Read between the lines: Board gender diversity, family ownership, and risk-taking in Indian high-tech firms

ABSTRACT

This article examines the effect of board gender diversity on firm risk-taking level. Drawing on the contingency framework, we contend that the influence of women executives on firm outcomes like risk taking depends largely on the organizational context of the firm such as the industry in which it operates. To investigate this proposition, we compare the influence of board gender diversity on firm risk-taking level in Indian high-tech and in non-high-tech sectors. Our findings indicate that female executives operating in high-tech sectors take more risk than their counterparts female executives who operate in non-high sector. Interestingly, our analysis also reveals that family ownership negatively moderates the impact of female executives on risk-taking in high-tech firms. In additional analysis, we find that female executives exert a positive impact on firm performance only in high-tech sector. This suggests that the influence of female executives on firm outcomes is not always straightforward.

Keywords: Board Gender Diversity; Risk-Taking; High-Tech Sector; Uncertainty

JEL Code: G30; G32; G34; C23

1. INTRODUCTION

Boardroom gender diversity has become an important topic on academic and social grounds in recent years. Previously considered as a social issue and a matter of repute, women representation on board is increasingly perceived as a value-driven for firms (Terjesen and Sealy, 2016). Consequently, there has been increased social and regulatory pressure on firms to include more women directors in their boardrooms. A burgeoning evidence shows that gender diversity on boards positively influences value creation in the organization by bringing a broader, fresher, and different voice to the table and linking organizations to different external constituencies (Carter et al., 2015; Saeed et al., 2016), which in turn affects firm productivity and performance (Green and Homroy, 2018; Sarhan et al., 2018; Adams and Ferreira, 2009).

One of the potential channels through which gender diverse board can influence firm performance is the risk choices it makes. A gender diverse board broadens the boards' perspective by offering benefits from skills, experiences and backgrounds of diverse members which facilitate in corporate decision making process, including risk taking (Saeed et al., 2016).Empirical evidences examining the direct relationship between directors' gender and risk-taking, however, remains equivocal at best, as some studies report negative or no effect of women executives on firm risk-taking (e.g., Wahid, 2018;Chen et al., 2017;Levi et al., 2014), while others indicate positive impact (Bernile et al, 2018; Green and Homroy, 2018; Adams and Funk, 2012; Berger et al. 2014). The inconclusive results lead researchers to suggest that rather than examining a direct relationship between gender diversity and risk-taking, variables surrounding this relationship must be examined (e.g., Bernile et al, 2018; Berger et al., 2014; Bargeron et al., 2010; Miller & Triana, 2009). That indicates, the influence of women executives on risk-taking may, at least in part, depends on the organizational contingencies. Importance of organizational circumstances in which women achieve executive positions is discussed in recent literature (Willey and Monllor-Tormos, 2018; Adams et al., 2009), however, research examining the role organizational context plays in shaping the outcome of gender diverse board is very limited.

In line with this research stream, it is submitted that contextual factors are important because these are susceptible to change (Maxfield et al., 2010) and firms operating in different industries experience different set of economic and environmental constraints such as technology development, competition and regulations. Therefore, they differ in terms of their basic attributes like growth opportunities, profit margins, financial risk, and research and development intensity

(Gavious et al., 2012), which ultimately effect on level of risk taking (Fernández and Nieto, 2006;). These sectoral differences appear more starkly when looking at risk-taking in high-tech sector. High-tech sector is characterized by innovation and uncertainty. Specially, firms in this sector encounter uncertainty regarding consumer demand and rapid development in technology. Further, these firms are inclined towards high-risk strategic investments (e.g., mergers and acquisitions, backward or forward integration) due to the hyper-competitive pressure (Willey and Monllor-Tormos, 2018).Collectively, the joint characteristics of uncertainty and complexity of the innovation process make the risk-takingas a requirement of the industry. So, women directors are also coerced to follow the risk-taking behavior. Hence, the high-tech sector provides a most appropriate setting to test the impact of board gender diversity on risk-taking.

Recent studies have also shown that firm risk-taking propensity is significantly affected by the firm's ownership. A large scholarship maintains that family ownership structure leads firms to risk-avoiding decisions (e.g., Gomez-Mejia et al. 2017; Gomez-Mejia et al. 2007;Tsao and Lien, 2013; Abdullah et al., 2016). There are reasons to believe for such assertion. Firstly, in family firms, owners are the large shareholders (investors) of the firm and have to bear the full financial burden of unsuccessful investments. So, risky decisions are generally avoided to protect the family wealth (Souder et al, 2017; Naldi et al., 2007). Secondly, their investment is tied closely to their firm that makes the diversification of their investment portfolios difficult (Poletti-Hughes and Willaia, 2017;Tsao and Lien, 2013). Consequently, the undiversified nature of investment portfolio leads family firms to take less risk. Thirdly, family businesses are more geared to long-term survival and aim to keep the business within the hands of the family. This may lead family firms to risk-avoiding decisions as higher risk could endanger the goal of business succession and business survivability (Poletti-Hughes and Willaia, 2017; Hiebl, 2012).We formally incorporate this idea by focusing on the moderating role of family ownership structure in the relationship between board gender diversity and risk-taking in high-tech sector.

This study innovates in several ways. Firstly, it takes a more direct approach to the study of women directors' influence on firm risk-taking by focusing on the high-tech sector which is characterized by innovation and uncertainty. One closely related study is of Sila et al, (2016) that investigates the influence of board gender diversity on risk taking in the US and found negative effects. We extend this work by using contingency perspective and emphasize on industrial factors of high-tech sector which influence female director's risk-taking behavior in terms of Altman's Z-score, leverage, R&D expenditure and variance in return on assets. Moreover, we investigate how this relationship varies across family and nonfamily firms. In additional analysis, we estimate the impact of women directors' contribution on corporate ultimate outcome- performance. We conduct this study in a context of large emerging economy India, which has different socio-culture and regulatory environment to US. Secondly, how does this relationship differ across firm ownership structure? We add to the family business literature by specifically testing the relationship between women on board and corporate risk-taking across family and non-family high-tech firms. Unlike non-family firms with dispersed ownership, conflict of interest between insiders and outsiders do not take place in family firms but higher equity ownership of family members negatively influences their propensity to take risk (John et al., 2008). Hence, it is more likely for family firms to invest more conservatively. This pattern of conservative financial policies would probably bind women as well as men directors to avoid risk. Taken together, by considering contextual factors (industry and ownership), we heed the call earlier researchers (e.g., Zona et al., 2013) who emphasized the importance of context and asserted that outcomes of board of directors must be evaluated with reference to contingency variables. As an additional analysis, we also test that how presence of women directors affects firm performance in high-tech sector. Thirdly, we answer these questions by employing the data from an emerging economy —India which has received much attention recently on the prowess of its high-tech sector. In the last decade, India has revealed surprising strength in skill-intensive tradable services, including software development, information technology-enabled services (business-process-outsourcing), biotechnology, electronics, pharmaceuticals and healthcare. More importantly, considering the fact that much of the prior research in board gender diversity and risk taking is Western based, our study extends existing research to a rich and complex context beyond that of developed countries. Lastly, we use first-difference Generalized Method of Moments (GMM) estimation technique and alternatively propensity-score matching technique, to control the presence of unobserved firm-specific effects and for the endogeneity of explanatory variables.

2. LITERATURE REVIEW AND HYPOTHESES DEVELOPMENT

2.1. Related studies on board gender diversity and risk-taking

Diversity in values and views may help improving board decision-making by increasing the number of alternatives considered, the quality of ideas as well as different aspects of the issues at hand (Carter et al., 2010). Gender diversity on boards is a valuable source of knowledge and expertise for formulating and assessing firm strategic decisions which includes corporate risk taking. There is an increasing literature analyze the effect of gender on risk taking at corporate board level. For example, using a cross-sectional sample of the boards of directors of publicly traded US firms, Adams and Ferreira (2009) document that woman directors prefer to have a lower risk in financial decision-making, therefore firms with fewer female directors experience more variability in their stock returns. This effect leads to the confirmation of woman board members as tough monitors. Liao et al.(2015) show that companies having female directors disclose more environment related information to avoid litigation risk. Pak and Gul (2011) examine the link between gender diversity in US boardrooms and corporate risk taking. They anticipated women as risk aversive on the basis of the finding of gambling experiments, contextual environmental experiment and field studies such as of Eckel and Grossman (2008). Study reveals that corporate risk taking, proxied by R&D expenditure and capital expenditure, is lower for firms having a gender diverse board. Drawing on the sample of emerging market firms, Saeed et al. (2016) find that board gender diversity negatively associates with risk taking in Indian listed firms. Chen et al. (2017) find that gender diverse boards are more cautious about reputational risks associated with aggressive tax strategies. Levi et al. (2014) also support this notion that women directors avoid risky and challenging situations. Accordingly, they postulated the negative relationship between women board members in relation to initiating bids acquisition and size of bid premium. Using acquisition bids by S&P 1500 companies, they find support for their assertion and show that firms with female directors are less likely to pursue acquisitions and if they do, pay lower bid premium.

In sharp contrast, there are some studies showing positive or no relation between board gender composition and firm risk-taking. Using a sample of Tunisian firms, Loukil and Yousfi (2015) hypothesized and subsequently found that state appointed women directors discourage risk taking by adopting conservative investment polices of state. They attribute their finding to the fact that government is more likely to invest in less risky investment project to make sure to spare funds for public welfare spending. In a recent work, Gull et al. (2018) find that presence of women directors in the boardroom decreases the level of earning management. They attribute their finding to the risk aversion, strong monitoring and different decision making style of women directors.

However, this effect disappears when other characteristics are also considered. Berger et al. (2014) proposed the both negative and positive gender hypothesis and observed the increase in portfolio risk with higher proportion of female executives on board in German banks. They further explain their results by reporting that heterogeneous board members are more influenced by diverse experiences and perspectives which enable a more thorough decision. Such extensive analysis of decisions helps in reducing risk in portfolio selection. Adam and Funk (2012) have taken into account gender differences in boardrooms by comparing value priorities and attitudes towards risk and documented that females differ in most in relation to values and risk attitudes to males. Specifically, they report that women directors care more about stimulation, and less about security, conformity and tradition, therefore tend to take more risky decisions than their male counterparts. Khaw et al., (2016) reveal that risk-taking activities amongst Chinese firms generally increases with the presence of male-only boards, however this relationship reverses with the state-ownership. Finally, Sila et al., (2016) anticipated the negative relationship between gender diversity at board level and corporate risk taking while relying on the experimental studies in the relevant literature. Initially, their study finds a negative relationship which disappears when suitable econometric technique has been applied.

2.2. Contingency framework

The inconsistency across empirical results (as discussed above) is partly due to the differences in organizational environment in which risk-taking is considered. As Pak and Gul (2011) note that gender-specific risk propensity tend to vary over context and researchers could benefit from deeper firm level probing to better evaluate how the particulars of each industry and country impact on managerial risk taking behavior. Meta-analysis conducted by Byrnes et al. (1999) of more than 150 studies on gender differences in risk-taking also reveals a lack of consideration of context.

In this perspective, contingency perspective (Fiedler, 1967) suggests that there is no universal management approach to manage the organization, and management styles tend to be contingent upon the characteristics of the firm's external environment. Fundamentally, contingency perspective stresses on environmental, organizational structural and strategic contingencies. According to this theory, industry attributes and institutional characteristics are main constituents of environmental contingencies, whereas organizational structural contingencies depend on firm size and ownership structure. Several studies link the contingency factors to board structure and their decisions, and report substantial differences in board decisions across various business environments (e.g., Willey and Monllor-Tormos, 2018; Carter et al., 2015; Millerand Triana,2009).

2.3. Hypothesis development

Corporate risk taking literature indicates that organizational contingencies play an important role in women behavior towards risk taking (Byrnes et al. 1999 and references therein). Weber et al. (2002) suggest that the evidence indicating women as risk averse must be interpreted cautiously as managerial risk attitudes tend to vary over environments. Firms operating in different industries experience different set of economic and environmental contingencies (Maxfield et al., 2010). For example, if a firm is operating in an industry where innovation is a requirement, female executives of that company tends to take more risk through investing in R&D just to sustain in the market. Moreover, industries are subject to different challenges within technology development, environmental regulations, etc.

Risk taking in the high-tech sector has perhaps been the most visible and is perceived as being a requirement of the industry (Balkin et al., 2000). The high-tech is an innovative industry which offers more uncertain environment as compared to traditional industries mainly due to uncertainty of external environment, the complexity of production, and the limit of business activities. Furthermore, the high-tech firms have relatively small amount of fixed assets and have strong market outlook (Talberg et al., 2008). Chen (2003) articulates that the risk of high-tech sector mainly manifested as the development risk, high information asymmetry, and agency problems because large part of their investment is in intangibles rather than assets-in-place. Similarly, Zhang (2007) considers that the high-tech industrial development requires a large and long investment cycle which increases the high losses and high-yield duality. Generally, investment in high-tech sector —which mostly takes in the form of R&D expenditures— is viewed as high risk investment compared to investment carried out in non-high-tech industries that appears as capital expenditures on property, plant, and equipment (e.g., Pak and Gul, 2010).

A central element of agency theory is the assumption that agency problems may influence corporate risk taking propensity (Jensen and Meckling, 1976). Literature drawing on agency problems show that managers are biased towards risky projects and less likely to undertake risky decisions due to career concerns (Narayanan, 1985), concerns about near-term stock prices (Stein, 1989), and herding behavior (Zwiebel, 1995). If the agency problem is severe then directors are more likely to prefer low risk investment strategies—avoid innovative activity in favor of less risky forms of investments.

Given that women bring different underlying values and management style (Bogac et al, 2018; Carter et al., 2010) therefore a gender diverse board is assumed as a strong monitor (Adams and Ferreira, 2009), which aids in reducing agency problems in corporate decisions. Earlier studies provide evidence that the presence of women in boardroom improve the board's monitoring and control functions (e.g., Sila et al. 2018; Carter et al., 2010). For example, Adams and Ferreira (2009) show that female directors in US firms are 3.5 percent more likely to be appointed in monitoring related committees such as audit, and corporate governance committees due to efficient monitoring. Srinidhi et al. (2011) show that gender diverse board offers a better oversight of manager's reporting which leads to reduced information asymmetry between firm and financial market. Empirical evidence has already shown a negative relationship between agency problem and corporate risk taking (e.g., Zwiebel, 1995; Stein, 1989). Therefore, if board gender diversity leads to a reduction in the agency problems (which are prevalent in high-tech firms), we expect a positive link between the gender diversity and corporate risk taking.

Yet, a vigilant monitoring may not be enough: effective leadership to encourage and facilitate initiatives involving risk is also required. Women are found to have different professional experiences and insights (Hillman et al., 2007; Abdullah et al. 2016), exhibit more innovativeness (Miller & Triana, 2009) and possess transformational leadership style (Eagly et al., 2001). Owing to these characteristics, women directors may support initiatives involving risk within the organization by recognizing, encouraging and rewarding innovation (Miller & Triana, 2009). Specifically, they do so by encouraging diversity of opinion and by undertaking innovative projects (Bundy, 2002), while displaying individual consideration for employees provides a protective environment (tolerance for short-term losses and reward for long-term success) so that organization takes risks. This might be especially important for high-tech setting where innovation is the primary performance criteria.

A context-specific argument in support for the positive relationship between gender diverse board and risk taking can also be drawn from the supply-side of expertised female executives in high-tech sector in India. According to a study conducted in Indian four technology-hub cities found that girls are far less fearless of science and technology subjects than boys, and science subjects do not considered as unfeminine (Mukhopadhyay, 2005). Similarly, regarding the workforce gender parity in the high-tech sector of India, an industry report of American Society of Engineering Education shows an increasing trend in the percent of women in the technology sector of India, and reveals that the number of female engineers employed in India has surpassed the US (Poster, 2013). Jonge (2014) also reports the higher proportion of female workforce and its positive effect on the representation of women on the boards for Indian high-tech firms. The implication is that women directors in high-tech sector of India are selected from a larger pool of talented female executives and their 'higher expertise' lessens gender-based risk aversion. On the basis of our discussion, we may suggest that high-tech firms having gender diverse boards maintain a positive relationship with corporate risk-taking.

Hypothesis 1: There is a positive relationship between board gender diversity and firm risk-taking in Indian high-tech firms.

Firm ownership structure shapes the corporate governance environment in which female directors operate and take decisions which involves risk (Wang et al. 2018). So, the impact of women directors on corporate risk taking is likely to be contingent on the firm's ownership. Noticeably these ownership forms include family ownership that is commonly observed in emerging economies like India.

From the agency problem's perspective, we can expect that ability of women directors to do effective monitoring would be lower in family firms compared to nonfamily firms which reduces the corporate risk taking. Family firms may have coordination problems, as Block (2012, p.253) describes family firms as 'fertile fields for conflicts'. These conflicts may originate from sibling rivalry, identity conflict, or different goals of individual family members about the development of organization (Schulze et al., 2003). Such internal family conflicts cause additional coordination problems and make monitoring more difficult. In such environment, effective monitoring would become more difficult for women directors which ultimately deteriorate the risk-taking environment of the firm. Additionally, family firms have a different set of agenda and commitment to the organization as compared to nonfamily firms. Miller et al. (2017) explain that family members have strong emotional attachment to the firm, have intention to protect of own investment, take business as an extension of the family and protect business for future descendants, therefore, they avoid any risky decision which endanger their objectives. Such environment discourages gender diverse board to take risky decisions.

On the other hand, there are also strong reasons to believe that the impact of board gender diversity on corporate risk taking will be weaker in family owned high-tech firms. Risky financial decisions are generally avoided in family firms due to concerns about the safety of the family wealth stemming from the undiversified investment portfolios and to protect the business succession (Gomez-Mejia et al., 2007). Naldi et al., (2007) further suggest that owners are the large stakeholder of the firm and have to bear the full financial burden of unsuccessful investments. Resultantly, decisions that involve higher risk are generally evaded to protect the family wealth (Souder et al, 2017). Risk-averse and conformist family owned firms are less likely to include women on boards because such inclusion is high risk move (Abdullah et al., 2016). However, if such firms do nominate woman director they prefer nomination from within their circles — preferably within families— as a mean of reducing risk. These insiders tend to avoid growth oriented activities which involve risk due to personal gains and losses associated with the decision (Wright et al., 1996). Anecdotal evidence from emerging markets, particularly India, shows that women family members frequently hold the board positions. For instance, PriyaAgarwal is a board member of her father's company, Cairn Energy India; IshaAmbani serves on the board of her family firm, Reliance Industries; JayantiChauhan is the director at her family enterprise Bisleri; and AshniBiyani is the member of her family enterprise Future Group's board. Such pattern of appointing women directors in family firms is also observed by Srinivasan and George (2013) which suggest that selection of women directors on Indian family firms is largely based on individual's belonging to the family. Regarding the effect of women directors in family firms, Sarkar and Selarka (2015) provide evidence from the Indian market and show that the positive effect of women directors on firm performance weakens in family owned firms. Similar finding is observed by Martín-Ugedo & Minguez-Vera (2014) in Spanish context and report a significant negative relationship between board gender diversity and firm risk-taking for family owned businesses. Importantly, regardless of female directors are family connected or not, such cautious selection of female director creates an environment which discourages gender-diverse board to take risks in investment decisions. Thus, the positive dynamics of a diverse board, mentioned in the last section, is obstructed by family ownership. Based on these accounts, we may construe that female representation in family firms in Indian market is associated with risk-averse decisions.

Thus, we expect that effect of board gender diversity on risk taking is likely to be weaker in family owned high-tech firms.

Hypothesis 2: Family ownership negatively moderates the relationship between board gender diversity and firm risk-taking in Indian high-tech firms as compared to non-high-tech firms.

3. DATA AND METHODOLOGY

3.1. Context

Women comprise 48.5% of Indian population and their overall participation in Indian labor force (female-to-male ratio) is 34% (World Economic Forum, 2016). The further breakdown shows that women employment in organizations comprises of 26% of total employees, off these 9% of women present in mid-to-senior managerial positions and only 5% reach to executive positions (McKinsey, 2012).This phenomenon of reduced pool of female candidate which is basically the attrition of females as one climbs up the corporate ladder is termed as the 'leaking pipeline'. It is attributed to glass ceilings that prevent the development of a successful executive career, and institutional stereotype practices that built on the historical perspective of norms, culture and identities associated with male and female in the society (Cook and Glass, 2014).Due to severe problem of leaking pipeline, India has highest women drop out ratio, 45.9%, between junior and middle level position amongst Asian countries and, therefore India left with smaller pool of women to move up on the corporate ladder (Sarkar and Selarka, 2015). Therefore, women representation on corporate board has been persistently low in India (around 5%).

The gender disparity varies across industrial sectors. In particular, presence of women in manufacturing sector is around 17%, whereas the proportion of women in the labor force is higher in the Indian technology sector, such as software and IT 35.3%, pharma and health care 41%, and telecom and allied sectors 29.3%, as reported in Indian skills report (2016). A recent research report in year 2017, Gender Skilled Migration and IT-GSM-IT (2017) by Open University, also shows that female students' participation rate in postgraduate courses in computing and IT is 46.8% in academic year 2014-15 in India, which is higher than UK. These statistics suggest the availability of a large pool of women in high-tech sector that can ultimately affect the proportion of ready-for-the-board women.

3.2. Data

This study relies on data obtained from firms listed on National Stock Exchange of India (NSE) during the period 2008-2014. All companies listed on BSE/NSE have to comply with the reporting standard of Indian-GAAP IAS. This standard is well-established and makes certain that the financial data are presented in a similar and fair way for each listed company. The financial data and information on board members is hand-collected from the corporate annual reports. We use an unbalanced panel dataset since this type of panel structure has the benefit of partially mitigating potential selection and survival bias problems.

Following Bosworth and Collins (2007), and Winters and Yusuf (2007)we include firms related to health sciences, information technology, telecom, automobile and electronics in high-tech sample. We start with top 250 listed firms based on market capitalization as of 2008 with non-missing values for important variables. The data availability in financial reports differs greatly across firms, with better coverage for higher market capitalization firms. Importantly, the company information is richer for recent years, while, firm information beyond 4-5 years is very limited. This is particularly true in the case of information on 'R&D' and ‘Board members and Officers’. Such data-coverage is more prominent for firms having high market capitalization. Thus, we use market capitalization as firm selection criteria and retrieved data for top 250 firms. Additionally, we apply instrumental regression method (explained in the next section) for which, minimum three firm-year observations are required to capture the variability in the firm’s risk taking behavior. After applying the above mentioned restrictions we are left with the sample of 60 high-tech firms comprising 394 observations. Following Balkin et al. (2000) we obtain a corresponding control sample, for which firm size (total assets) is used as the matching criterion. For matching, we use range of 80% to 120% of assets of firm in high-tech sample to get the corresponding firm in non-high-tech sample. By doing this, we allow one non-high-tech firm for each high-tech firm of comparable size in the control sample. The size criterion ensures that we match firms having comparable amount of resources to fund R&D investment and to appoint women directors on board. Subsequently, using the same sample selection filters, control sample consists of 61firms (382 firm-year observations) from non-high-tech and non-financial industries is selected. This approach allows us flexibility to conduct the regression analysis on full sample and subsequently to conduct the regression analysis on split samples of high-tech and control samples.

3.3. Variable measurement

Dependent variable: Firm's risk taking behavior is taken as dependent variable in this study, which is measured by using three measures of risk taking: Altman's Z-score (inverse), leverage and Research and Development (R&D) expenditure. Altman's Z-score reflects the higher probability of bankruptcy. Notion of the Altman's Z-score is that higher risk taking increases the chance of bankruptcy. We construct Z-score by following the widely used index defined by Altman (1968). Altman's *Z*-score index to predict bankruptcy for firm is: Z-score = 1.2(Working capital/Total assets)+1.4(Retained earnings/Total assets)+3.3(Earnings before interest and taxes/Total assets)+0.6(Market value of equity/Book value of total liabilities)+ 0.999(Sales/Total assets). However, Z-score moves in the opposite direction to predict the probability of bankruptcy. Therefore, we take the inverse of the Z-score to make it comparable with other risk taking proxies. Other studies such as Nakano and Nguyen (2012) also follow the same method to use Altman's Z-score as a proxy of risk-taking. Our second proxy is leverage which captures the riskiness of financing decisions. The underlying idea of using leverage as a proxy for risk taking is that higher leverage increases the odds of risk to default. Leverage is measured as total debt divided by total assets (Sila et al, 2016). Our third measure is R&D investment which is carried out for firm's innovative activities and considered as risky and unpredictable investment (Holmstrom, 1989). Previous literature has established that firm R&D spending is an appropriate proxy for the firm's risk taking (Bargeron et al., 2010; Miller & Triana, 2009; Balkin et al., 2000). R&D expenditure was extracted from the Annexure- I of Director's report attached in the Annual Report of the company. Second proxy used in this study to measure firm risk taking is. Other proxies used in the robustness analysis for risk taking includes standard deviation of ROA that is calculated as the volatility of a firm's return on assets over six-years period. ROA is defined as the ratio of earnings before interests and taxes to total assets. Standard deviation of ROA is largely used in the literature to measure the firm risk taking behavior (e.g. Sila et al., 2016; Miller & Triana, 2009; Miller and Bromiley, 1990). We also used capital expenditure and σROA as alternative proxies for firm risk taking. Capital expenditure is measured as net capital expenditure divided by total assets.

Independent variables: Board gender diversity is our main independent variable which is measured as a percentage of female directors on board. This definition is consistent with the prior studies such as Carter et al (2010) and Miller & Triana (2009).In particular, we are considering women board of directors which include both executive and non-executive directors.Data for board gender diversity was taken from the corporate governance report attached in the firm's Annual Report. To identify the gender composition of the board, we looked for the first names of the directors in each year. Additionally, we also considered titles placed prior to the names of board members such as Ms., Mrs. to identify women directors.In case of any ambiguity persisted in the name, we 'Googled' such gender-ambiguous names.

It was a difficult task to segregate the family firms and non-family firms in India. Majority of firm owners were started business as family business. Latter, they have turned their small businesses into large corporations. Accordingly, their equity ownership may not remain as majority shareholders but the significant presence of promoter family (founder of a business) on board is still there and it has been observed while extracting data. The reasons of diminishing of ownership may lies in fulfillment of listing and corporate governance obligations or may be for firm's financing purposes. Therefore, identifying family firms only on the basis of equity ownership is not relevant in Indian perspective. It is possible that, though they don't have 20% equity ownership (Abdullah et al., 2016) according to shareholding pattern given in the annual report but they can control the decision making of the firm due to their significant presence on the board from a single family. Therefore we have established two different thresholds to ascribe the firm as family firm. First, following (Abdullah et al., 2016; Martín-Ugedo & Minguez-Vera, 2014)a family firm is defined as if firm having 20% or more equity ownership lies with the family. Second, if firm has two or more than two board members from the same family thereby influencing the board decisions (Alam and Shah, 2013), although they may not have the 20% equity ownership according to shareholding pattern planted in the annual reports is also considered as family firm. We can identify family members by using their last name as criteria to identify by following (Chu, 2009). It is not difficult to identify the family members in the Indian context because their last names generally indicate that they belong to the same family. Further, it is a legal requirement for wife and daughter to carry the husbands and fathers names respectively which make easier to identify the family members. Finally, on the basis on these two identification methods, we have used a binary variable for family firms, which is equal to one for family firms and zero otherwise.

Control variables: Based on earlier corporate governance literature on board gender diversity we employed various board and firm level characteristics as control variables (Chakraborty et al., 2018; Yamori et al., 2017; Sila et al, 2016; Levi et al, 2014; Dezso and Ross, 2012). These controls include lag of dependent variable, board size, which is measured as total number of directors on the board, and board independence, that is measured as ratio of independent directors in relation to total number of directors. CEO duality which is one when CEO is also chairman of the board and zero otherwise. Market to book ratio is measured as market value of equity to book value of equity for firm, ROA is defined as the ratio of earnings before interests and taxes to total assets Firm level controls include firm size, firm age, leverage, growth opportunities, and internal capital. Firm size is measured as logarithm of firm's total assets and firm age is measured as number of years from its establishment. Growth opportunities are proxied by price earnings ratio. Internal financial resources or unobserved slack referred as slack, which readily available for firm to invest. Following previous studies, cash on hand available to firm is taken as slack (e.g., Kraatz and Zajac, 2001).

3.4. Method of estimation and model specification

The issue of endogeneity is quite common in empirical research on board-diversity where the list of potential determinants can be large (Adams and Ferreira, 2009). For example, firm-level unobservable variables which represent time-invariant characteristics of firms such as corporate culture may affect firm risk-taking but is difficult to control in the analysis. Further, Huang and Kisgen (2013) pointed out that women are appointed on board under specific circumstances and not selected randomly. Risk taking firms may also not appoint women on risk taking positions due to high female risk aversion (Croson and Gneezy, 2009) or women may self-select for firms which take less risk (Graham et al., 2013). Moreover, endogeneity concerns arise because of omitted unobservable firm characteristics (Willey and Monllor-Tormos, 2018). Omitted variables that affect both the selection of female directors and risk taking decisions could lead to spurious correlations between board gender diversity and risk taking variable. It is plausible, for example, that CEOs of high managerial ability may be more effective in managing risk, while at the same time having more influence over director' appointment decisions in which they tend to be indifferent of the gender of potential director. Another example of omitted unobservable variable in the risk-board relationship is corporate social responsiveness (Sila et al., 2016). Socially responsible firms are perceived as less risky (as CSR activities reduces risk factors such as regulatory sanctions, customer boycotts etc.) and simultaneously they also appoint more female directors to increase firm legitimacy.Keeping in view of above, it is mandatory to address the issue of endogeneity between gender and risk.

To remove the endogeneity concerns studies on board gender diversity (Adams & Ferreira, 2009; Carter et al. 2010) have widely used fixed effect, two-stage least square and instrumental variable estimation techniques. Fixed effect alleviates the issue of unobservable heterogeneity however it cannot deal with time invariant variables (board gender diversity) in the data because fixed effect drops time-invariant observations (Wintoki et al., 2012). Two-stage least square method resolves the problem of endogeneity but itis dependent on the availability of the valid instrument. We employ instrumental variable technique, particularly first-differenced Generalized Method of Moments (GMM) estimation technique (Arellano and Bond, 1991). GMM provides several benefits over other estimation techniques, as first difference eliminates the impact of time-invariant variables on coefficient estimates. GMM utilizes lagged values of the variables as instruments. Lastly, GMM also deals with firm level heterogeneity, reverse causality and measurement errors occurred while employing orthogonal condition. For the reliability of GMM parameter estimates we conduct Sargan and AR (2) test as suggested by Arellano and Bond(1991). Sargan test provides the validity of the instrument and AR (2) test detects the serial correlation in the error structure. Rejection of the null hypothesis in both cases validates the GMM parameter estimates.

Specific our model is a follows:

$$Risk\ Taking_{it} = \alpha + \beta_1\ Board\ Gender\ Diversity_{it} + \beta_2\ High\ Tech\ Firms_{it} + \beta_3 Family\ Ownership_{it} + \beta_4\ Board\ Gender\ Diversity_{it} \times High\ Tech\ Firms_{it} + \beta_5 Board\ Gender\ Diversity_{it} \times\ Family\ Ownership_{it} + \beta_6 Board\ Gender\ Diversity_{it} \times\ High\ Tech\ Firms_{it} \times Family\ Ownership_{it} + Control\ Variables + \varepsilon_{it} \quad \ldots\ldots\ldots (1)$$

Subscripts ‘i’ and ‘t’ shows firm and year respectively. The β is the coefficient estimate of independent variables and subscript ‘ε’ represents error of the model. We control for year fixed effects in the both samples of high-tech and non-high tech sector, whereas industry effects are only controlled in the sample of non-high tech sector. We included five industry dummies on the basis of two-digit level of Standard Industrial Classification (SIC). Two-digit SIC distributes non-financial firms into 12 categories; however,following Campbell (1996) we reclassified industry groups to a narrower six industries. The main reason to use a few broad industry groups rather than more detailed groups is our relatively small number of sample size and lack of industrial diversity. Studies that use similar industrial classification include, among others, Saeed et al., (2016) and Skaggs et al. (2012).

[Insert Table 1 about here]

4. EMPIRICAL RESULTS

4.1. Descriptive Statistics & Correlations

Table 2 summarizes the summary statistics of the variables used in the study for our entire, high-tech and control samples. The mean value of Altman's Z-score (Inversed) is higher in high-tech firms (0.313) than in non-high-tech firms (0.296) and the difference is statistically insignificant. Mean difference for leverage is significant but higher for non-high tech firms may be due to the fact that high-tech firms mostly rely on internal resources for innovative projects. High-tech firms tend to have a higher mean value (0.026) of R&D than the value for non-high-tech firms (0.0115). This difference is strongly significant at the 1% level. Such higher value of R&D for high-tech sample is due the reason that within these firms, innovation is a key source of competitive advantage whereas for non-high-tech firms innovation is less critical for success. Next, the difference across both samples for our main independent variable board gender (mean ratio of high-tech is 0.057 whereas for non-high tech sample is 0.056) is not statistically significant. The mean size (total assets) of firms in the high-tech sample is 22.91 and this value is 22.78 for control sample, while the difference between these values is statistically insignificant. Thus, the average firm size was comparable in the two samples. Mean difference between high-tech and non-tech samples for Market to book ratio is statistically insignificant. CEO duality is more profound in Indian high-tech firms. Next, both board size and board independence do not differ across both samples. Interestingly, when compared with non-high tech firms, high-tech firms are slightly less profitable and have less growth opportunities. However, these differences are found statistically insignificant. Mean value of σROA is higher in high-tech firms (0.04) than in non-high-tech firms (0.03) and the difference is statistically significant.Finally, high-tech firms have a higher mean value of capital expenditure and industry-adjusted R&D when compared with non-high-tech firms, showing pattern similar with R&D expenditure. This difference is statistically significant at 1% level.

[Insert Table 2 about here]

Table 3 presents correlations among the variables used in this study. Notably there is negative and significant correlation between R&D expenditure and board gender diversity. High-tech firms are also positively correlated with R&D expenditure. In addition capital expenditure is also positively correlated with gender diversity.

[Insert Table 3 about here]

4.2. Multivariate results

GMM regressions were performed. Three measures of risk taking are used, Altman's Z-score (inversed), leverage and R&D expenditure. In the regression analysis, tests were also carried out for the reliability of the GMM estimates. The insignificant Hansen-Sargan test for overidentifying restrictions with the null hypothesis that instruments are valid is not rejected shows that there is no correlation between the instrument and error term. Further, second-order serial correlation test values are also statistically insignificant suggesting that there is no threat of serial correlation in the analysis. Lastly, Wald test statistic for the joint significance of the independent variables provides support that all regressors included in the model are all jointly significant. All specifications include time dummies and industry dummies.

We have used hierarchal regression for analysis in Table 4. We also show all results in a change mode as well by taking a difference of current and previous year ($\Delta = t\text{-}t_{t-1}$) for all dependent, independent and control variables. All regression models are followed by regressions for these change results as well. We have estimated the effect of board gender diversity on firm risk-taking with control variables. Results reveals that coefficient of percentage of women on board has shown significant and negative impact on all firm risk-taking measures, namely, Altman's Z-score, leverage and R&D expenditure. Next we rerun the same regression in addition with interactions. Hypothesis-1 predicts that there is positive relationship between board gender diversity and risk taking in high-tech firms. For this we have included two-way interaction term for board gender diversity and high-tech firms. Results reveals that coefficient of percentage of women on board has shown strong significant and positive impact on all risk-taking measures. In terms of economic significance, given that each ten percent of women directors on the board corresponds to approximately one female director (as board size is approximately 10), so replacing one man with one woman on board would lead to an increase in risk taking in the form of Altman's Z-score (Inversed) by 2.9%, leverage by 0.32%, and R&D expenditure by 0.15%. We have also included three-way interaction term for board gender diversity, high-tech firms and family firms to test the moderating impact of women on board in high-tech family firms which is our second hypothesis. The coefficient for three-way interaction term is found to be significant and negative which indicates that family ownership decreases the effect of board gender diversity on all risk taking measures. Results achieved for variables in change form (Δ = **t-t$_{t-1}$**) are in agreement to our main f findings.

[Insert Table 4 about here]

In an extended analysis to re-affirm our findings, we conduct the split sample analysis by splitting the main sample into two samples, high-tech and control samples. GMM regressions were performed for high-tech and control sample separately and results are presented in Table 5 for three main risk taking measures used in this study that is Altman's Z-score (Inversed), leverage and R&D expenditure. These results are also supplemented by change mode (Δ = **t-t$_{t-1}$**). Results reveal that coefficient of percentage of women on board has shown strong significant and positive impact on firm risk-taking (for all three measures) in high-tech sample. The findings strongly support our hypothesis (1) that predicts a positive relationship between firm risk-taking and board gender diversity in high-tech sample. We also add interaction term for family firms and board gender diversity to test the moderating impact of women on board in high-tech family firms which is our second hypothesis. The coefficient for interaction term is found to be significant and negative which indicates that family ownership decreases the effect of board gender diversity on firm's risk taking. Result signifies that family firms negatively moderate the relationship between women directors and firm risk-taking and confirms our theoretical prediction of hypothesis (2). We extend the analysis to examine the relationship between board gender diversity and firm risk-taking (in the form of Altman's Z-score (Inversed), leverage, and R&D expenditure) for control sample. Same regression estimation routine is repeated for non-high-tech sector (control sample). Results reveal that negative and significant relationship is found between board gender diversity and firm risk-taking. It indicates that board-gender exert negative effect on firm risk-taking in non-high tech sector. Similarly, we find negative moderating effect of family ownership on risk-taking and board gender diversity relationship, as the result for interacting term is also statistically significant.

Taken together, our empirical findings indicate that the hypothesized positive relationship between board gender diversity and firm risk-taking exists in the high-tech sample. Similarly, moderating effect of family ownership on this relationship is also visible in high-tech sector. Thus, we may interpret our overall findings as business contingencies (contextual factors) play an important role in the determination of woman risk-taking propensity, and inferring the overall risk-taking behaviour of women directors without considering contextual requirements can be misleading.

[Insert Table 5 about here]

4.3. Robustness tests

We perform several sensitivity tests to ensure the robustness of our earlier results using model in Table 4 as our base model. Collectively, these additional tests, which are reported in Tables 6 and 7, reinforce our earlier evidence.

4.3.1. Alternative measures of firm risk-taking

We have used two alternative measures for risk taking, standard deviation of ROA and capital expenditure. Standard deviation of ROA is largely used in the literature to measure the firm risk taking behavior (e.g. Sila et al., 2016; Miller & Triana, 2009; Miller and Bromiley, 1990). One can expect that if firm's leverage and R&D expenditure increases it may also influence firm's capital expenditure. As our descriptive statistics show similar pattern of R&D expenditure and capital expenditure in both high-tech and control samples, which leads us to use capital expenditure as firm alternative to R&D spending. Following Carter et al., (2015) and Sila et al., (2016) capital expenditure is measured as net capital expenditure divided by total assets. GMM regression is performed and results are reported in Panel A and B of Table-6. We conduct the regression analysis by using standard deviation of ROA (σROA) and capital expenditure as alternative risk measures. Results reveal that coefficient of two-way interaction of board gender diversity and high-tech firms exert a positive and statistically significant impact on risk taking. Whereas coefficient of three-way interaction term shows a negative moderating impact of family firms on board gender diversity. These results are in agreement to our hypothesis 1 that women directors positively influence the risk in high-tech. Results reveals that the coefficient of three-way interactions term is significant and negative, which shows that board gender diversity decreases the risk in family firms.

[Insert Table 6 Here]

4.3.2. Restricted definition of board gender diversity

Thus far, we treat the women board membership as a homogenous group. However, research suggests that it is even difficult for women to get an executive board member position as compared to non-executive board membership and the effect of non-executive women directors on business decision making is very marginal (e.g. Sila et al., 2016). Hence, to examine the impact of women directors on risk-taking, we restrict our sample to only executive women directors. To this purpose, we use a narrower definition of board gender diversity as the number of women executive directors over board size (percentage of women executive directors on board). Results are presented in panel C of Table 6. The coefficient estimate on women director ratio is positive and significant in two-way interaction term for board gender diversity and high-tech firms, suggesting that positive association between board gender diversity and firm risk-taking is not specific to women's executive or non-executive membership. Further, the coefficient on three-way interaction term is found negative and statistically significant indicating that moderating effect of family ownership on the relationship between board gender diversity and risk-taking holds even with more restricted definition of board gender diversity.

4.3.3. Alternative estimation techniques-Heckman two-stage sample selection technique

Although our estimation technique (GMM) helps mitigate concerns about the potential endogeneity of the board gender diversity, we further confront this matter using Heckman's two-stage sample selection procedure (Heckman, 1979). This procedure include probit model in first stage a dummy variable indicating the likelihood of women presence on board (one for women on firm’s board and 0 otherwise) is regressed on same regressors used in the base analysis in addition to instrument, which distinguishes the probability of women appointment on board for firm. Our instrument variable is the ratio of male board members who sits on the other firm’s board which comprises women. This reflects the female social network while appointing them on the boards. Instrument is previously used by Faccio et al. (2016) and Adam and Ferreira (2009), and is based on the notion of familiarity. In the second stage of the procedure we regress our dependent variable (risk) on all independent variables. Results are shown in Panel D of Table 6. Our findings are qualitatively similar to earlier results. Importantly, we find that Inverse Mills ratio is statistically not significant at conventional levels, thus we reject possible selection bias. In sum, our findings suggest that our results are independent of endogeneity issue.

4.3.4. Industry-adjusted R&D expenditure

We focus on the high-tech setting in this study to test whether board gender diversity affects firm risk taking measured as firm's R&D expenditure. As high-tech sector is characterized by innovation and uncertainty, one can expect that higher expenditure on R&D is the industry norms in comparison to low technology sectors. We intend to examine whether or not having women on boards in high-tech sector challenge (deviate) the industry norms—which is higher R&D in high-tech sector? To test this, we redefine the measure R&D expenditure as industry-adjusted R&D expenditure for risk taking and adjust the industrial effect on firm's R&D expenditure. We classify industries on the basis of two-digit level of Standard Industrial Classification (SIC). To compute industry-adjusted R&D expenditure, we first calculate the average of the R&D expenditure for each industry and then industry average R&D expenditure is taken away from the individual firm's R&D expenditure. Results for industry-adjusted R&D expenditure are provided in the Panel E of Table 6. Results are in agreement to our both hypotheses and robust to baseline findings which suggest women directors are risk taker in high-tech sector and family firms negatively moderate this relationship.

4.3.5. Propensity score matching technique

We extend robustness analysis for our baseline findings by employing propensity score matching technique (Rosenbaum and Rubin, 1983) by using split sample that is high-tech and control samples. This approach eliminates the concern of self-selection and also provides more accurate way to match the firms. This method allow us to match each firm in treatment group with the firm of approximate similar characteristics in control group except the only existing difference between the firms is “woman on board” (treatment group)and “all male board members”(control group). To execute this, we first estimate the propensity scores for both high-tech and control samples for firms with woman on board in the presence of same firm-level factors, which are controlled in the base line analysis in Table 4. Year fixed effects are included for both samples and industry effects are only included for control sample. Distribution of propensity scores is quite well overlapped in both samples but for exact match we allow only pairs of firms (one from treatment and one from control group) with the maximum absolute difference of 0.1% in propensity scores in both high-tech and control samples. Then, we identify family firms with the woman on board and firms with all male board members within high-tech and control samples.

[Insert Table 7 Here]

Panel A of Table 7 presents the results for high-tech sample and shows that the average value of R&D expenditure (0.111) for firms with women on board is significantly higher than the R&D expenditure of (0.020) for firms with all male board members. The average Altman’s Z-score (Inversed) 0.343 for firms having woman on board is also higher than the firms with all male board members (0.292). Average value of leverage (0.373) for firms with women on board is significantly higher than the leverage of (0.260) for firms with all male board members. Results for average Altman’s Z-score (Inversed) and leverage is also significantly lower for firm with woman on board than firms with all male board members in family firms. Similarly, family firms shows that average value for R&D expenditure is (0.037) is significantly lower for firms with woman on board than for firms with all male board members (0.074). These findings are robust to our baseline findings and provide support to our both contentions that board gender diversity positively influences the firm risk taking in high-tech sample and family ownership negatively moderate this relationship.

In contrast, Panel B presents results for control sample which shows that average values of R&D expenditure, Altman’s Z-score (Inversed) and leverage are significantly lower for firms with woman on board than the firms with all male board members. Similarly, family firms also exert negative impact on the relationship between board gender diversity and firm risk taking.

4.4. Additional analysis

Considering the effect of female executives on risk-taking one step further, it is interesting to investigate the impact of female executives on firm performance in high-tech sector. To examine this question,we measure firm performance using an approximation of Tobin's Q. In particular, Tobin q is measured as market value of the equity plus book value of the debt divided by total assets.

In Model (1) of table 3 we regress firm's performance on board gender diversity without allowing control variables. Results reveal a positive and statistically significant coefficient of board gender diversity at 1% in high-tech sample and a negative and significant coefficient in non-high-tech sample. These results remain consistent even after introducing control variables in model (2) however, the magnitude of coefficients decreases. Findings of the high-tech firms are consistent with previous studies (Sarhan et al., 2018; Carter et al., 2015; Kang et al., 2010). Model (3) reports that family ownership negatively moderate the relationship between board gender diversity and firm's market performance in both high-tech and non-high-tech sectors. However the statistical significance is achieved only for high-tech sector. In sum, our findings indicate that presence of women directors in high-tech sector reveals a positive influence on firm's market performance.

[Insert Table 8 about here]

5. CONCLUDING REMARKS

This study is conducted with the premise of women as risk taker. Traditionally, in literature gender diversity is positively related to firm innovation (Miller &Triana, 2009) and innovative projects are risky and unpredictable (Bernile et al, 2018; Holmstrom, 1989) for which we need managers who have higher risk appetite (Galasso& Simcoe, 2011). This theoretical conflict leads us to conduct the underlying study. Our base line results are in agreement to our hypothetical predictions that suggest that women directors are risk taker in high-tech firms and family firms negatively moderates the relationship between women director and firm risk-taking in high-tech firms. These results corroborate with the studies such as Adams and Funk (2012) which show that Swedish female top executives are less risk-averse than their male counterparts, and Berger et al., (2014) suggesting that women can be more aggressive than men when they work in more uncertain and risky environment. Our results provide a strong impetus to consider firm's contextual factors as managerial risk attitudes tend to vary over environments.

We can draw two important inferences from our study. Firstly, contingency perspective can serve as a valuable lens through which we can improve understanding of the heterogeneity in risk-taking behavior of directors in general and women directors in particular. Women director's attitude toward risk in high-tech sector is driven by her self-identification as a member of the salient category, female, which pressurises her to take risk in business decisions. We may also infer that business contextual factors play an important role in the determination of woman directors as risk averse or risk taker. Board directors' risk-taking appetite is embedded in the specific context in which firm operates. Secondly, various contextual factors may develop conflicting risk-taking tendencies within board directors, as ownership structure (family ownership) in our context inversely influences women directors' risk-taking attitude. Though our study does not involve comparative analysis of contextual factors to establish which factor is more prevailing however it strongly advocates the inclusion of contextual factors in research determining women directors' influence on firm risk-taking.

Our findings further suggest that influence of board gender diversity on risk taking should be taken into account the contextual features. Positive association between women directors on the boards of high-tech firms and risk taking realizes that stakeholder of corporate governance may recognize the importance of distinct institutional pressures, such as number of female employees in an Indian high-tech sector and socio-cultural norms which encourage female enrolment in science and technology subjects in India. These institutional factors create an environment which accept, encourage and positively evaluate the presence of women in leadership positions. Our finding also suggests that presence of women directors for family owned and non-family owned high-tech firms are alike. The plausible reason could be that family firms even in the high-tech sector adopts nepotism to appoint women directors that may damage the potential advantage of women director in family owned high-tech firms .

The results of our analysis support the business case for inclusion of women on corporate boards. Our study offers new insights to managers and policy makers that a gender diverse board is more incline to take risk in high-tech firms suggesting that women directors’ attitude toward risk is highly context-specific. This gives validity to gender equality policies that recently initiated in many countries, and obliges government to make efforts to clear the way for women to access board positions. As if a segment of society’s talent that makes up more than half of the population is barred from these boards, not because of talent but gender, then such boards are sub-optimal.

Another key implication of our findings is that studies that attempt to associate the director's gender with corporate outcomes have to carefully consider the environment in which firm operates and decisions are made.

To generalize the findings of this study to other countries requires caution as each country is subject to different regulatory and economic environment, cultural risk-preferences, the size of capital market and the effectiveness of governance mechanism. However, the findings can be relevant and generalised to economies characterised by similar socio-cultural and institutional setting, like China, Malaysia, Indonesia, and Pakistan.A natural extension of this study is to extend the scope of the study by including a number of countries which could facilitate a cross-country comparison of the impact of institutional and cultural differences on the relationship between board gender diversity and firm risk-taking. Further, to enhance our limited understanding of the subject, researchers must use moderators as moderation reveals how and why one variable affects another, it has taken a special place in organizational sciences (Baron and Kenny, 1986).

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Table 1: Two- digit Standard Industrial Classification

	Industry	Two Digit- SIC Code	Industry	Two Digit- SIC Code
1	Health Care/Pharmaceuticals	80	Manufacturing-Chemical Products	28, 29
2	Software/IT (including BPO-ITES Firms)	73	Manufacturing-Agriculture based Products.	01,07, 22
3	Telecommunication	48	Manufacturing-Construction equipment and material	35
4	Electronics	36		
5	Automobile	37		
	High-tech sample		Non-high-tech sample	

Table 2: Descriptive statistics for key variable

	Full sample (firm-year observations 776)				High-tech Sample (firm-year observations 394)				Control sample (firm-year observations 382)				Mean difference (t-stats)
	Mean	St. dev	Min	Max	Mean	St. dev	Min	Max	Mean	St. dev	Min	Max	
Risk taking-R&D	0.019	0.064	0.000	0.943	0.026	0.077	0.00	0.943	0.011	0.046	0.000	0.536	-0.015***
Risk taking-1/Z-score	0.325	0.212	0.012	0.909	0.296	0.294	0.012	0.016	0.313	0.450	0.58	0.909	-0.017
Risk taking-Leverage	0.29	0.20	0.00	0.73	0.28	0.20	0.00	0.73	0.29	0.20	0.00	0.72	0.008*
Board gender diversity	5.68	7.48	0.00	50.00	5.74	7.17	0.00	28.57	5.62	7.80	0.00	50.00	-0.11
Family Ownership	0.485	0.47	0.00	1.00	0.50	0.50	0.00	1.00	0.47	0.47	0.00	1.00	-0.03
CEO Duality	0.39	0.49	0.00	1.00	0.47	0.49	0.00	1.00	0.32	0.46	0.00	1.00	-0.15***
Board size	9.36	2.79	3.00	17.00	9.36	2.8	3.00	16.00	9.35	2.78	4.00	17.00	-0.006
% Independent directors	0.53	0.10	0.00	0.85	0.55	0.11	0.06	0.85	0.52	0.10	0.00	0.77	-0.03**
Market-to-book	2.81	3.93	0.60	5.52	2.44	1.78	1.45	4.17	3.19	2.07	0.45	5.52	0.75
Firm size	22.85	1.56	18.70	27.34	22.91	1.58	18.70	27.34	22.78	1.54	19.10	27.30	-0.12
Firm Age	36.85	25.11	6.00	149	29.34	15.19	6.00	78.00	44.55	30.42	9.00	149.0	15.21***
Slack	-3.15	1.66	-8.18	10.14	-3.02	1.51	-7.39	1.57	-3.31	1.79	-8.18	10.14	-0.29***
Growth opportunities	13.09	19.09	-21.44	40.29	12.85	19.977	-21.44	30.845	13.33	18.18	-15.76	40.29	0.47
σ ROA	0.03	0.06	-0.004	0.67	0.04	0.071	0.00	0.595	0.03	0.06	-0.004	0.67	-0.001*
Capital expenditure	0.064	0.181	0.000	0.693	0.066	0.152	0.000	0.487	0.010	0.195	0.000	0.693	-0.0650***
Industry-adjusted R&D	-0.023	0.076	0.000	0.798	0.046	0.090	0.000	0.798	0.004	0.046	0.000	0.524	0.046***
Tobin's Q	2.45	8.05	0.001	27.78	1.78	0.74	0.23	12.22	3.14	11.30	0.001	27.78	1.36**

*Significant at 10% **Significant at 5% ***Significant at 1%

Table: 3 Correlations

	Variables	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19
1	Board gender diversity	1.00																		
2	Firm Research Expenditure	-0.06*	1.00																	
3	Altamn's Z-Score^{-1}	-0.03	0.00	1.00																
4	Leverage	-0.04	0.03	0.00	1.00															
5	High-Tech firm	0.00	0.09**	-0.04	0.04	1.00														
6	Family Ownership	0.04	0.10**	-0.02	-0.02	0.45	1.00													
7	Firm Size	0.03	0.00	0.00	-0.04	-0.04	-0.12*	1.00												
8	Firm Age	-0.03	-0.04	0.00	-0.02	-0.22*	-0.17*	0.34**	1.00											
9	ROA	-0.03	-0.04	0.04	0.00	0.06	0.01	0.10*	-0.06	1.00										
10	Slack	-0.03	0.00	1.00	0.00	-0.04	-0.02	0.00	0.00	0.04	1.00									
11	Growth Opportunities	0.06	0.03	-0.01*	0.01	-0.06	-0.05	0.05	0.00	0.02	-0.01	1.00								
12	Market-To-book Ratio	-0.02	0.06*	0.00	0.19**	-0.08**	-0.06	-0.05	0.07*	0.10**	0.00	0.07**	1.00							
13	CEO Duality	-0.03	-0.01*	-0.03	0.05	0.15**	0.18*	-0.07*	-0.01	-0.07*	-0.03	-0.05	-0.07	1.00						
14	Board Size	-0.05	-0.06	-0.02	-0.02	0.03	0.02	0.32**	0.05	0.18**	-0.02	-0.03	-0.05	0.02	1.00					
15	Board Independence	-0.03	0.04	-0.01	-0.01	0.10**	0.02	-0.23*	-0.07	-0.01	-0.01	-0.07	-0.01	0.19**	-0.05	1.00				
16	Tobin's Q	0.01	0.01	0.03	0.14**	0.03	-0.02	0.08**	0.04	0.45**	0.03	0.21**	0.56*	-0.08**	0.11*	-0.04	1.00			
17	σ ROA	-0.03	-0.02	0.01	0.06	0.00	0.01	0.07*	0.03	-0.09*	0.01	-0.08*	0.01	-0.06	-0.02	-0.02	0.00	1.00		
18	Firm Capital Expenditure	0.02	0.02*	0.00	0.00	0.03	0.00	0.04	-0.07*	0.04	0.00	0.03	0.01	-0.02	0.05	-0.03	0.26	0.02**	1.00	
19	Ind-Adj R&D	-0.03	0.23	0.00	0.00	0.24*	-0.04	0.72**	0.23*	0.23*	0.00	-0.02	0.09*	-0.02	0.27*	-0.11*	0.24*	0.09*	0.04	1.00

*Significant at 10% **Significant at 5% ***Significant at 1%

Table 4: Board Gender Diversity and Risk Taking

	Panel A				Panel B				Panel C			
	R&D	$\Delta = t - t_{t-1}$	R&D	$\Delta = t - t_{t-1}$	Z-score^{-1}	$\Delta = t - t_{t-1}$	Z-score^{-1}	$\Delta = t - t_{t-1}$	Leverage	$\Delta = t - t_{t-1}$	Leverage	$\Delta = t - t_{t-1}$
Firm Size	0.869*	0.07**	0.047**	0.089*	0.870**	0.043***	0.624***	0.140***	0.280***	0.248***	0.827*	0.703**
	(0.453)	(0.03)	(0.023)	(0.057)	(0.334)	(0.001)	(0.058)	(0.021)	(0.050)	(0.022)	(0.474)	(0.310)
Firm Age	-2.382*	-1.259**	-3.89***	-1.071***	-0.489*	-0.012*	-0.065*	0.035*	-2.750*	0.072*	-52.585**	1.480**
	(1.211)	(0.561)	(0.440)	(0.033)	(0.278)	(0.061)	(0.035)	(0.017)	(1.682)	(0.038)	(17.20)	(0.507)
ROA	-0.766***	-0.011***	-6.720***	-0.391***	-0.069*	-0.017*	0.183	0.055	-0.597***	-0.099***	-4.514***	-0.637***
	(0.237)	(000)	(0.852)	(0.077)	(0.034)	(0.008)	(0.143)	(0.612)	(0.0186)	(0.013)	(0.498)	(0.085)
Slack	0.004***	-0.009***	0.290***	-0.0031***	0.163***	0.0163***	0.161***	0.0151***	-0.0001	-0.00049	0.0033	-0.00377
	(0.000)	(0.001)	(0.0008)	(0.000)	(0.0002)	(0.001)	(0.000)	(0.000)	(0.069)	(0.00266)	(0.063)	(0.0139)
Growth Opportunities	0.098	0.031	0.088***	0.020*	0.293*	0.017*	-0.009	0.001	0.035	-0.014	8.205	0.263
	(0.294))	(0.623)	(0.2190)	(0.011)	(0.221)	(0.008)	(0.015)	(0.661)	(0.661)	(0.046)	(42.252)	(0.280)
Market-to-book	0.387	0.0105	1.317**	0.017**	0.155	0.016	0.352**	0.008**	-0.163	0.061	2.061	0.991
	(0.375)	(0.146)	(0.542)	(0.004)	(0.160)	(0.540)	(0.149)	(0.003)	(1.926)	(0.579)	(1.986)	(2.135)
CEO Duality	0.667	0.1389	0.051	0.0093	-0.490	0.0418	-0.613	-0.273	-0.021	-0.005	0.322	-0.030
	(5.248))	(1.104)	(0.147)	(0.932)	(0.723)	(0.961)	(0.786)	(0.348)	(0.131)	(1.607)	(2.39)	(0.651)
Board Size	-0.017	-0.043	-0.033*	-0.016*	-0.108	0.034	-0.394**	-0.026**	0.013	-0.018	0.167	0.099
	(0.018)	(0.774)	(0.023)	(0.009)	(.201)	(1.367)	(0.175)	(0.011)	(0.0159)	(0.464)	(1.046)	(2.022)
Board Independence	0.018	0.015	0.044	-0.089	0.256	-0.138	0.121	0.002	0.034	0.047	-1.126	0.784
	(0.183)	(0.405)	(0.554)	(1.516)	(0.553)	(0.448)	(0.363)	(0.612)	(0.134)	(0.754)	(5.358)	(0.547)
Risk Taking$_{t-1}$	0.513**	0.198**	0.713***	0.077***	-0.003	-0.004	0.006	-0.002	0.110***	0.151***	0.221***	0.134***
	(0.239)	(0.055)	(0.172)	(0.008)	(0.018)	(0.0017)	(0.013)	(0.008)	(0.071)	(0.024)	(0.001)	(0.030)
Hi-Tech Firms	0.155	0.129	0.085**	0.061	0.095	0.0721	-0.061	-0.025	1.522	0.167	0.898	0.846
	(0.226)	(0.351)	(0.030)	(0.079)	(0.141)	(1.311)	(0.707)	(0.581)	(0.416)	(0.246)	(0.565)	(1.249)
Family Firms	-0.033	0.019	-0.080	-0.086	-0.295	-0.130	6.400	3.492	0.017	0.016	0.137	-0.119
	(1.589)	(0.210)	(0.241)	(0.189)	(1.241)	(1.511)	(4.709)	(2.635)	(0.061)	(1.291)	(2.297)	(1.338)
Board Gender diversity	-0.355*	-0.100*	-0.344*	-0.1309*	-0.059***	-0.001***	-0.051*	-0.031*	-0.479*	-0.088*	-0.595***	-.035***
	(0.217)	(0.055)	(0.258)	(0.062)	(0.011)	(0.000)	(0.0325)	(0.011)	(0.255)	(0.041)	(0.090)	(0.004)
Interactions												
Board Gender diversity ×			0.015***	0.014***			0.293***	0.147***			0.032*	0.008*
Hi-Tech Firms.			(0.001)	(0.009)			(0.060)	(0.012)			(0.020)	(0.039)
Board Gender diversity ×			-0.025***	-0.013***			-0.303**	-0.435***			-0.0035**	-0.001***
Family Firms.			(0.007)	(0.000)			(0.111)	(0.179)			(0.0014)	(0.000)
Board Gender diversity ×			-0.018***	-0.012***			-0.798*	0.701*			-0.069*	-0.021*
Hi-Tech Firms × Family Firms			(0.001)	(0.001)			(0.476)	(0.313)			(0.035)	(.011)
No. of Observations	776	776	776	776	776	776	776	776	776	776	776	776
Hansen-Sargan Test	4.254	4.289	2.332	2.158	17.550	16.021	11.720	11.321	6.624	6.543	3.290	2.982
	(0.421)	(0.395)	(0.272)	(0.621)	(0.528)	(0.441)	(0.220)	(0.289)	(0.500)	(0.692)	(0.491)	(0.325)
AR-1	0.02	.005	0.01	0.00	0.02	0.01	0.09	0.01	0.04	0.02	0.06	0.05
AR-2	0.24	0.29	0.33	0..42	0.43	0..39	0.51	0.32	0.73	0.61	0.23	0.25
	(0.324)	(0.451)	(0.226)	(0.491)	(0.371)	(0..383)	(0.421)	(0.514)	(0.690)	(0.749)	(0.173)	(0.284)
Wald Test	0.018	0.015	0.024	0.038	0.011	0.017	0.012	0.014	0.0001	0.0001	0.071	0.05
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

Table 4-Panel A, B and C reports our base line results by employing GMM regression analysis along with results in a change mode as well. In Panel A dependent Variable, firm risk taking measured R&D expenditure and in Panel B dependent variable, firm risk taking measured as Altman's Z-Score (Inversed), in Panel C dependent Variable, firm risk taking measured as Leverage. All specification includes Time dummies and Industry dummies are included. Sargan is a test of the overidentifying restrictions with under the null hypothesis of no correlation between the instruments and the error term, p-values are reported in the brackets. AR-2 is a test of second-order serial correlation. Wald test shows the joint significance of reported coefficients, p-value is reported. Robust standard errors are reported in brackets.*Significant at 10% **Significant at 5% ***Significant at 1.

Table 5: Board Gender Diversity and Risk Taking

	Panel A				Panel B				Panel C			
	High-Tech Sample		Control Sample		High-Tech Sample		Control Sample		High-Tech Sample		Control Sample	
	R&D	$\Delta = t\text{-}t_{t-1}$	R&D	$\Delta = t\text{-}t_{t-1}$	Z-score^{-1}	$\Delta = t\text{-}t_{t-1}$	Z-score^{-1}	$\Delta = t\text{-}t_{t-1}$	Leverage	$\Delta = t\text{-}t_{t-1}$	Leverage	$\Delta = t\text{-}t_{t-1}$
Firm Size	3.097**	0.080***	0.282*	0.069*	2.639	0.295	4.312***	0.358***	3.064*	0.016*	0.600*	0.083*
	(1.480)	(0.025)	(0.152)	(0.037)	(9.086)	(0.265)	(1.216)	(0.080)	(1.688)	(0.071)	(0.329)	(0.042)
Firm Age	-9.989	-3.279	-1.697**	-1.007**	6.483	-0.956	-2.259	-0.256	7.105	-0.281	-0.785***	-0.034*
	(6.669)	(5.236)	(0.380)	(0.506)	(4.476)	(1.097)	(9.482)	(0.359)	(7.904)	(0.416)	(0.098)	(0.018)
ROA	-3.737**	-0.218**	0.125	-0.0391	2..249	-1.588	-1.031***	-0.183***	-1.972***	-0.080***	-07.112***	-3.514***
	(1.729)	(0.110)	(0.185)	(1.770)	(2.076)	(7.281)	(0.113)	(0.014)	(0.143)	(0.0287)	(2.543)	(0.598)
Slack	0.173***	0.009**	-0.003	0.00094	-2.306	0.0003	16.3707***	0.163***	-1.810	0.163	9.684	-0.0001
	(0.060)	(0.003)	(0.006)	(0.0032)	(4.176)	(0.0071)	(0.015)	(0.009)	(1.164)	(0.189)	(7.150)	(0.0009)
Growth Opportunities	0.022*	0.046**	-0.007	-0.002	0.671**	0.019***	-2.110	-0.0276	0.651	0.126	0.005	0.013
	(0.011)	(0.019)	(0.004)	(0.004)	(0.242)	(0.001)	(2.390)	(1.587)	(0.877)	(0.452)	(0.174)	(0.065)
Market-to-book	-0.199	-1.969	-0.207	-0.007	-1.169	3.628	54.316	29.764	0.354	6.291	0.103	0.006
	(0.815)	(2.390)	(0.055)	(0.020)	(2.231)	(7.832)	(13.575)	(18.941)	(7.995)	(6.563)	(0.141)	(0.157)
CEO Duality	-1.487	-0.4.086	-0.206	0.043	-1.722	0.125	1.311	0.044	-0.860	-0.008	-0.260	0.600
	(1.402)	(0.6.649)	(0.314)	(1.160)	(10.771)	(0.508)	(3.151)	(0.645)	(0.727)	(0.118)	(3.062)	(2.095)
Board Size	-2.820**	-0.040**	0.720	0.0731	1.160***	0.696**	1.060	0.344	2.431	0.351	2.544	0.131
	(1.030)	(0.021)	(0.238)	(0.399)	(0.209)	(0.233)	(3.267)	(0.911)	(4.960)	(0.173)	(3.732)	(1.069)
Board Independence	0.1686**	0.0328**	0.023	0.146	0.339	-0.945***	-1.356	-0.057	0.259	-0.080	0.830	-0.704
	(0.075)	(0.012)	(0.331)	(0.429)	(11.866)	(0.132)	(1.659)	(0.044)	(0.667)	(0.758)	(1.496)	(1.019)
Risk Taking$_{t-1}$	1.008***	0.017***	0.150	-0.164	0.055	0.010	-0.0004	0.006	1.116***	0.084***	-0.219	-0.017
	(0.643)	(0.003)	(0.233)	(0.182)	(0.095)	(0.024)	(0.001)	(0.013)	(0.223)	(0.021)	(0.553)	(0.011)
Family Firms	-4.436	-0.138	0.210	-0.522	-1.58	0.203	0.863	0.0734	1.714	-.024	-0.465	0.021
	(5.19)	(0.123)	(0.575)	(0.598)	(7.747)	(4.321)	(3.458)	(0.067)	(3.011)	(0.761)	(0.819)	(0.535)
Board Gender diversity	0.019**	0.088**	-0.04***	-0.004*	0.031*	0.014***	-0.014*	-0.08***	0.063**	0.051*	-0.029**	0.040
	(0.060)	(0.038)	(0.01)	-(0.002)	(0.012)	(0.005)	(0.07)	(0.003)	(0.021)	(0.027)	(0.016)	(0.047)
Interaction												
Board Gender diversity	-0.19***	-0.087***	-0.019**	-0.009***	-0.384**	-0.030*	-0.217*	-0.285**	-0.03*	-0.015*	-0.065***	-0.001***
× Family Firms.	(0.018)	(0.020)	(0.003)	(0.007)	(0.182)	(0.016)	(0.175)	(0.133)	(0.017)	(0.007)	(0.011)	(0.000)
No. of Observations	394	382	394	382	394	382	394	382	394	382	394	382
Hansen-Sargan Test	0.631	0.510	0.458	3.801	0.631	2.92	4.40	11.280	0.250	0.284	1.275	4.54
	(0.728)	(0.927)	(0.796)	(0.149)	(0.728)	(0.231)	(0.131)	(0.290)	(0.883)	(0.886)	(0.581)	(0.254)
AR-1	0.07	.0.08	0.00	0.00	0.00	0.00	0.05	0.03	0.03	0.05	0.07	0.02
AR-2	0.38	0.26	0.23	0.34	0.37	0..47	0.31	0.43	0.48	0.54	0.42	0.34
	(0.351)	(0.338)	(0.456)	(0.394)	(0.355)	(0.467)	(0.394)	(0.351)	(0.463)	(0.759)	(0.647)	(0.394)
Wald Test	0.001	0.041	0.034	0.022	0.001	0.054	0.046	0.012	0.001	0.071	0.047	0.001
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	No	No	Yes	Yes	No	No	Yes	Yes	No	No

Table -5 reports base line results by using split sample analysis of high-tech and control samples along with results in a change mode as well. In Panel A dependent Variable, firm risk taking measured as R&D expenditure and in Panel B dependent variable, firm risk taking measured as Altman's Z-Score (Inversed), in Panel C dependent Variable, firm risk taking measured as Leverage. All specification includes time dummies where industry dummies are included for control sample. Sargan is a test of the overidentifying restrictions with under the null hypothesis of no correlation between the instruments and the error term, p-values are reported in the brackets. AR-2 is a test of second-order serial correlation. Wald test shows the joint significance of reported coefficients, p-value is reported. Robust standard errors are reported in brackets.*Significant at 10% **Significant at 5% ***Significant at 1%.

Table 6: Robustness Tests

	Panel A	Panel B	Panel C	Panel D	Panel E
	Alternative measure of risk-taking (σ ROA)	Alternative measure of risk-taking (Capital Expenditure)	Restricted definition of Board Gender Diversity	Heckman Two-stage selection model	Industry-adjusted R&D expenditure
Board Gender diversity	-0.091*	-0.130*	-0.023***	-0.311*	-0.017**
	(0.047)	(0.071)	(0.001)	(0.161)	(0.007)
Interactions					
Board Gender diversity ×	0.026**	0.018**	0.014*	0.041**	0.002*
Hi-Tech Firms.	(0.011)	(0.006)	(0.071)	(0.013)	(0.001)
Board Gender diversity ×	-0.153*	-0.041***	-1.103***	-0.542**	-0.052**
Family Firms.	(0.081)	(0.003)	(0.005)	(0.143)	(0.019)
Board Gender diversity ×	-0.112*	-0.032**	-0.031*	-0.947*	-0.031**
Hi-Tech Firms × Family Firms	(0.057)	(0.014)	(0.016)	(0.476)	(.011)
Control Variables	Yes	Yes	Yes	Yes	Yes
Inverse Mills ratio				0.641	
				(1.281)	
No. of Observations	776	776	776	776	776
Hansen-Sargan Test	3.371	6.932	1.036		0.607
	(0.240)	(0.617)	(0.466)		(0.839)
AR-1	0.03	0.01	0.00		0.01
AR-2	0.34	0.46	0.520		0.690
	(0.229)	(0.373)	(0.632)		(0.304)
Wald Test	0.001	0.035	0.041		0.005
Time dummies	Yes	Yes	Yes	Yes	Yes
Industry dummies	Yes	Yes	Yes	Yes	Yes

Table 6 reports robustness tests for our base line results. Panel (A) employing standard deviation of Return on Assets as an alternative measure of firm risk-taking, Panel (B) employing capital expenditure as an alternative measure of firm risk-taking, In Panel (C) we use a restricted definition of board gender diversity which is a fraction of executive female director divided by total number of directors on board and dependent variable is R&D Expenditure. Panel (D) presents the second-stage regression results of Heckman two-stage estimation, dependent variable is R&D Expenditure. In Panel (E) we use industry-adjusted R&D expenditure as dependent variable. All specification includes time dummies and industry dummies are included. Sargan is a test of the overidentifying restrictions with under the null hypothesis of no correlation between the instruments and the error term, p-values are reported in the brackets. AR-2 is a test of second-order serial correlation. Wald test shows the joint significance of reported coefficients, p-value is reported. Inverse Mills ratio is obtained from the first-stage regression of the Heckman two-stage procedure. It is insignificant indicating that there is no problem of selection bias. Robust standard errors are reported in brackets.*Significant at 10% **Significant at 5% ***Significant at1%.

Table-7: Propensity Scores Matching

Risk Taking Measure	Mean	Mean Difference (Woman on board – All male board members)	P-Value
Panel A-High-tech sample			
R&D Expenditure -Woman on board	0.111	0.091**	0.011
R&D Expenditure -All male board members	0.020		
Z-score-[1]-Woman on board	0.343	0.051*	0.052
Z-score-[1]-All male board members	0.292		
Leverage -Woman on board	0.373	0.113*	0.071
Leverage -All male board members	0.260		
No. of Observations	318		
Family Firms			
R&D Expenditure -Woman on board	0.037	-0.036**	0.0481
R&D Expenditure -All male board members	0.074		
Z-score-[1]-Woman on board	0.261	-0.268**	0.0261
1 Z-score-[1]-All male board members	0.529		
Leverage -Woman on board	0.443	-0.124*	0.071
Leverage -All male board members	0.567		
No. of Observations	173		
Panel B-Control sample			
R&D Expenditure -Woman on board	0.005	-0.003***	0.001
R&D Expenditure -All male board members	0.009		
Z-score-[1]-Woman on board	0.334	-0.165*	0.076
Z-score-[1]-All male board members	0.499		
Leverage -Woman on board	0.331	-0.336***	0.000
Leverage -All male board members	0.667		
No. of Observations	306		
Family Firms			
R&D Expenditure –Woman on board	0.004	-0.009*	0.0687
R&D Expenditure -All male board members	0.013		
Z-score-[1]-Woman on board	0.284	-0.339*	0.084
Z-score-[1]-All male board members	0.623		
Leverage -Woman on board	0.492	-0.091**	0.043
Leverage -All male board members	0.583		
No. of Observations	161		

Table 7: reports robustness test for our base line results by employing Propensity Score Matching. Propensity scores are estimated using firm level factors used in our baseline analysis with year fixed effects for both high-tech sample and control sample and industry effects are included for control sample only .Panel (A) provide results for high-tech sample and Panel (b) provide results for control sample with. Risk Taking is measured as R&D expenditure, Altman's Z-Score (Inversed) and Leverage with firms with their mean difference and P- value for mean difference. *Significant at 10% **Significant at 5% ***Significant at 1%.

Table 8: Impact of board gender diversity on firm performance

	High-tech sample			Control sample		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
Board gender diversity	0.344***	0.399*	4.024*	-1.273***	-0.352***	-0.614**
	(0.126)	(0.236)	(2.166)	(0.007)	(0.199)	(0.281)
Family Ownership			-1.723			-25.67
			(2.605)			(23.290)
Family Ownership×Board gender diversity			-0.528*			0.255
			(0.309)			(3.642)
Board Size		0.319	0.372		0.073*	0.063*
		(2.397)	(0.485)		(0.041)	(0.033)
% Independent directors		0.121**	-0.149		0.255	0.182
		(0.054)	(0.124)		(0.713)	(0.639)
Firm Size		-2.496***	0.055		-9.970**	-10.484*
		(0.926)	(0.663)		(4.926)	(5.387)
Firm Age		0.490**	3.052		-0.529	-0.287
		(0.223)	(4.154)		(0.644)	(1.325)
Slack		0.001	-0.007		-0.007	0.001
		(0.002)	(0.009)		(0.07)	(0.007)
Leverage		0.794***	-0.229*		-1.070**	-0.736*
		(0.203)	(0.141)		(0.500)	(0.407)
Growth Opportunities		-0.003	-0.011*		-0.030*	-0.0187
		(0.015)	(0.007)		(0.018)	(0.019)
No. of Observations	394	394	394	382	382	382
Sargan Test	19.68	16.57	2.85	12.05	2.74	2.57
	(0.140)	(0.020)	(0.723)	(0.602)	(0.907)	(0.766)
AR-2	0.12	0.16	0.23	0.20	0.11	0.38
	(0.130)	(0.109)	(0.189)	(0.301)	(0.239)	(0.451)
Wald Test	0.006	0.091	0.040	.0001	0.077	0.0143
Time dummies	Yes	Yes	Yes	Yes	Yes	Yes
Industry dummies	No	No	No	Yes	Yes	Yes

Table 8 reports the results of additional analysis by employing GMM regression for high-tech and control samples. Dependent Variable is firm performance measured as Tobin's q and independent variables remain same as in baseline analysis. All specification includes time dummies whereas industry dummies are included only in non-high-tech sample. Sargan is a test of the overidentifying restrictions with under the null hypothesis of no correlation between the instruments and the error term, p-values are reported in the brackets. AR-2 is a test of second-order serial correlation. Wald test shows the joint significance of reported coefficients, p-value is reported. Robust standard errors are reported in brackets.*Significant at 10% **Significant at 5% ***Significant at 1.