the rationale underlying the three moderators of the association between female representation on the board and firm performance. First, we consider organisational complexity as a moderator. Prior studies show that board structure varies with firm-level characteristics such as organisational complexity (Coles et al., 2008; Raheja, 2005). Hence, there is no one-size-fits-all board structure that optimises firm valuation. For example, Coles et al. (2008) find that firm valuation increases (decreases) with board size in complex (simple) firms. Prior studies find that gender-diverse boards can increase directors’ monitoring effectiveness (Adams & Ferreira, 2009), reduce agency costs (Karavitis et al., 2021), improve the corporate information environment and transparency (Gul et al., 2011; Li & Zeng, 2019), promote innovation (Griffin et al., 2021) and increase the quality of financial reporting (Francis et al., 2015; Srinidhi et al., 2011). Hence, we predict that the positive association between firm performance and board gender diversity is stronger in firms with higher organisational complexity.

Second, we consider corporate ownership as a moderator. There is a considerable stream of research that documents ownership by large non-management shareholders (blockholders) is positively associated with firm value (Claessens et al., 2002; Lins, 2003; Attig et al., 2009). Furthermore, the beneficial effect of large non-management shareholders in monitoring

management is more pronounced in countries with weaker investor protection (Lins, 2003, Attig et al., 2009; Aggarwal et al., 2011). A related stream of research documents that firm-level governance is positively associated with institutional investors, especially independent institutional investors that are not related to management (Aggarwal et al., 2011; Ferreira & Matos, 2008; Lel, 2019). These studies also document that firms with higher equity ownership by institutional investors have higher firm valuations and better operating performance. Recent studies find that firms with higher institutional investors have greater female directors on the boards (Gormley et al., 2023; Fu et al., 2023). Building on these studies, we predict that the positive association between firm performance and board gender diversity is stronger in firms with higher equity ownership by institutional shareholders.

Third, we consider industry downturn as a moderator. Clearly, environmental uncertainty is more severe during industry downturns. Prior studies find that gender-diverse teams are better at decision making under stress and are more likely to explore novel solutions in uncertain situations (Griffin et al., 2021; Kirsch, 2018). Moreover, other studies show that greater female representation on the board is associated with better firm performance during economic crisis such as the Global Recession in 2008 (Sun et al., 2015; Papangkorn et al., 2019). We extend this line of inquiry to examine whether board gender diversity varies with firm performance during industry downturns. We posit that during industry downturns, agency costs tend to increase and firms need more stringent monitoring and more diverse advice compared to industry growth periods. If greater board gender diversity is associated with stronger corporate governance and better decision making to improve firm performance during industry downturn, we predict that the positive association between firm performance and board gender diversity is stronger during industry downturn.

Using sample firms in eight Asian countries (Hong Kong, Indonesia, Malaysia, Philippines, Singapore, South Korea, Thailand and Taiwan) from 2015 to 2023, we offer four results. First, we find that firm valuation is positively associated with the proportion of female directors on a board. More importantly, the positive association between board gender diversity and firm valuation is conditional on firm-level characteristics. Second, we find the positive association between firm valuation and the proportion of female directors on the board is higher in firms with higher organisational

complexity. In our study, firms that have higher organisational complexity are firms with higher number of business segments, larger firms and firms with higher proportion of intangible assets. Our result suggests that board gender diversity fosters the monitoring of management and improves the information environment in firms with higher organisational complexity. Third, we find that the positive association between firm valuation and the proportion of female directors on the board is higher in firms with higher percentage of equity held by institutional shareholders. Our result suggests that female board representation and institutional shareholders play complementary corporate governance roles in improving firm performance. Fourth, we find the positive association between firm valuation and the proportion of female directors on the board is more pronounced during industry downturns. We interpret our result as suggesting that greater board gender diversity is associated with better coordination of diverse board views and more effective board-decision making to improve firm performance during periods of economic shocks such as industry downturns.

Our results are robust to endogeneity issues. After correcting for self-selection issues related to board gender diversity, we continue to find that the positive association between firm valuation and the proportion of female directors on the board is stronger in firms with higher organisational complexity, firms with higher equity ownership by institutional shareholders and during industry downturns. Furthermore, our results are robust to using alternative measures of firm performance such as accounting profitability performance measures. As an additional analysis, we also examine the association between firm risk and board gender diversity. We document that firm risk is lower in firms with higher board gender diversity. Furthermore, we find that the negative association between firm risk and the proportion of female directors on the board is stronger in firms with higher organisational complexity, firms with higher percentage of equity held by institutional shareholders and during industry downturns. In essence, our results on firm risk and board gender diversity varying systematically with firm-level characteristics are consistent with those documented on firm performance and board gender diversity.

Our study contains several contributions. First, consistent with the suggestions in Post and Byron (2015), we show that association and firm performance is conditional on three firm level characteristics. Our results suggest that prior studies' mixed evidence on the connection between

board gender diversity and firm performance may have been because the effects cancel out on average when not conditioned on firm-level characteristics. Our evidence suggests that to some extent, board of directors is constituted to maximise firm valuations and organisation complexity, corporate ownership and industry downturns are important factors in these decisions, which supports the concept of optimum board structures varying systematically with the firm's characteristics (e.g., information environment) as documented in Raheja (2005), Coles et al. (2008) and Harris and Raviv (2008).

Second, our results contribute to the literature about impact of institutional shareholders on corporate governance (Aggarwal et al., 2011; Ferreira & Matos; 2008; Lel, 2019). We show that in firms with high female board representation, the sub-sample of firms with higher equity ownership by institutional shareholders has higher firm performance. By examining the interaction between board gender diversity and institutional shareholders, we shed light on the complementary role of alternative corporate governance mechanism in affecting firm valuation. More generally, we provide evidence that institutional shareholders have the incentives and resources to monitor firm effectively.

Third, our findings extend the literature on the determinants of firm performance during crisis periods. Prior studies find that corporate social performance increases firm value during the global financial crisis in 2008 (Bouslah et al., 2018) and the COVID pandemic (Poursoleyman et al., 2023). These studies posit that investors consider corporate social performance of the firm as a signal of how these firms are likely to navigate in a crisis. Our results suggest that board gender diversity also affects investors' assessment of the firm's ability to weather industry crisis periods.

Fourth, Baker et al. (2020) highlight that majority of studies of board diversity focus on a single country. However, the results in Anglo-American nations may not apply in Asian countries due to institutional, social and economic differences. By examining listed firms in eight Asian countries, this article answers Baker et al. (2020) call for future research to conduct cross-country studies, especially in Asia.

LITERATURE REVIEW AND HYPOTHESES

Firm Performance and Board Gender Diversity

Prior studies provide mixed evidence on the association between firm performance and board gender diversity. Some studies find corporate performance is positively associated with board gender diversity. Carter et al. (2003) find a positive correlation between board diversity and firm value based on a sample of US firms. Campbell and Minguez-Vera (2008) find that female directorship is positively correlated with the performance of Spanish firms. Using a sample of banks in nine countries from 2004 to 2010, García-Meca et al. (2015) find that bank performance is positively associated with proportion of female directors on the board, especially in countries with stronger regulatory regime. Using a sample of China's listed firms, Liu et al. (2014) find a positive relation between board gender diversity and firm performance². Consistent with the critical mass theory, their results suggest that boards with three or more female directors have a stronger impact on firm performance than boards with two or fewer female directors. Kim and Starks (2016) find that female directors contribute functional expertise to corporate boards, which enhances the board's advisory effectiveness and increases firm value. Using Spain's board gender diversity reform, Reguera-Alvarado et al. (2017) find that the requirement increases female representation on boards and improves firm value.

However, other studies find a negative association between corporate performance and board gender diversity. Adams and Ferreira (2009) find that firm valuation is negatively associated with the proportion of female directors on the board. Ahern and Dittmar (2012) find that firm valuation decreases following the introduction of the 40% female gender quota in Norway³. Based on a sample of French firms from 2001 to 2010, Bennouri et al. (2018) find that female directorship significantly decreases firm valuation. Using a sample of the US firms, Greene et al. (2020) find a negative market reaction around the California law mandating women representation of the board, particularly for firms with a lower supply of female director candidates⁴. In fact, some studies fail to find any relationship between corporate financial performance and board gender diversity (Carter et al., 2010; Chapple & Humphrey, 2014).

Prior studies suggest some reasons to explain why board gender diversity may affect firm performance. Based on the leadership literature, there are gender differences in terms of leadership style (Mandell & Pherwani, 2003; Eagly & Carli, 2003; Glass & Cook, 2016). In general, these studies suggest that in contrast to male leaders who are more transactional in style and tend to use command-and-control methods, female leaders often have a more transformational style, which promotes participation, communication and cooperation. Francis et al. (2021) find that female CEOs are more likely to communicate and cooperate with hedge fund activists to achieve intervention goals. Furthermore, they find that female-led targets experience greater increases in market and operational performance subsequent to hedge fund targeting.

Another stream of literature finds that gender diverse boards increase corporate board effectiveness. Adams and Ferreira (2009) find that female directors have better board meeting attendance records than male directors, male directors have fewer attendance problems when the proportion of female directors on the board increases, and women are more likely to join monitoring committees. They also find that in firms with higher proportion of female directors, CEO turnover is more sensitive to poor stock return performance. Other studies find that female executives demonstrate higher propensity to comply with regulations and law (Bernardi & Arnold, 1997) and higher proportion of female directors on the board reduces the likelihood of securities fraud (Cumming et al., 2015). Furthermore, gender diverse boards are more likely to consider various points of view, leading to better decision making by the board (Glass & Cook, 2016).

Other studies posit that the greater board gender diversity reduces agency costs, which increases firm valuation. Pandey et al. (2019) and Karavitis et al. (2021) find that firms with more female directors on the board have lower cost of debt. Some studies show that female directors are associated with better financial accounting quality (Srinidhi et al., 2011; Francis et al., 2015) and a lower likelihood to manipulate financial statements (Gupta et al., 2020). In addition, board gender diversity improves the flow of information to stock prices (Gul et al., 2011), increases dividend payout (Chen et al., 2017) and reduces the probability of stock price crash risk (Li

& Zeng, 2019).

In summary, we posit that board gender diversity promotes diverse views, strengthens board effectiveness, improves monitoring of the top management team, reduces agency costs and promotes corporate transparency. Our first hypothesis is as follows:

H1: Firm performance is positively associated with board gender diversity.

The Effect of Organisational Complexity on the Association between Board Gender Diversity and Firm Performance

Given investors' limited processing capacity, complexity in information processing can significantly delay the impounding of information into asset prices (Sims, 2006). Furthermore, Veldkamp (2006) shows that when information acquisition is costly, rational investors will only purchase a sub set of information, making only a small fraction of expensive firm-specific information incorporated into stock prices. Thus, lowering the information processing cost will increase the speed and the amount of that information being incorporated into stock prices.

Building on prior studies (Bushman et al., 2004; Coles et al., 2008; Cohen & Lou, 2012), organisational complexity reflects investors' difficulty in understanding the economic substance of the firm's transactions. In essence, these studies posit organisational complexity as a friction to decision-making in management and corporate valuation. Thus, firms with higher organisational complexity face more complex operational and informational environments (Bushman et al., 2004, Coles et al., 2008). Thus, prior studies provide evidence that given investors' limited processing and capital capacity, information processing costs are higher in firms with higher organisational complexity (Cohen & Lou, 2012; Lee et al., 2019).

Organisational complexity is multi-dimensional and there are many proxies to measure organisational complexity. Hence, in this study, we employ three widely-used proxies to measure organisational complexity: (i) number of business segments, (ii) firm size, and (iii) intangible assets. We briefly

discuss how these proxies are associated with higher operational complexity and more complex informational environments.

Firms with multiple business segments may experience inefficient capital allocation within the firm such as transfer of resources from profitable segment to cross-subsidise loss-making segment (Stein, 1997). Furthermore, divisional managers may take sub-optimal actions that increase individual segment performance but harm the company-wide performance, leading to higher moral hazard problems in multi-segment firms (Lang & Stulz, 1994). Moreover, monitoring costs and information complexities are higher in firms operating in multiple geographic segments due to geographic dispersion, multiple currencies, high auditing costs, differing legal systems and cultural differences (Bushman et al., 2004; Lee et al., 2019).

Organisational complexity is positively associated with firm size due to coordination problems and differing investment opportunities in large firms (Smith & Watts, 1992). Moreover, diverse business operations in large firms require greater managerial attention, effort and talent (Lang & Stulz, 1994).

Investments in intangible assets are typically characterised by uncertain future benefits, long gestation period and high risk of failure. Analysts forecast errors are larger in firms with higher intangible assets (Barth et al., 2001). Information asymmetry associated with intangible assets is higher than that associated with tangible assets due to the relative uniqueness of intangible assets (Aboody & Lev, 2000) and difficulty in monitoring managerial discretion over the growth opportunities arising from intangible assets (Smith & Watts, 1992).

We posit three mechanisms to explain how board gender diversity can improve firm valuation in complex firms. First, higher board gender diversity is linked to better monitoring of managers, leading to higher corporate transparency. Gul et al. (2011) find that stock prices of firms with gender-diverse boards reflect more firm-specific information, i.e., greater stock price informativeness. They also find that gender diversity improves stock price informativeness through encouraging higher public disclosure in large firms and facilitating greater private information collection in small firms. Second, complex firms have higher innovation and larger proportion of intangible assets (Bushman et al., 2004; Coles et al., 2008). Using a sample of 45 countries, Griffin et al. (2021) find that the proportion of female

directors on a corporate board is positively associated with more innovation (as measured by citation-weighted patent count), more novel (exploratory) innovation (as captured by the scope of citations by a firm's patents), and greater innovative efficiency (as measured by citation-weighted patent count normalised by R&D capital). In terms of mechanisms by which board gender diversity increases corporate innovation, Griffin et al. (2021) document that board gender diversity is associated with more failure-tolerant and long-term executive compensation, a more innovative corporate culture, and more diverse inventors. Third, board gender diversity improves the firm's information environment. Francis et al. (2015) find that firms with higher board gender diversity have better financial accounting quality. Srinidhi et al. (2011) find the presence of female directors (female non-executive directors, female audit committee members) reduces earnings management, measured by accruals quality and earnings benchmark measures. Li and Zeng (2019) find a negative association between female Chief Financial Officer (CFOs) and future stock price crash risk. The authors argue that due to higher risk-aversion, female top executives are less likely to invest in risky value-destroying projects and they are less likely to hoard bad news arising from loss-making investments.

If board gender diversity increases monitoring of management, fosters innovation and improves information environment to a greater extent in more complex firms, our second hypothesis is:

H2: The positive association between firm performance and board gender diversity is stronger in firms with higher organisational complexity.

The Effect of Institutional Shareholders on the Association between Board Gender Diversity and Firm Performance

There is a stream of research that posits that large non-management shareholders positively affect firm value (Laeven & Levine, 2008; Lins, 2003; Attig et al., 2009). The rationale is that due to their substantial investment in the firm, large non-management shareholders will suffer a greater loss from expropriation than smaller shareholders. Thus, large non-management shareholders have stronger incentives to monitor and constrain activities that reduce shareholder wealth. Given that the monitoring effectiveness of

large non-management shareholders increases with the size of their equity ownership in the firm, large non-management shareholders can lower agency costs, which in turn increases firm performance.

There is considerable evidence on the positive association between firm valuation and large non-management shareholders. Using a sample of 18 emerging markets, Lins (2003) find that cash flow rights of large non-management shareholders are positively related to firm value, especially in countries with weak investors protection. Attig et al. (2009) find that the presence, number and size of multiple large non-controlling shareholders are positively associated with a corporate valuation in a sample of East Asian countries. They also document that the beneficial valuation effects of multiple large non-controlling shareholders are greater in firms with higher agency costs. Similarly, Laeven and Levine (2008) show the positive effect of large non-controlling shareholder cash flow rights on firm value in a sample of European firms. Attig et al. (2008) find evidence that the cost of equity decreases with the presence, number, and voting size of large shareholders beyond the controlling owner. They also find that multiple large non-management shareholders play an important internal corporate governance role in curbing private benefits and reducing information asymmetry, especially in countries with weaker regulatory environments.

Another stream of closely related research is the corporate governance role of institutional shareholders in shaping firm performance. Aggarwal et al. (2011) find that firm-level governance is positively associated with international institutional investment. They also document that firms with higher institutional ownership are more likely to terminate poorly performing Chief Executive Officers (CEOs) and exhibit improvements in valuation over time. Ferreira and Matos (2008) find that institutional investors have a strong preference for firms with good governance. Firms with higher ownership by foreign and independent institutions have higher firm valuations, better operating performance, and lower capital expenditures. Lel (2019) find that foreign institutional investors reduce earnings management activities of firms, especially for firms in which monitoring is more valuable such as firms in weak investor protection countries and when firms have greater growth opportunities.

Recent papers document a positive association between institutional investors and board gender diversity. Gormley et al. (2023) find that the “Big Three” institutional investors (State Street, Blackrock and Vanguard)

launched campaigns that led US firms to increase female directorships. They also report that firms increased board gender diversity by identifying candidates beyond the managers' existing networks and by placing less emphasis on candidates' executive experience⁵. Similarly, using a sample of UK firms, Fu et al. (2023) find that higher institutional ownership leads to higher female director representation on boards.

Building on the above studies, we posit that institutional shareholders are likely to complement board gender diversity in affecting firm performance. Thus, our third hypothesis is:

- H3: The positive association between firm performance and board gender diversity is stronger in firms with larger equity ownership held by institutional shareholders.

The Effect of Industry Downturns on the Association between Board Gender Diversity and Firm Performance

As there is greater potential for managerial expropriation during economic crisis, corporate governance quality attracts greater investor scrutiny and firm performance is more reliant on the board's effectiveness in monitoring and advising management (Lemmon & Lins, 2003; Mitton, 2002). Prior studies find that female directors increase board effectiveness of monitoring management (Adams & Ferreira, 2009; Gul et al., 2011; Cumming et al., 2015). Furthermore, prior studies find board gender diversity can enhance group decision making and promote diverse views especially when confronting uncertain situations (Post & Byron, 2015; Griffin et al., 2021). By and large, prior studies provide evidence on the beneficial effects of board gender diversity during economic crisis. Sun et al. (2015) find that boards are more likely to accept female directorship during an economic crisis and boards with greater female board representation are more likely to make tough counter-cyclical investments to improve firm performance during a crisis. Papangkorn et al. (2019) find that the greater female board representation improved firm performance during the 2008 Global Financial Crisis.

In this study, we extend this line of inquiry by examining whether the association between firm performance and board gender diversity is stronger during industry downturns. In general, board of directors' strategies and

actions are likely to be more consequential during periods of industry decline compared to periods of strong industry growth (Coles et al., 2008; Cohen & Lou, 2012). The rationale is that when opportunities are scarce during industry downturns, taking advantage of every opportunity becomes crucial. In contrast, when investment opportunities are abundant during industry growth, it is less costly to miss an opportunity.

We posit that during industry downturn, agency costs tend to increase and firms need more stringent monitoring and more diverse advice compared to industry growth periods. If gender diverse boards signal good corporate governance and motivate board members to expend more effort toward the common goal of exploring alternatives to improve firm performance during industry downturn, we predict that:

H4: The positive association between firm performance and board gender diversity is stronger during industry downturn.

SAMPLE AND METHOD

Sample

We begin with the Standard and Poor's Global Vantage database to identify listed firms in Hong Kong, Indonesia, Malaysia, Philippines, Singapore, South Korea, Thailand and Taiwan from 2015 to 2023. We exclude the firms in the financial industry due to their unique financial characteristics and regulatory requirements. We delete firms with missing financial statement information and stock price information. We manually collect data on the board structure and corporate ownership structure from the annual reports. In view of the cost of data collection, we randomly select 800 firms to obtain their annual reports from their corporate website. Our final sample consists of 800 firms for 6,735 firm-year observations during the period 2015 to 2023.

Empirical Model

We employ the following model to test the association between firm performance and board gender diversity:

$$\begin{aligned}
\text{TOBINQ}_{it} = & \beta_0 + \beta_1 \text{FEMALEDIR}_{it-1} + \beta_2 \text{FEMALEDIR}_{it-1} * \\
& \text{COMPLEX}_{it-1} + \beta_3 \text{FEMALEDIR}_{it-1} * \text{INSTIOWN}_{it-1} + \\
& \beta_4 \text{FEMALEDIR}_{it-1} * \text{DOWNTURN}_{it-1} + \beta_5 \text{COMPLEX}_{it-1} + \\
& \beta_6 * \text{INSTIOWN}_{it-1} + \beta_7 \text{DOWNTURN}_{it-1} + \beta_8 \text{BDSIZE}_{it-1} + \\
& \beta_9 \text{OUTDIR}_{it-1} + \beta_{10} \text{LNASSET}_{it-1} + \beta_{11} \text{DEBT}_{it-1} + \\
& \beta_{12} \text{SALECHG}_{it-1} + \text{INDUSTRY} + \text{COUNTRY} + \text{YEAR}
\end{aligned}
\tag{1}$$

where, i = firm; t = year t , TOBINQ = ratio of market value of the ordinary equity and book value of total liabilities divided by the book value of total assets; FEMALEDIR = number of female directors divided by number of directors on the board; COMPLEX = a firm's organisational complexity based on a common factor analysis of three widely used measures of business and operational complexity: (i) number of business segments, (ii) firm size and (iii) proportion of intangible assets to total assets. COMPLEX is a dummy variable that equals one if this common factor score is greater than the median value and zero otherwise; INSTIOWN = proportion of common equity held by institutional shareholders; DOWNTURN = a dummy variable that equals one if the industry the firm operates in experiences a 5% or greater decrease in aggregate sales for the year and zero otherwise; BDSIZE = total number of directors on the board; OUTDIR = the proportion of outside directors on the board. Outside directors are directors who are not classified as inside or grey directors where grey directors include former employees or persons who have related party transactions with the firm; LNASSET = the natural logarithm of book value of total assets; DEBT = total liabilities divided by book value of total assets; SALECHG = the prior year sales growth; INDUSTRY = dummy variables to control for industry effects using 2-digit SIC codes; COUNTRY = dummy variables to control for country effects; YEAR = dummy variables to control for time trends.

Our first hypothesis predicts that firm performance is positively associated with board gender diversity. Thus, β_1 should be positive.

Following Coles et al. (2008), we measure the firm's organisational complexity based on a common factor analysis of three widely used measures of business and operational complexity: (i) number of business segments, (ii) firm size and (iii) proportion of intangible assets to total assets. The factor score for a firm-year observation is a linear combination of the transformed (to standard normal) values of these three variables. As expected, this common factor score, i.e., firm's organisational complexity, increases

with number of business segments, firm size and intangible assets. We create a dummy variable (COMPLEX) that equals one if this common factor score is greater than the median value and zero otherwise.

Hypothesis H2 predicts that the positive association between firm performance and board gender diversity is stronger in firms with greater organisational complexity. Thus, we predict coefficient β_2 of the interaction term FEMALEDIR * COMPLEX to be positive.

Hypothesis H3 predicts that the positive association between firm performance and board gender diversity is stronger in firms with greater equity ownership by institutional investors. Thus, we predict coefficient β_3 of the interaction term FEMALEDIR * INSTIOWN to be positive.

Using each firm's primary four-digit SIC code, we assign firms to the Fama and French (1997) industry classifications. Following prior studies (Mitchell & Mulherin, 1996; Han et al., 2016), we use industry sales activity to define industry shocks. Specifically, we define an indicator variable DOWNTURN that equals one if the industry the firm operates in experiences a 5% or greater decrease in aggregate sales for the year. Hypothesis H4 predicts that the negative association between firm performance and board gender diversity industry is stronger during industry downturns. Thus, we predict coefficient β_4 of the interaction term FEMALEDIR * DOWNTURN to be positive.

Our control variables are as follows. As monitoring by outside directors increases, firm performance also increases (Shivdasani, 1993; Perry & Peyer, 2005). Thus, we include the proportion of outside directors on the board (OUTDIR) in our tests. Prior studies find that smaller boards are associated with higher firm value due to lower coordination problems (Yermack, 1996). Hence, we include board size at the end of the preceding fiscal year (BDSIZE). We also control for firm size by including the natural logarithm of total assets (LNASSET). To control for growth opportunities (Smith & Watts, 1992), we include the firm's sales growth rate in the prior year (SALECHG). To control for the effect of debt financing in mitigating agency costs (Jensen, 1986), we include the ratio of total liabilities divided by book value of total assets (DEBT). We control for country effects with country indicators (COUNTRY), for industry effects with industry indicators (INDUSTRY) and for time trends with year indicators (YEAR).

RESULTS

Descriptive Statistics

Table 1 presents the descriptive statistics of our sample consisting of eight Asian countries (Hong Kong, Indonesia, Malaysia, Philippines, Singapore, South Korea, Thailand and Taiwan) during the period of 2015 to 2023. In our sample, the mean percentage of female directors on the board is 17.1%. By comparison, Adams and Ferreira (2009) document that the mean percentage of female directors on the board in the US listed companies is 8.5%⁶. In our sample, there is no firm with more than 50% female directors on the board. The proportion of outside directors (OUTDIR) on the board has a mean of 58.2%. The average board size (BDSIZE) is 8.72. The average TOBINQ is 2.953. On average, the firms are profitable (mean ROA is 3.6%).

TABLE 1
Descriptive statistics

Variable	Mean	25th percentile	Median	75th percentile	S. D.
TOBINQ	2.953	0.716	1.186	1.973	8.102
FEMALEDIR	0.171	0	0	0.198	0.231
COMPLEX	0.50	0	0.50	1.0	0.624
INSTIOWN	0.243	0.067	0.104	0.198	0.157
DOWNTURN	0.197	0	0	0	0.481
BDSIZE	8.723	7	9	10	4.941
OUTDIR	0.582	0.433	0.674	0.729	0.211
LNASSET	8.731	3.256	7.641	9.237	4.106
ROA	0.036	0.005	0.029	0.081	0.073
SALECHG	0.243	-0.009	0.154	0.196	0.107
DEBT	0.381	0.129	0.418	0.673	0.185

Notes: This table presents the descriptive statistics. sample consists of 800 firms for 6,735 firm-year observations during the period 2015 to 2023. TOBINQ = the market value of equity plus book value of total liabilities divided by total assets; FEMALEDIR = the proportion of female directors on a board; COMPLEX = a dummy variable on organisational complexity that equals one if a common factor score (based on number of business segments, firm size and proportion of intangible assets to total assets) is greater than the median value and zero otherwise; INSTIOWN = the proportion of common equity held by institutional shareholders; DOWNTURN = a dummy variable that equals one if the industry the firm operates in experiences a 5% or greater decrease in aggregate sales for the year and zero otherwise; BDSIZE = the number of directors on the board. OUTDIR = the proportion of outside directors on the board; Outside directors = directors who are not classified as inside or grey directors, where grey directors include former employees or persons who have related party transactions with the firm; ROA = net income divided by total assets; LNASSET = the natural logarithm of book value of total assets; SALECHG = the prior year sales growth; DEBT = the total liabilities divided by book value of total assets.

Univariate Results

Table 2 presents the Spearman correlations. Several points are noteworthy. First, firm valuation is positively associated with proportion of female directors on the board, indicating that higher board gender diversity is associated with higher firm performance. Second, firm valuation is positively related to organisational complexity. Third, firms with higher equity ownership by institutional shareholders have higher valuation. Fourth, equity ownership by institutional shareholders is positively associated with board gender diversity.

TABLE 2
Spearman correlations

	TOBINQ	ROA	FEMALEDIR	COMPLEX	INSTIOWN	DOWNTURN	STDRET
TOBINQ	1						
ROA	0.315 (< 0.01)	1					
FEMALEDIR	0.189 (0.02)	0.095 (0.06)	1				
COMPLEX	0.106 (0.07)	-0.161 (0.14)	0.131 (0.14)	1			
INSTIOWN	0.242 (< 0.01)	0.155 (0.08)	0.265 (0.03)	0.318 (0.22)	1		
DOWNTURN	-0.286 (< 0.01)	-0.197 (0.02)	0.092 (0.13)	0.064 (0.25)	0.085 (0.14)	1	
STDRET	-0.175 (0.04)	-0.112 (0.09)	0.213 (0.02)	0.186 (0.14)	0.279 (< 0.01)	0.328 (0.06)	1

Notes: This table presents the Spearman correlations between the selected variables. TOBINQ = the market value of equity plus book value of total liabilities divided by total assets; ROA = net income divided by total assets; FEMALEDIR = the proportion of female directors on a board; COMPLEX = a dummy variable on organisational complexity that equals one if a common factor score (based on number of business segments, firm size and proportion of intangible assets to total assets) is greater than the median value and zero otherwise; INSTIOWN = the proportion of common equity held by institutional shareholders' DOWNTURN = a dummy variable that equals one if the industry the firm operates in experiences a 5% or greater decrease in aggregate sales for the year and zero otherwise; STDRET = the standard deviation of daily stock returns in the past year. The parenthesis contains the *p*-value.

Firm Valuation and Board Gender Diversity

This section examines the association between firm valuation and the proportion of female directors on the board. To mitigate the impact of outliers, all observations are winsorised at the 1st percentile and the 99th percentile. All variables have variance inflation factors below 4, suggesting that multicollinearity is not likely to affect our results. To address heteroscedasticity, we adjust the standard errors using White's (1980) heteroscedasticity procedures.

Table 3 presents the regression results of market-to-book ratio (TOBINQ) on the proportion of female directors on the board. In column (1), the estimated coefficient on FEMALEDIR is positive and statistically significant

at the 1% level. Consistent with hypothesis H1, the results indicate that firm valuation is positively associated with the proportion of female directors on the board.

In column (2), we test whether the association between firm valuation and the proportion of female directors on the board depends on organisational complexity. The interaction term, $FEMALEDIR * COMPLEX$, is positive and significant at the 1% level. Thus, consistent with hypothesis H2, we find that the positive association between firm valuation and the proportion of female directors on the board is stronger in firms with greater organisational complexity.

In column (3), we test whether the association between firm valuation and the proportion of female directors on the board is contingent on equity ownership by institutional shareholders. The interaction term, $FEMALEDIR * INSTIOWN$, is positive and significant at the 5% level. Thus, consistent with hypothesis H3, our result suggests that the positive association between firm valuation and the proportion of female directors on the board is stronger in firms with higher equity ownership by institutional shareholders. Our result supports the notion that board gender diversity and institutional shareholders are complementary corporate governance mechanisms to improve firm valuation.

In column (4), we test whether the association between firm valuation and the proportion of female directors on the board varies with industry downturns. The interaction term, $FEMALEDIR * DOWNTURN$, is positive and significant at the 5% level. Hence, consistent with hypothesis H4, the positive association between firm valuation and the proportion of female directors on the board is stronger during industry downturns. More generally, our results support the rationale that greater board gender diversity fosters board of directors' strategies and actions to be more consequential during periods of industry downturns.⁷ In other words, when opportunities are scarce during industry downturns, board gender diversity plays a more pronounced role to successfully navigating every opportunity.

In column (5), we include all three interaction terms between the proportion of female directors on board and firm-level institutional features. Our results are qualitatively similar. In summary, we continue to document that the positive association between firm valuation and the proportion of female

directors on the board is higher in: (i) firms with greater organisational complexity, (ii) firms with higher equity ownership by institutional shareholders, and (iii) during industry downturns. Our results support the notion that the association between firm valuation and female board representation varies systematically with firm-level characteristics.

TABLE 3

Firm valuation and board gender diversity

Variable	1	2	3	4	5
Intercept	0.193 (1.29)	0.317 (1.82)*	0.042 (1.33)	0.215 (2.96)***	0.422 (1.30)
FEMALEDIR	0.328 (3.16)***	0.245 (3.38)***	0.197 (2.86)***	0.085 (2.13)**	0.209 (2.16)**
FEMALEDIR *		0.308 (3.37)***			0.415 (3.07)***
COMPLEX					
FEMALEDIR*			0.283 (2.29)**		0.169 (2.84)***
INSTIOWN					
FEMALEDIR *				0.192 (2.14)**	0.173 (2.05)**
DOWNTURN					
COMPLEX	0.416 (1.52)	0.176 (2.06)**	0.252 (1.16)	0.103 (1.72)*	0.188 (2.10)**
INSTIOWN	0.187 (2.83)***	0.239 (1.83)*	0.186 (2.19)**	0.083 (2.06)**	0.211 (2.72)***
DOWNTURN	-0.264 (-2.18)**	-0.192 (-2.36)**	-0.073 (-1.81)*	-0.284 (-2.71)***	-0.325 (-2.68)***
BDSIZE	-0.079 (-2.04)**	-0.083 (-2.01)**	-0.016 (-1.98)**	-0.148 (-2.21)**	-0.053 (-1.33)
OUTDIR	0.217 (1.38)	0.152 (2.09)**	0.193 (0.84)	0.075 (1.82)*	0.061 (2.04)**
LNASSET	0.422 (2.95)***	0.283 (3.02)***	0.315 (3.26)***	0.409 (3.36)***	0.502 (3.46)***
SALECHG	0.511 (2.03)**	0.168 (2.52)***	0.129 (1.21)	0.055 (1.33)	0.283 (2.02)**
DEBT	-0.394 (-0.84)	-0.185 (-1.12)	-0.028 (-0.74)	-0.016 (-0.92)	-0.028 (-0.65)
Country fixed effects	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes
Adjusted R ²	25.3%	27.1%	30.2%	28.1%	31.5%

Notes: This table presents the regression results of firm valuation. The dependent variable is TOBINQ, which is the market value of equity plus book value of total liabilities divided by book value of total assets. FEMALEDIR = the proportion of female directors on a board; COMPLEX = a dummy variable on organizational complexity that equals one if a common factor score (based on number of business segments, firm size and proportion of intangible assets to total assets) is greater than the median value and zero otherwise; INSTIOWN = the proportion of common equity held by institutional shareholders; DOWNTURN = a dummy variable that equals one if the industry the firm operates in experiences a 5% or greater decrease in aggregate sales for the year and zero otherwise. BDSIZE = the number of directors on the board; OUTDIR = the proportion of outside directors on the board; Outside directors = directors who are not classified as inside or grey directors, where grey directors include former employees or persons who have related party transactions with the firm; ROA = net income divided by total assets; LNASSET = the natural logarithm of book value of total assets; SALECHG = the prior year sales growth; DEBT = the total liabilities divided by book value of total assets. The parentheses contain the t-statistics. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

In general, the control variables are in their predicted direction. Consistent with the monitoring role of outside directors, firm valuation is positively associated with the proportion of outside directors on the board.

Furthermore, firm valuation is lower in firms with lower board size. Firms with higher equity ownership by institutional shareholders have higher valuation.

Alternative Measures of Firm Performance

In this section, we use alternative measures of firm performance such as accounting profitability. Table 4 examines the association between female board representation and various measures of firm performance. In column (1), the dependent variable is return on assets. We find that firms with higher board gender diversity have higher profitability than those with lower board gender diversity. More importantly, we find the positive association between return on assets and the proportion of female directors on board is higher in (i) firms with greater organisational complexity, (ii) firms with higher equity ownership by institutional shareholders, and (iii) during industry downturns.

In column (2), the dependent variable is return on equity. Our results are qualitatively similar. Consistent with our hypothesis, the association between firm's profitability and board gender diversity varies systematically three contextual factors: (i) Organisational complexity, (ii) equity ownership by institutional shareholders, and (iii) industry downturns.

TABLE 4

Alternative measures of firm performance: Profitability and board gender diversity

Dependent variable	1	2
	Return on Assets (ROA)	Return on Equity (ROE)
Intercept	0.083 (3.19)***	0.029 (3.31)***
FEMALEDIR	0.147 (2.01)**	0.109 (1.88)*
FEMALEDIR * COMPLEX	0.179 (2.15)**	0.085 (2.47)***
FEMALEDIR * INSTIOWN	0.204 (2.04)**	0.176 (2.19)***
FEMALEDIR * DOWNTURN	0.239 (1.77)*	0.163 (2.01)**
COMPLEX	0.416 (1.52)	0.054 (1.39)
INSTIOWN	0.141 (2.53)***	0.185 (1.81)*
DOWNTURN	-0.365 (-2.93)***	-0.412 (-2.57)***

(Continued on next page)

TABLE 4 (Continued)

Dependent variable	1	2
	Return on Assets (ROA)	Return on Equity (ROE)
Intercept	0.083 (3.19)***	0.029 (3.31)***
BDSIZE	−0.014 (−1.15)	−0.027 (−0.93)
OUTDIR	0.129 (2.38)***	0.129 (2.57)***
LNASSET	0.209 (2.38)***	0.129 (2.57)***
SALECHG	0.053 (1.24)	0.021 (1.03)
DEBT	−0.038 (−0.97)	−0.016 (−1.04)
Country fixed effects	Yes	Yes
Industry fixed effects	Yes	Yes
Year fixed effects	Yes	Yes
Adjusted R ²	18.1%	20.6%

Notes: This table presents the firm-fixed effects regression results of operating profitability. In column (1), the dependent variable is return on assets (ROA) computed as net profit after tax divided by total assets. In column (2), the dependent variable is return on equity (ROE) computed as net profit after tax divided by book equity. FEMALEDIR = the proportion of female directors on a board; COMPLEX = a dummy variable on organisational complexity that equals one if a common factor score (based on number of business segments, firm size and proportion of intangible assets to total assets) is greater than the median value and zero otherwise; INSTIOWN = the proportion of common equity held by institutional shareholders; DOWNTURN = a dummy variable that equals one if the industry the firm operates in experiences a 5% or greater decrease in aggregate sales for the year and zero otherwise; BDSIZE = the number of directors on the board; OUTDIR = the proportion of outside directors on the board; Outside directors = directors who are not classified as inside or grey directors, where grey directors include former employees or persons who have related party transactions with the firm; LNASSET = the natural logarithm of book value of total assets; SALECHG = the prior year sales growth; DEBT = the total liabilities divided by book value of total assets. The parentheses contain the t-statistics. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

Firm Risk and Board Gender Diversity

As additional analysis, this section examines the association between firm risk and board gender diversity. Prior studies find that female executives are more risk averse and less risk tolerant than male executives (Croson & Gneezy, 2009). Faccio et al. (2016) find that firms run by female CEOs have lower leverage, less volatile earnings and a higher chance of survival than otherwise similar firms run by male CEOs. Furthermore, transitions from male to female CEOs are associated with reductions in corporate risk-taking. Bernile et al. (2018) find that greater board diversity leads to lower volatility and better performance⁸. The lower risk levels are largely due to diverse boards adopting more persistent and less risky financial policies.

Huang and Kisgen (2013) find that firms with female executives are less likely to make acquisitions and the acquisitions made by female executives have higher announcement returns compared with those made by firms with male executives.

Table 5 presents the regression results of firm risk on the percentage of female directors on the board. Our proxies for operating risk are:

1. Standard deviation of stock returns in the past five years.
2. Standard deviation of return on assets in the past five years.
3. Standard deviation of cash flow from operations in the past five years.

TABLE 5

Firm risk and board gender diversity

Variable	1	2	3
Dependent variable	STDRET	STDROA	STDOCF
Intercept	0.108 (0.92)	0.229 (2.97)***	0.043 (0.66)
FEMALEDIR	−0.217 (−2.53)***	−0.098 (−2.41)***	−0.185 (−2.38)***
FEMALEDIR * COMPLEX	−0.085 (−2.04)**	−0.062 (−2.59)***	−0.219 (−2.46)***
FEMALEDIR * INSTIOWN	−0.162 (−2.71)***	−0.113 (−2.02)**	−0.268 (−2.70)***
FEMALEDIR * DOWNTURN	−0.098 (−2.06)**	−0.046 (−1.89)*	−0.116 (−2.01)**
COMPLEX	0.063 (1.83)*	0.1573 (1.29)	0.228 (0.93)
INSTIOWN	−0.114 (−2.39)***	−0.524 (−1.79)*	−0.328 (−1.23)
DOWNTURN	0.208 (2.86)***	0.0652 (1.13)	0.047 (2.53)***
BDSIZE	0.057 (1.09)	0.127 (1.44)	0.2385 (1.06)
OUTDIR	−0.106 (1.42)	0.129 (0.67)	0.291 (1.37)
LNASSET	0.129 (2.61)***	0.261 (2.87)***	0.057 (1.05)
SALECHG	0.149 (1.16)	0.019 (1.50)	0.834 (1.19)
DEBT	0.352 (0.67)	0.218 (0.92)	0.068 (1.29)

(Continued on next page)

TABLE 5 (*Continued*)

Variable	1	2	3
Country fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Adjusted R ²	11.3%	12.5%	11.9%

Notes: This table presents the estimation results of the regression of firm risk on board gender diversity. In column (1), the dependent variable is the standard deviation of daily stock returns in the past year (STDRET). In column (2), the dependent variable is the standard deviation of return on assets in the past five years (STDROA). In column (3), the dependent variable is the standard deviation operating cash flow divided by total assets in the past five years (STDOCF). FEMALEDIR = the proportion of female directors on a board; COMPLEX = a dummy variable on organisational complexity that equals one if a common factor score (based on number of business segments, firm size and proportion of intangible assets to total assets) is greater than the median value and zero otherwise; INSTIOWN = the proportion of common equity held by institutional shareholders; DOWNTURN = a dummy variable that equals one if the industry the firm operates in experiences a 5% or greater decrease in aggregate sales for the year and zero otherwise; BDSIZE = the number of directors on the board; OUTDIR = the proportion of outside directors on the board; Outside directors = directors who are not classified as inside or grey directors, where grey directors include former employees or persons who have related party transactions with the firm; LNASSET = the natural logarithm of book value of total assets; SALECHG = the prior year sales growth; DEBT = the total liabilities divided by book value of total assets. The parentheses contain the *t*-statistics. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

In column (1) in Table 5, the dependent variable is the standard deviation of stock returns in the past five years. The coefficient FEMALEDIR is negative and significant at the 1% level, indicating that firms with higher percentage of female directors have lower standard deviation of stock returns in the past five years. The interaction term, FEMALEDIR * COMPLEX, is negative and significant at the 5% level, indicating that the risk reduction effect of higher board gender diversity is more pronounced in firms with greater organisational complexity. Furthermore, the interaction term, FEMALEDIR * INSTIOWN, is negative and significant at the 1% level, indicating that the negative association between firm risk and board gender diversity is stronger in firms with higher equity ownership by institutional shareholders. Moreover, the interaction term, FEMALEDIR * DOWNTURN, is negative and significant at the 5% level, indicating that the negative association between firm risk and board gender diversity is stronger during industry downturns. In summary, the risk reduction effect of gender diverse boards is more pronounced in: (i) firms with greater organisational complexity, (ii) firms with higher equity ownership by institutional shareholders, and (iii) during industry downturns.

In column (2), the dependent variable is the standard deviation of return on assets in the past five years. In column (3), the dependent variable is the standard deviation of cash flow from operations in the past five years. Our results are qualitatively similar. We continue to document that the negative association between firm's profitability and board gender diversity is conditional on three contextual factors: (i) organisational complexity, (ii) equity ownership by institutional shareholders, and (iii) industry downturns.

Our results that the association between firm risk and board gender diversity depends on contextual factors, i.e., conditional on the firm level characteristics, extend prior studies that document that board gender diversity is associated with lower corporate risk (Faccio et al., 2016; Huang & Kisgen, 2013; Bernile et al., 2018). It should be noted that lower risk is not in and of itself desirable, if it comes at the expense of shareholder value. It is possible that diverse boards adopt sub-optimal low risk policies that do increase firm value. However, our prior results on the positive association between board gender diversity and firm valuation, show that on average, the benefits from board gender diversity outweigh its costs.

Endogeneity

It is possible that board gender diversity is endogenous. For example, firms with higher valuation may attract more female directors, leading to reverse causality issues. Following the approach in Liu et al. (2014) and Li and Zeng (2019), we conduct the two-stage least square (2SLS) method to account for the potential endogeneity of board diversity. In the first stage, following Liu et al. (2014) and Li and Zeng (2019), we use the industry-level median female board representation as the instrumental variable for firm-level female board representation. Table 6 column presents the 2SLS estimation results. Column (1) presents the first stage of the instrumental variable. We find that the firm-level female board representation is positively and significantly related to the industry-level median female board representation, suggesting the relevance condition of the instrumental variable analysis is satisfied.

Then, in the second stage regression, we examine the association between the fitted value of firm-level female board representation and firm performance. In column (2), after controlling for endogeneity, our result suggests that firm valuation is positively associated with the proportion of female directors on

the board. We continue to document that the positive relation between firm valuation and the proportion of female directors on the board is higher in (i) firms with greater organisational complexity, (ii) firms with higher equity ownership by institutional shareholders, and (iii) during industry downturns. Column (3) presents the second stage estimation results of the association between the fitted value of firm-level female board representation and firm risk. In column (3), after controlling for endogeneity, our result suggests that firm risk is negatively associated with the proportion of female directors on the board. We continue to find that the negative relation between firm valuation and the proportion of female directors on the board is stronger in (i) firms with greater organisational complexity, (ii) firms with higher equity ownership by institutional shareholders, and (iii) during industry downturns.

TABLE 6

Two stage least squares regressions: Board Gender Diversity and Firm Performance

Dependent variable	1	2	3
	<i>First stage</i>	<i>Second stage</i>	<i>Second stage</i>
	FEMALEDIR	TOBINQ	STDRET
AVGBGD	0.318 (2.94)***		
Predicted FEMALEDIR		0.726 (3.11)***	−0.285 (−2.73)***
Predicted FEMALEDIR * COMPLEX		0.045 (2.02)**	−0.109 (−2.83)***
Predicted FEMALEDIR * INSTIOWN		0.296 (2.85)***	−0.216 (−2.01)**
Predicted FEMALEDIR * DOWNTURN		0.113 (2.72)***	−0.046 (−2.54)***
COMPLEX	0.084 (1.29)	0.173 (1.02)	0.456 (1.01)
INSTIOWN	0.215 (2.76)***	0.494 (3.27)***	−0.153 (−1.12)
DOWNTURN	0.017 (0.73)	−0.262 (−2.01)**	−0.274 (−2.80)***
BDSIZE	0.021 (2.77)***	−0.029 (−2.01)	0.141 (1.03)
OUTDIR	0.013 (1.42)	0.106 (1.31)	0.122 (1.35)
LNASSET	0.004 (2.91)***	0.512 (2.83)***	0.065 (1.22)

(Continued on next page)

TABLE 6 (*Continued*)

Dependent variable	1	2	3
	<i>First stage</i>	<i>Second stage</i>	<i>Second stage</i>
	FEMALEDIR	TOBINQ	STDRET
SALECHG	0.015 (1.78)*	0.217 (0.83)	0.010 (1.32)
DEBT	0.002 (0.83)	0.083 (1.05)	0.195 (1.42)
Country fixed effects	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes
Year fixed effects	Yes	Yes	Yes
Adjusted R ²	13.9%	21.4%	15.6%

Notes: The first-stage regression models the firm-level proportion of female directors on a board (FEMALEDIR). In the first stage regression (column (1)), we use the average industry-level proportion of female directors (AVGBGD) on the board as an instrumental variable for the firm-level proportion of female directors on a board (FEMALEDIR). In column (2), the dependent variable in the second-stage regression is the market-to-book equity (TOBINQ). In column (3), the dependent variable in the second-stage regression is the standard deviation of daily stock returns in the past year (STDRET). Predicted FEMALEDIR is the predicted proportion of female directors on a board from the first stage regression. All other variables are defined in Table 1. All models include dummy variables for country effects, industry effects and years effects (not tabulated). The parentheses contain the t-statistics. ***, **, and * denote statistical significance at the 1%, 5%, and 10% levels, respectively.

CONCLUSIONS

We posit that the association between board gender diversity and firm performance is conditional on contextual factors. Using a sample of listed firms in Asia, we find that firm valuation is positively associated with the proportion of female directors on a board. We find three firm-level characteristics that affect the association between board gender diversity and firm performance. First, we find that the positive association between firm valuation and the proportion of female directors on the board is higher in firms with higher organisational complexity, suggesting that more gender diverse boards promote better information environment and more effective monitoring. Second, we document that the positive association between firm valuation and the proportion of female directors on the board is higher in firms with higher equity ownership by institutional shareholders, suggesting the complementary corporate governance roles of institutional shareholders and female board representation. Third, we find that the positive association between firm valuation and the proportion of female directors on the board is stronger during industry downturns, suggesting that board gender diversity

also affects investors' assessment of the firm's ability to navigate industry crisis periods. Using alternative firm performance measures, we continue to document qualitatively similar results. Our results show that positive effect of board gender diversity on firm profitability is higher in firms with higher organisational complexity, firms with higher equity ownership by institutional shareholders and during industry downturns.

Additional analysis shows that firm risk is lower in firms with higher board gender diversity. Moreover, the effect of board gender diversity on firm risk is conditional on organisational complexity, equity ownership by institutional shareholders and industry downturns. Specifically, we find that the negative association between firm risk and the proportion of female directors on the board is stronger in firms with higher organisational complexity, firms with higher equity ownership by institutional shareholders and during industry downturns. Our results suggest the firm-level characteristics such as organisational structure, ownership structure and industry downturns are important moderators of the board gender diversity and firm performance relationship.

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NOTES

1. Using firms in the US, Carter et al. (2010) find an insignificant relationship between board gender diversity and firm performance. They argue that this is due the contingency effect of board gender diversity and firm performance. Thus, their results are consistent with a contingency explanation because the effect of the gender diversity of the board may be different under different circumstances at different times.
2. They also report that female executive directors have a stronger positive effect on firm performance than female outside directors, indicating that the advisory effect outweighs the monitoring effect.

3. They argue that the gender quota in Norway results in the appointment of younger and less experienced women directors in corporate boards.
4. The authors examine stock market reactions and board adjustments to California Senate Bill No. 826 (SB 826), the first mandated board gender diversity quota in the US.
5. The authors document that firms also promoted more female directors to key board positions (such as chair or member of nominating committee and audit committees), suggesting the firms' responses went beyond tokenism.
6. In Adams and Ferreira (2009), the standard deviation of the proportion of female directors on the board is 8.3% whereas in our sample, it is 23.1%.
7. Our results are robust to using a 10% cut-off in industry sales decrease to measure industry downturns or using measures based on industry stock market returns.
8. The authors construct an index on board diversity based on six dimensions comprising gender, age, ethnicity, educational background, financial expertise, and breadth of board experience.

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