The effect of board gender diversity on firm performance, risk, and risk management strategy: A new evidence from US Real Estate Investment Trust

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Abstract

This study examines the relationship between board gender diversity and firm performance, risk, and risk-adjusted return in US Equity Real Estate Investment Trusts (REITs). The study is motivated by the agency, resource dependence, and risk aversion theories. While previous research has produced mixed results, we argue that the disclosure of REITs' property locations provides unique and reliable instrumental variables that address endogeneity concerns. The results first suggest that women on the board positively affect firm performance, but they also increase firm risk. As a result, there is no effect on risk-adjusted returns. We then explore the sources of risk associated with board gender diversity, focusing on REITs' portfolio characteristics such as geographical, tenant, and property-type diversification. We find that REITs with more women on the board tend to be geographically more focused (i.e., less diversified). Further, this geographical concentration appears to be a significant driver of increased risk for firms with more women on their boards. These results suggest that firms with gender-diverse boards exhibit increased risk due to lower levels of overconfidence among women on boards, as evidenced by geographical concentration. In the areas where board members have excellent market knowledge, investment history, and network, we can expect superior investment decisions. Accordingly, these firms also tend to achieve superior performance.

Keywords: Gender diversity; Board of directors; Firm performance; Firm risk; Risk management strategy; Overconfidence; Real Estate Investment Trust

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1. Introduction

Prior studies have examined the effects of board gender diversity on firm performance and corporate actions. These studies are motivated by three main theories: the agency theory (Fama & Jensen, 1983), the resource dependence theory (Pfeffer & Salancik, 1978; Hillman & Dalziel, 2003), and the risk aversion theory (Croson & Gneezy, 2009).

The agency theory explains the potential conflicts of interest that may arise between shareholders and managers. To mitigate these conflicts, corporate governance mechanisms, such as boards of directors, executive compensation schemes, and shareholder activism, are commonly used. Adams and Ferreira (2009) have shown that boards with a higher proportion of female directors tend to engage in tougher monitoring, have a greater alignment of incentives, and involve directors more in decision-making. Such boards may positively impact corporate performance by overcoming agency problems between managers and shareholders. However, Adams and Ferreira (2009) also found that, in already well-governed firms, board gender diversity has a negative impact on firm performance due to over-monitoring. On the other hand, the effect of board gender diversity is positive in firms with weak governance.

The resource dependence theory suggests that boards of directors can help firms reduce their external dependencies and gain legitimacy, advice, and resources. Gender diversity on the board can help firms achieve better legitimacy and overcome homogeneity problems when providing advice. As stakeholders, suppliers, and consumers become more diverse, firms that include gender diversity on their boards gain access to a wider range of communication channels and resources. This increased understanding of the marketplace, as highlighted by Robinson and Dechant (1997), may enable firms to respond better to the needs and preferences of their diverse stakeholders, suppliers, and consumers.

Finally, the risk aversion theory suggests that women may be more risk-averse and less overconfident than men (Groson & Gneezy, 2009). Research by Schopohl et al. (2021) and Faccio et al. (2016) suggest that firms with female executives tend to have lower leverage ratios, while Li and Zeng (2019) found that they are associated with lower stock price crash risk. Huang and Kisgen (2013), in turn, found that female executives tend to reduce merger propensity and increase acquisition and debt announcement returns. These findings underscore the importance of considering both risk and return when evaluating the effects of board gender diversity.

Empirical studies have explored the impact of board gender diversity on firm performance and risk, yielding conflicting findings. While some studies have reported a positive association between board diversity and firm performance (Liu et al., 2014; Campbell & Minguez-Vera, 2008), others have found a negative relationship in firms with strong governance (Adams & Ferreira, 2009), and still, others have detected no significant link (Carter et al., 2010; Rose, 2007). Similarly, research examining the relationship between board gender diversity and firm risk has produced mixed results, with some studies suggesting that gender-diverse boards increase firm risk (Adams & Ragunathan, 2017; Berger et al., 2014), while others find no discernible effect on risk for non-financial firms (Sila et al., 2016). These divergent results emphasize the complexity of the issue and the need for further research to elucidate the nature of the relationship between board gender diversity, firm performance, and risk. Adams and Ferreira (2009) also pointed out the importance of trying to address the endogeneity of gender diversity in performance regressions.

The objective of this study is to explore the relationship between board gender diversity and firm performance, risk, and risk-adjusted returns. To achieve this, we focus on a sample of US Equity Real Estate Investment Trusts (REITs) as a laboratory. Utilizing the unique information disclosed by REITs, we propose reliable instrumental variables that address endogeneity concerns and aim to uncover the sources of REITs' firm risk in connection with board gender diversity. Through our analysis, we seek to shed light on the impact of board gender diversity on organizational outcomes and provide insights that may be useful for policymakers, executives, and stakeholders.

We use a sample of US REITs mainly because these entities disclose the locations of their properties. This disclosure enables us to create unique and valid instrumental variables for board gender diversity to address potential endogeneity concerns by measuring a REIT's business exposures to different states with different gender equality levels. The detailed property portfolio information also allows us to understand the sources of risk focusing on a REIT's portfolio characteristics, such as geographical, tenant, and property-type diversification. REITs are relatively homogeneous and have a straightforward business model, which naturally controls for potential confounding factors. Additionally, the 5:50 ownership rule restricts external blockholders from owning more than 50 percent of the shares, making external takeovers unlikely (Ghosh & Sirmans, 2003). Therefore, internal monitoring mechanisms are more critical for REITs, and women directors are known to be efficient monitors (Adams & Ferreira, 2009). As such, board gender diversity is an ideal

proxy for internal mechanisms to deal with agency problems, and we expect it to play an important role among REITs.

We begin by analyzing the effect of female boardroom representation on firm performance. To address concerns about endogeneity, we use instrumental variables that leverage information about the locations of properties owned by REITs. Our findings indicate that women on the board have a positive effect on firm performance. We then examine if women on the board affect firm risk. Our analyses reveal that women on the board increase firm risk, which is seemingly contradictory to the widely held belief that women are more risk-averse or less overconfident than men (Croson & Gneezy, 2009). To assess the combined effects on return and risk, we examine the impact of female boardroom representation on risk-adjusted return and find no significant effect. This finding suggests that any incremental increase in risk due to board gender diversity is justified by the increase in performance. Accordingly, board gender diversity appears to promote REITs to have higher-risk, higher-return profiles.

Thus, our research reveals a noteworthy result that women serving on a board can lead to a substantial increase in a firm's risk, which seems to be inconsistent with the risk-aversion theory. To better understand the underlying reasons for this finding, we investigate the impact of female boardroom representation on diversification strategies that REITs employ to manage their risk, using the Herfindahl index[1] as a measure of diversification (Hartzell et al., 2014). Most interestingly, we find that REITs with more women on the board tend to be geographically more focused (i.e., less diversified). Further, we find that, for firms with more women on their boards, geographical concentration appears to be a significant driver of increased firm risk, while an increase in firm risk cannot be fully explained by geographical concentration among firms with fewer women on their boards. These results suggest that firms with gender-diverse boards exhibit increased risk due to lower levels of overconfidence among women on boards, as evidenced by geographical concentration. In the areas where board members have excellent market knowledge, investment history, and network, we can expect superior investment decisions. As a result, these firms also tend to achieve superior performance.

The remainder of the paper is organized as follows. Section 2 covers the existing literature and motivation of gender diversity on firm performance and risk. Section 3 describes the data

[1] Alternatively, we use the average square root of distance of properties to a REITs headquarters (Milcheva et al., 2021) as a measure of geographic diversification.

used, and the methodology applied. Section 4 presents the results on the economic and statistical significance of the empirical tests of board gender diversity on firm performance, risk, sources of risk, and risk-adjusted returns. Section 5 summarizes and concludes.

2. Literature review

Numerous studies have highlighted the potential benefits of diversity in top management teams. Cox and Blake (1991) and Robinson and Dechant (1997) argue that diversity can provide a business advantage, with firms that incorporate diversity experiencing lower rates of employee turnover and absenteeism. In contrast, firms that fail to embrace diversity may incur higher costs due to these factors. In addition to these benefits, diverse management teams can bring a wealth of other advantages. For example, diverse teams can offer enhanced marketplace knowledge, creativity and innovation, and improved problem-solving as a result of the variety of perspectives and experiences they bring (Cox and Blake, 1991; Robinson and Dechant, 1997; Richard and Shelor, 2002). Therefore, firms that prioritize diversity may have a competitive edge in today's global marketplace.

Given claims that diversity could benefit firms, the relationship between board gender diversity and firm performance has been a topic of interest in the literature. Empirical studies have investigated this relationship, but the results differ widely across studies, leaving the relationship inconclusive. For example, Adams & Ferreira (2009) find a negative relationship between female directors and firm performance. In contrast, Liu et al. (2014) find a positive relationship between gender diversity and firm performance, as measured by ROA and return on sales. Campbell & Minguez-Vera (2008) also find a positive relationship between gender diversity on boards and firm performance, measured by Tobins Q. Similarly, Carter et al. (2003) find a positive relationship between the fraction of women on the board and firm value, measured by Tobins Q. However, some studies find no significant relationship between board gender diversity and firm performance. For instance, Carter et al. (2010) and Rose (2007) find no significant relationship between several firm performance measures and board gender representation.

Research on the impact of gender diversity in the REIT industry is still limited, and the findings are mixed. Dimovski et al. (2014) reported no significant association between female directors and firm performance, while Schrand et al. (2018) found a positive impact of board gender diversity on market performance. In contrast, Noguera (2020) found that board gender diversity had a positive impact on REIT performance only when there was a critical

mass of women on the board. However, Hogan and Huerta's (2019) study on gender diversity in middle management found a negative impact on REIT performance. These studies suggest that the relationship between gender diversity and REIT performance is complex and may depend on various factors, such as the level of female representation and the hierarchical position of women within the organization. Thus, further research is necessary to fully understand the impact of gender diversity on REIT performance.

The motivation to study the impact of gender diversity on organizations stems from three main theories in the literature. They are the agency theory (Fama & Jensen, 1983), the resource dependence theory (Pfeffer & Salancik, 1978), and the risk aversion theory (Croson & Gneezy, 2009).

The agency theory posits that the separation of decision management from residual claims in organizations can lead managers to prioritize their own interests over those of shareholders, which highlights the need for monitoring. The board of directors, especially outside board members, has been recognized as a means of mitigating agency problems by acting as a monitoring mechanism (Fama & Jensen, 1983). Research indicates that board independence is crucial, and diversity in the form of gender or ethnicity can enhance the independence of the board, thereby improving monitoring (Carter et al., 2003). Specifically, Adams and Ferreira (2009) have shown that women directors are more likely to be present on monitoring committees, have better attendance records, and improve the attendance of the boards to which they belong. Furthermore, evidence suggests that women directors align the interests of management and shareholders, as companies with more women on the board are associated with more equity-based compensation for directors.

The resource dependency theory, introduced by Pfeffer & Salancik (1978), suggests that organizations rely on resources from their external environments, such as financial, capital, technology, raw materials, and labor. Organizations are not self-sufficient and cannot produce all the resources they need internally. Therefore, they must obtain them from external sources. However, this dependence on external resources creates risks because organizations may not have full control over the availability or quality of these resources. To manage these risks, organizations attempt to establish connections with the external environment they depend on (Hillman et al., 2007). This could include creating alliances or partnerships with other organizations, lobbying for favorable regulations, or building relationships with suppliers, customers, and other stakeholders.

The board of directors is an effective method for reducing an organization's dependence on external resources. According to Pfeffer and Salancik (1978) and Hillman and Dalziel (2003),

boards provide benefits such as legitimacy, counsel and advice, channels of communication, and access to resources. Legitimacy is important for firms as they face external pressures for diversity and need to adapt their diversity to how societies value diversity (Hillman et al., 2007; Cox et al., 1991). Firms can also profit from the legitimacy obtained through diverse boards by consumers who value diversity, thereby creating goodwill (Robinson & Dechant, 1997). In terms of counsel and advice, heterogeneous teams outperform homogenous teams with enhanced problem-solving skills, according to Robinson and Dechant (1997). Having diversity in a team or a board of directors can help ensure that a wider range of potential solutions are explored, which can ultimately lead to better outcomes for the organization. With respect to channels of communication and resources, stakeholders, customers, and suppliers are becoming more diverse. By including women on corporate boards, firms could benefit through an enhanced understanding of the marketplace (Robinson & Dechant, 1997).

The risk-aversion theory suggests that men and women differ in their risk-taking preferences. Croson & Gneezy (2009) review the literature on gender differences and conclude that women, in general, are more risk-averse than men. Such risk-averse behavior is exhibited in investment choices where women make more conservative investment decisions than men (Watson & McNaughton, 2007; Charness & Gneezy, 2012; Bernasek & Shwiff, 2001; Sundén & Surette, 1998). A growing body of literature has investigated the implications of such risk-taking differences in various corporate actions involving the top management of firms. Evidence from the literature suggests that female executives are associated with lower leverage (Schopohl et al., 2021; Faccio et al., 2016), lower stock price crash risk (Li & Zeng, 2019), and a lower propensity to engage in mergers and acquisitions and higher acquisition and debt announcement returns (Huang & Kisgen, 2013).

Studies on gender differences in the board of directors on the firm risk, however, find contrasting results. For instance, Sila et al. (2016) find no relationship between board gender diversity and firm risk-taking in a sample of non-financial firms, whereas Adams & Ragunathan (2017) find women directors to be less risk-averse than their male counterparts in the finance industry. Similarly, Berger et al. (2014) find women directors increase bank portfolio risk. Such differences are argued to be a result of selection processes into industries where the risk preferences of individuals are different for industries from the stereotyped women are more risk averse than men (Adams & Ragunathan, 2017).

3. Data and Methodology

3.1. Data

The analysis is based on a sample of US equity public REITs identified using the S&P Capital IQ database. We include all US equity REITs that have existed at any point in time, including those that may have only existed for a brief period, in order to avoid survivorship bias. We obtain board-level data for the selected firms from BoardEx database via Wharton Research Data Services (WRDS). Financial data is obtained from S&P Capital IQ and the COMPUSTAT Capital IQ database. Stock price data is obtained from CRSP database via WRDS. We merge the board data from BoardEx with S&P Capital IQ, COMPUSTAT Capital IQ, and the CRSP database. Due to the availability of board data on BoardEx, our final sample consists of 179 firms with 2,190 firm-year observations for the period from 2000 to 2018. The number of observations varies depending on the variables included in the model and on the model specification.

3.2. Methodology

Following is our main estimation model:

$$dependent_{it} = \alpha + \beta independent_{it} + \gamma controls_{it} + \nu_i + \mu_t + \varepsilon_{it} \quad (1)$$

where ν_i is firm fixed effects and μ_t is the industry average dependent variable excluding the firm itself in each year, to control for market-wide unobserved time-varying factors that affect the overall level of a dependent variable in each year. We take this approach because we focus on the REIT industry, where firms are relatively homogeneous. Dependent variables (firm return and risk measures), the main independent variables (board gender diversity measures), and control variables are explained in detail in the sections 3.3, 3.4, and 3.5, respectively.[2]

3.3. Dependent variables

We follow the literature on board gender diversity and performance and use return on assets (**ROA**) and return on equity (**ROE**)[3] as our measures of firm performance (Adams &

[2] A description of the variables is provided in Appendix A Table A1.
[3] Following Feng et al, (2021), we restrict ROE to -100 and +100%.

Ferreira, 2009; Liu et al., 2014; Campbell & Minguez-Vera, 2008; Carter et al., 2003; Carter et al., 2010; Rose, 2007).

For our risk measures, we use idiosyncratic (**IVOL**), systematic (**SVOL**), and total volatilities (**TVOL**), following Sila et al. (2016) and Bernile et al. (2018). We obtain measures of volatility by regressing monthly excess returns on the Fama & French (1993) three factors and an additional real estate factor (Hsieh & Peterson, 2000)[4] as follows:

$$r_{it} - r_{ft} = \alpha_i + \beta_1\left(R_{Mt} - r_{ft}\right) + \beta_2 SMB_t + \beta_3 HML_t + \beta_4 NAREIT_t + \varepsilon_{it} \quad (2)$$

where r_{it} is return of firm *i* in month *t*. r_{ft} is the risk free rate. $r_{it} - r_{ft}$ is the firms monthly excess return. α_i is the intercept. $(R_{Mt} - r_{ft})$ is the excess return on the market portfolio. SMB_t is the difference in small and large portfolio of stocks. HML_t is the difference in high and low book to market portfolio of stocks.[5] $NAREIT_t$ is a real estate factor which is the return on National Association of Real Estate Investment Trusts (NAREIT) equity REITs. This additional factor is computed as the sum of the intercept and the error term when regressing the NAREIT equity REIT return on the Fama & French three factors, which results in an orthogonalized factor capable of capturing the variation in excess of the other factors (Hsieh & Peterson, 2000). ε_{it} is the error term. We call this model the RE factor.

TVOL is the standard deviation of the firm's monthly excess returns each year ($r_{it} - r_{ft}$). IVOL is the standard deviation of the residuals in each year (ε_{it}). SVOL is obtained by subtracting IVOL from TVOL. Additionally, we use Jensen's alpha (**Alpha RE**) which is the alpha coefficient (α_i) as a measure of risk-adjusted returns.[6]

Lastly, we use the Herfindahl index as a measure of diversification (Hartzell et al., 2014). Three types of diversification are measured: geographical diversification (**HHI G**), property-type diversification (**HHI P**), and tenant diversification (**HHI T**). We compute these measures as follows:

$$Herfindahl\ Index = \sum_{i=1}^{n} Prop_i^2 \quad (3)$$

where $Prop_i$ is the proportion of properties of a REIT in state *i* for HHI G, the proportion of properties of property type *i* for HHI P, and a proportion of the top 30 tenants by revenue for

[4] We also compute systematic and idiosyncratic volatilities from the Fama & French (1993) three factor and Fama & French (2015) five factor models as robustness checks.
[5] The Fama & French three factors and the risk-free rate are obtained from Kenneth French's website: https://mba.tuck.dartmouth.edu/pages/faculty/ken.french/data_library.html
[6] We also compute Jensen's alpha, our measure of risk-adjusted returns, using the Fama & French (1993) three factor and the Fama & French (1995) five factor models as robustness checks.

HHI T, respectively. We divide the index by 10,000 to scale it from 0 to 1, with a higher value implying a higher concentration.

As an alternative measure of geographic diversification, we use the average square root of the distance of properties to a REITs headquarters (**DIST**) (Milcheva et al., 2021), which is measured as follows:

$$DIST_{it} = \frac{1}{N_{it}} \sum_{n=1}^{N} sqrt(Distance_{nit}) \quad (4)$$

where N_{it} is the total number of properties for each REITi in year t and $sqrt(Distance_{nit})$ is the square root of the distance of properties to a REITs headquarters.

3.4. Independent variables

The key variable of interest in our study is the gender diversity of the board. We follow the literature on board gender diversity and use the percentage of women on the board **(% Women**) as a measure for female boardroom representation (e.g., Carter et al., 2003; Liu et al., 2014).

3.5. Control variables

We include various board and firm characteristic variables in our analysis, as recommended in the existing literature (e.g., Carter et al., 2003; Adams & Ferreira, 2009; Sila et al., 2016). Specifically, we include four board characteristic variables: **Board Size**, which measures the number of directors on the board; **% Independent**, which represents the proportion of independent directors on the board; **Duality**, a binary variable that equals one if the CEO also serves as the chairman of the board and zero otherwise, and **CEO Tenure**, which reflects the length of time the CEO has been in his or her position. In addition, we incorporate several firm characteristic variables. These variables include the natural logarithm of the total assets (**Ln(Total Assets)**), which captures the size of the firm; **Firm Age**, which reflects the number of years since the firm was listed on the stock exchange; **Leverage**, which measures the book value of debt as a percentage of total assets; and **MTB**, which represents the ratio of the market value of the firm to its book value. These variables are commonly used in the literature to capture different dimensions of firm characteristics that may influence firm performance and risk.

3.6. Endogeneity

Endogeneity in the form of omitted variable bias and reverse causality is known to exist for gender studies where the gender diversity of the board is not truly exogenous. To address these concerns, we use fixed effects to account for the former and employ an instrumental variable approach to address the latter. To construct a valid and unique instrumental variable for % Women, we combine the gender equality index, proposed by Sugarman & Straus (1988) and updated by Noia (2002), with information about the locations of REIT properties disclosed by REITs. By using property location information, we can proxy REITs' business exposures in different states with varying levels of gender equality rather than relying solely on information about headquarters' location, as in some prior studies.

The gender equality index consists of economic, political, and legal indicators that reflect how women are doing relative to men in each of the aforementioned spheres for the 50 states of the US. For instance, the economic sphere consists of indicators such as civilian labor force participation or the median income of women relative to men. However, the index proposed by Noia (2002) is time-invariant. Therefore, we update the index year on year for our sample period by hand-collecting the data for each of the indicators under the economic, political, and legal spheres. Our final indicators are not entirely similar to Noia (2002) owing to data limitations and after including certain relevant laws which did not exist in the previous research. The details of these indicators of our index are summarized in Appendix A Table A2. Following the procedure used in Noia (2002), once we have obtained our indicators, we compute the economic and political spheres by taking an average of the indicators, respectively. The legal sphere indicators are dummy variables taking a value of one if the state has enacted the law and zero otherwise. Therefore, we compute a percentage of the number of laws enacted in a state divided by the total number of laws. Once we have all the three spheres, we take an average of the three spheres, which gives us our gender equality score. Lastly, we compute the index as a property weighted score (GEI) as follows:

$$GEI_{it} = \sum_{j=0}^{50} w_{ijt} * \text{ gender equality score}_{jt} \quad (5)$$

where w_{ijt} is the proportion of assets in a portfolio of REIT *i* in state *j* in year *t*. The more friendly policies a state has for women, the higher its score.

As our second instrumental variable for % Women, we use peer industry (PEERS), following Liu et al. (2014). This instrument is constructed as a percentage of the total number of women on the board in a REITs sub-industry excluding the firm itself, divided by the board size in a REITs sub-industry excluding the firm itself. This instrument can be viewed as a proxy for peer pressure, where a firm would be more likely to follow its industry peers in their governance practices. As a robustness check, we also use gay rights (Gay Rights) (Lax & Phillips, 2009) as an instrument for % Women. Gay Rights proxy gender awareness or friendliness. The procedure to compute Gay Rights is similar to GEI where we compute a property weighted score for each REIT.

4. Results

4.1. Descriptive statistics

Table 1 provides the descriptive statistics for our sample, while Table 2 presents a comparison of these characteristics between firms with and without women on their boards. The board characteristics indicate that, on average, women represent 10.17% of board members. Firms with female board members have larger boards, more independent directors, and fewer CEOs serving as board chairs. The average CEO tenure across all firms is 5.58 years, with no significant difference between those with and without women on their boards.

Turning to firm characteristics, we find that firms with female board members are significantly older (20 years vs. 6 years) and have larger asset sizes. There is no significant difference in leverage between the two groups. Firms with female board members also exhibit higher market-to-book ratios and return on equity, as well as lower total and idiosyncratic risk. Additionally, these firms tend to have greater geographical diversification and hold properties located farther from their headquarters.

Note that we observe these differences in firm outcomes (e.g., return, risk, and risk management strategies) without controlling for other variables in Table 2. Additionally, there are significant variations in many board and firm characteristics between firms with and without female board members. Hence, the differences in firm outcomes may be attributed to the differences in board and firm characteristics. To better comprehend the effects of female board representation on firm outcomes, we carry out formal analyses that control for board and firm characteristics and account for possible endogeneity. The variance inflation factors

(VIFs) of all the variables are below 3 and the mean VIF is 1.36. Thus, the multicollinearity is not a serious concern for our regressions.

[Insert Table 1 Here]

[Insert Table 2 Here]

4.2. Does board gender diversity affect firm performance?

In Table 3, we present the results of regressions that examine the impact of board gender diversity on firm performance, where performance is measured by ROA and ROE. In columns (1) and (4), ordinary least squares (OLS) models are used. The remaining columns report the results based on instrumental variables (IV) regressions (both 1st stage and 2nd stage).

The OLS regressions reveal that % Women is positively and significantly associated with ROA at the 5% level (column (1)), while controlling for board and firm characteristics and including firm- and time-fixed effects. In terms of economic significance, a 1% increase in % Women results in a 0.011% rise in ROA. We do not find any statically significant association between % Women and ROE (column (4)).

However, it is well documented in the literature that the board gender diversity and performance relationship suffers from endogeneity concerns where the gender diversity of the board is not truly exogenous. We use an IV method to deal with the endogeneity concerns. We use GEI and PEERS as instruments for the percentage of women on the board. GEI is a property-weighted gender equality score. PEERS proxies peer pressure by measuring a percentage of the total number of women on the board in a REITs sub-industry excluding the firm itself, divided by the board size in a REITs sub-industry excluding the firm itself, as explained earlier. We expect these instruments to be positively related with % Women and not with the outcome.

Columns (2) and (5) in Table 3 present the first stage IV results where we regress % Women on our instruments and a set of control variables. In line with our expectation, PEERS and GEI are positively and significantly associated with the percentage of women on board. We then regress the performance variables on the predicted % Women obtained from the first stage, along with control variables and firm- and time-fixed effects.

The second-stage regression results, as presented in columns (3) and (6), reveal that a higher percentage of women on boards has a significant positive effect on both ROA and

ROE. Specifically, a 1% increase in % Women is associated with a 0.193% increase in ROA (significant at the 1% level) and a 0.841% increase in ROE (significant at the 10% level). These findings lend support to the idea that gender diversity in boardrooms is beneficial for firm performance, aligning with agency theory and resource dependency theory.

To ensure the exogeneity and validity of our instruments, we conducted tests on both counts. The Sargan-Hansen test of overidentifying restrictions and the Anderson-cannon test of under-identification indicate that our instruments are valid and exogenous. These results strengthen the credibility of our findings and suggest that our use of instrumental variables is appropriate for addressing the endogeneity issues that may arise in the estimation of causal effects.

The results with control variables show that Board Size and Firm Age have a significant negative impact on both ROA and ROE, whereas asset size has a significant positive effect on both. Additionally, we find that leverage has a significant positive effect on ROA but a negative effect on ROE. Finally, CEO Tenure appears to have a positive association with ROE.

[Insert Table 3 Here]

4.3. Does board gender diversity affect firm risk?

The risk-aversion theory and empirical studies that tested the theory highlighted the importance of considering both risk and return when evaluating the effects of board gender diversity (Groson & Gneezy, 2009; Schopohl et al., 2021; Faccio et al., 2016; Li and Zeng, 2019; Huang and Kisgen, 2013). Table 4 shows the results of regressions that examine the effects of board gender diversity on firm risk.

In Table 4, columns (1) and (2) report the results of regressions where a dependent variable is total risk (TVOL). Columns (3) and (4) focus on systematic volatility (SVOL) and columns (5) and (6) examine idiosyncratic volatility (IVOL) as dependent variables. By examining these different measures of risk, we can gain a deeper understanding of how the effect of board gender diversity differs across different types of volatility. Columns (1), (3), and (5)

present results based on OLS regressions, whereas, the remaining columns report the results based on IV regressions.[7]

The results of the OLS regressions indicate a significant and positive association between % Women and IVOL. However, no significant relationship was found with TVOL and SVOL. When accounting for endogenuity, the results of the IV regressions show that % Women has a positive and significant association with TVOL and SVOL but not with IVOL. A 1% increase in women on the board results in a 1.1% and 0.7% increase in total and systematic volatilities, respectively.[8] The IV regression findings are important because systematic risk (SVOL), and not idiosyncratic risk, is priced, making it essential for well-diversified investors.

Our observations regarding the positive impact of board gender diversity on firm risk are in stark contrast to the risk aversion literature on gender differences. This literature suggests that women are more risk-averse than men (Croson & Gneezy, 2009). Nevertheless, our findings are consistent with those of Adams & Ragunathan (2017) and Berger et al. (2014), who discovered that women on boards increase risk in the finance and banking industries. Our findings, however, contradict Sila et al.'s (2016) findings, which found no significant relationship between women on the board and firm risk for a sample of companies that excluded financial and utility firms.

[Insert Table 4 Here]

4.4. Does board gender diversity affect risk-adjusted returns?

In light of our previous findings that the presence of women on a company's board increases both firm performance and risk, we have conducted further analysis to investigate the impact of board gender diversity on risk-adjusted returns. The results are presented in Table 5, where Column (1) shows the results of an OLS regression, while Columns (2) and (3) present the results of IV regressions. Our analysis did not reveal any significant relationship between the gender diversity of a board and risk-adjusted returns, regardless of

[7] Here, we show only results of the 2nd-stage IV regressions. The results of the 1st-stage IV regressions are generally similar to those shown in Table 3.
[8] Alternatively, we compute systematic and idiosyncratic volatility using the Fama & French (1993) three factor and the Fama & French (1995) five factors and find that on average our results still hold (See Table A4 and Table A5 in the appendix).

the model specifications used.[9] This indicates that any additional risk arising from greater gender diversity on the board is offset by the benefits to performance. Therefore, we can conclude that board gender diversity promotes REITs to adopt higher-risk, higher-return strategies without sacrificing returns on a risk-adjusted basis.

[Insert Table 5 Here]

4.5. Does board gender diversity affect risk management strategy?

Our research has uncovered that having women on board increases firm risk, but this increased risk is justified by the benefits of improved firm performance. In order to better understand this relationship, we aim to explore the mechanisms behind these findings. We first examine how board gender diversity impacts risk management strategies employed by REITs. Using REITs as our sample allows us to identify the sources of such risk more precisely. By utilizing the detailed information about properties owned by REITs, we investigate if board gender diversity affects various aspects of risk management, such as geographical diversification, distances of properties from REITs' headquarters, property-type diversification, and tenant diversification.

In Table 6, panel A, B, C, and D present the results where our diversification measures are HHI G, DIST, HHI P, and HHI T, respectively. Columns (1), (4), (7), and (10) are based on OLS regressions, whereas the remaining columns are based on IV regressions. Thus, the main conclusions are drawn from the results of the 2nd stage IV regressions, as shown in columns (3), (6), (9), and (12).

In Panel A, Column (3), it is shown that % Women has a significant and positive impact on our primary geographic diversification measure (HHI G), at the 1% level. The result indicates that a 1% increase in female board representation leads to an 0.8% increase in geographic concentration, suggesting that firms with greater gender diversity in their boardrooms tend to be more geographically focused. This finding is further supported in Panel B, Column (6), where we present an alternative measure of geographic diversification. Here, we find that having more women on the board significantly and negatively affects the average square root

[9] Alternatively, we compute Jensen's alpha using the Fama & French (1993) three factor and the Fama & French (1995) five factor models and find that our results still hold (See Table A6 in the appendix).

of the distance of properties to their headquarters, suggesting that REITs with more women on their boards tend to own properties that are closer to their headquarters.

These results suggest that firms with more women on their boards tend to make conservative investment choices by investing in areas where board members are familiar, which is consistent with the risk-aversion literature that suggests that women are less overconfident. Interestingly, this less overconfident investment behavior results in geographical concentration, which in turn increases firm risk. Combining this result with the result of risk-adjusted return, we can argue that the increased risk caused by board gender diversity is justified by an increased firm performance because the increased risk is caused by less overconfident behavior led by boards with gender diversity. In the areas where board members have excellent market knowledge, investment history, and network, we can expect superior investment decisions.

In Panel C, Column (9), we find that % Women is negatively and significantly associated with HHI P at the 5% level, suggesting that firms with more women on the board tend to diversify by property type.[10] In Panel D, Column (12), we find no effect of board gender diversity on tenant diversification.

[Insert Table 6 Here]

4.6. Moderating effect of board gender diversity on the link between geographical concentration and firm risk

In the previous subsection, we established that an increase in board gender diversity leads to an increase in geographical concentration, which, in turn, raises firm risk. However, we did not conduct a formal test to establish a direct relationship between geographical concentration caused by gender-diverse boards and firm risk. In this section, we focus on exploring this link. Specifically, we conduct a regression analysis to examine the relationship between a geographical diversification measure (HHI G) and firm risk, focusing on total risk (TVOL), for sub-samples defined by female representation on the board. In Panel A of Table 7, we split the sample into three categories: the top 30% (High), the middle 40% (Mid), and

[10] Note that the results of property-type diversification apply only to diversified REITs that own a variety of property types. In the United States, the majority of US REITs are specialized, meaning they focus on a specific property sector.

the bottom 30% (Low) based on female representation. In Panel B, we split the sample into two categories: Above median (High) and below median (Low).

The findings from both Panel A and B reveal that a rise in geographical concentration, indicated by a higher value of HHI G, leads to an increase in overall volatility. However, this effect is observed only among subsamples of firms with a relatively high proportion of women on their boards (columns (1) and (4)). Specifically, the results suggest that an increase in firm risk cannot be fully explained by geographical concentration among firms with fewer women on their boards. In contrast, for firms with more women on their boards, geographical concentration appears to be a significant driver of increased firm risk. These results support our argument that firms with gender-diverse boards exhibit increased risk due to lower levels of overconfidence among women on boards, as evidenced by geographical concentration. As a result, these firms also tend to achieve superior performance.

[Insert Table 7 Here]

4.7. Robustness tests

We have conducted proper exogeneity and validity tests for instruments in the IV regressions. Still, as a robustness test, we perform our analyses using an alternative instrumental variable, Gay Rights, along with PEERS, as instruments for % Women in our IV estimations.

4.7.1. Performance robustness tests

In Table 8, we present the results for the effect of women on the board on firm performance using the IV regressions. In columns (1) and (3), we regress % Women on PEERS and Gay Rights (i.e., our instruments) and a set of control variables. We find that similar to our primary results, PEERS, and our new instrument Gay Rights used in place of GEI, are significantly and positively related to % Women.[11]

From the second stage IV results in columns (2) and (4), we find women on the board are positively and significantly associated with our performance measures, ROA and ROE at the

[11] For the remaining analyses, on average, we find PEERS and GEI to be positively related with % Women. Furthermore, the instruments meet the exogeneity and validity assumptions where we fail to reject the null hypothesis under the Sargan-Hansen test and reject the null hypothesis under the Anderson-canon test.

1% and 5% level, respectively. Economically, a 1% increase in women on the board increases ROA and ROE by 0.28% and 1.10%, respectively. Our findings are similar to our preliminary results and confirm that women on the board are indeed associated with superior firm performance.

[Insert Table 8 Here]

4.7.2. Firm risk robustness tests

Table 9 reports the results of the effect of women on the board on our firm risk measures. Using Gay Rights and PEERS as instruments for % Women, we find that women on the board are significantly and positively related to total and systematic volatility, both at the 5% level. With respect to economic significance, a 1% increase in women on the board results in a 1.5% and 1% increase in total and systematic volatility respectively.[12] These findings, although greater in magnitude, reinforce our initial findings that contrary to popular belief, board gender diversity has a positive effect on firm risk-taking behavior.

[Insert Table 9 Here]

4.7.3. Risk-adjusted returns robustness tests

Table 10 reports the results for the effect of women on the board on risk-adjusted returns using PEERS and Gay Rights as instruments for % Women. Our findings propose that gender diversity of the board is not associated with superior risk-adjusted performance, thereby validating our primary results.[13]

[Insert Table 10 Here]

4.7.4. Risk management strategy robustness tests

[12] We also compute systematic and idiosyncratic volatility using Fama & French (1993) three factor and Fama & French (1995) five factor models and find similar results (See Table A7 and Table A8 in the appendix).
[13] Alternatively, we compute Jensen's alpha using the Fama & French (1993) three factor and the Fama & French (1995) five factor models and find that our results still hold (See Table A9 in the appendix).

In Table 11, panel A, B, C, and D, present the results of our diversification measures. Our findings using PEERS and Gay Rights as instruments for % Women in our analyses are similar to our initial results, where women on the board increase the geographic concentration of a REITs asset portfolio. % Women is significantly and positively associated with HHI G and negatively with DIST, both at the 1% level. In terms of economic significance, a 1% increase in board gender diversity results in a 1.9% increase in HHI G (i.e., our primary geographic diversification measure). We do not find any evidence of property-type and tenant diversification.

[Insert Table 11 Here]

5. Conclusion

This study provides insights into the relationship between board gender diversity, firm performance, risk, and risk-adjusted returns in the context of US Equity Real Estate Investment Trusts (REITs). Using unique information disclosed by REITs, the study proposes reliable instrumental variables to address endogeneity concerns and examines the sources of firm risk associated with board gender diversity. The findings suggest that women on the board have a positive effect on firm performance, but they also increase firm risk, which is seemingly inconsistent with the risk-aversion theory. However, the study reveals that any incremental increase in risk due to board gender diversity is justified by the increase in performance, suggesting that board gender diversity promotes REITs to have higher-risk, higher-return profiles.

Moreover, the study finds that REITs with more women on the board tend to be geographically more focused (i.e., less diversified), and this concentration is a significant driver of increased firm risk. This finding suggests that women on boards exhibit lower levels of overconfidence, as evidenced by geographical concentration, leading to superior investment performance. The study's results are particularly relevant for policymakers, executives, and stakeholders seeking to understand the impact of board gender diversity on organizational outcomes.

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Table 1: Descriptive statistics

This table reports summary statistics for the sample over the period 2000 to 2018. All variables are defined in Table A1.

	N	Mean	Median	Std. Dev	Min	Max
Board characteristics						
% Women	2190	10.165	10.000	10.411	0.000	50.000
Board Size	2190	8.169	8.000	2.093	2.000	17.000
% Independent	2190	80.178	83.333	10.732	0.000	100.000
Duality	2190	0.449	0.000	0.497	0.000	1.000
CEO Tenure	2190	5.580	3.800	5.895	0.000	44.700
Firm characteristics						
Firm Age	1816	17.286	15.000	13.369	0.000	65.000
Ln(Assets)	2187	14.610	14.778	1.412	8.172	17.464
Leverage	2187	0.492	0.496	0.168	0.000	1.381
Performance variables						
MTB	1347	1.371	1.275	0.468	0.303	3.991
ROA	2174	2.745	2.692	1.930	-10.225	15.195
ROE	2160	4.335	4.949	11.765	-96.499	92.565
Risk variables						
TVOL	2166	0.260	0.209	0.192	0.010	2.187
SVOL	2166	0.123	0.099	0.110	0.002	1.327
IVOL	2166	0.137	0.107	0.125	0.000	2.061
Diversification variables						
HHI G	2093	0.204	0.133	0.203	0.007	1.000
DIST	2070	24.753	24.968	12.151	1.837	79.084
HHI P	2093	0.724	0.800	0.262	0.154	1.000
HHI T	1087	0.047	0.011	0.102	0.001	1.000
Risk-adjusted return variables						
Alpha RE	2166	0.008	0.007	0.152	-3.078	2.660

Table 2: Mean difference test

This table presents the results for the mean difference test of firms with and without women on the board. All variables are defined in Table A1.

	Firms with Women (1)		Firms without women (2)		Mean Difference
	N	Mean	N	Mean	(1) - (2)
Board characteristics					
Board Size	1279	8.696	911	7.430	1.266***
% Independent	1279	82.487	911	76.938	5.549***
Duality	1279	0.425	911	0.483	-0.058**
CEO Tenure	1279	5.610	911	5.539	0.070
Firm characteristics					
Firm Age	1033	20.007	783	13.697	6.309***
Ln(Assets)	1276	15.069	911	13.967	1.102***
Leverage	1276	0.494	911	0.489	0.004
Performance variables					
MTB	781	1.427	566	1.294	0.133***
ROA	1271	2.765	903	2.716	0.049
ROE	1268	5.397	892	2.826	2.571***
Risk variables					
TVOL	1272	0.246	894	0.280	-0.034***
SVOL	1272	0.122	894	0.124	-0.002
IVOL	1272	0.124	894	0.156	-0.032***
Diversification variables					
HHI G	1211	0.181	882	0.234	-0.053***
DIST	1191	25.795	879	23.342	2.453***
HHI P	1211	0.727	882	0.719	0.008
HHI T	643	0.045	444	0.051	-0.006
Risk-adjusted return variables					
Alpha RE	1272	0.006	894	0.012	-0.007

Table 3: Board gender diversity and firm performance

This table reports the results for the effect of percentage of women on the board on firm performance. Definitions of variables are provided in Table A1. Standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	ROA	% Women	ROA	ROE	% Women	ROE
% Women	0.011**		0.193***	0.035		0.841*
	(0.005)		(0.073)	(0.036)		(0.466)
PEERS		0.161**			0.162**	
		(0.064)			(0.064)	
GEI		0.152**			0.146**	
		(0.069)			(0.069)	
Board Size	-0.144***	0.354**	-0.227***	-0.200	0.369**	-0.582**
	(0.027)	(0.146)	(0.044)	(0.213)	(0.146)	(0.283)
% Independent	-0.012**	0.023	-0.009	0.028	0.016	0.028
	(0.005)	(0.026)	(0.007)	(0.037)	(0.026)	(0.041)
Duality	0.217**	0.102	0.173	0.623	0.065	0.439
	(0.088)	(0.477)	(0.119)	(0.700)	(0.478)	(0.747)
CEO Tenure	0.004	-0.048	0.009	0.128**	-0.045	0.144**
	(0.007)	(0.036)	(0.009)	(0.053)	(0.036)	(0.059)
Firm Age	-0.022**	0.929***	-0.231***	0.067	0.829***	-0.747*
	(0.011)	(0.070)	(0.079)	(0.079)	(0.064)	(0.454)
Ln(Assets)	0.303***	-1.559***	0.557***	0.491	-1.624***	1.800*
	(0.070)	(0.380)	(0.149)	(0.560)	(0.383)	(0.975)
Leverage	1.274***	-0.925	0.960**	-2.180	-1.202	-4.626*
	(0.296)	(1.654)	(0.414)	(2.365)	(1.669)	(2.631)
Constant	-0.945	-6.416	-0.181	-7.167	1.520	-11.282
	(0.951)	(7.344)	(1.296)	(7.415)	(7.165)	(9.070)
Observations	1802	1749	1749	1796	1746	1746
R^2	0.619		0.311	0.335		0.170
Anderson (p)			0.002			0.002
Sargan (p)			0.586			0.855
Firm FE	YES	YES	YES	YES	YES	YES
Time Effects	YES	YES	YES	YES	YES	YES
Regression type	OLS	IV (1^{st} stage)	IV (2^{nd} stage)	OLS	IV (1^{st} stage)	IV (2^{nd} stage)

Table 4: Board gender diversity and firm risk

This table presents the regression results for the effect of female boardroom representation on firm risk, where risk measures are obtained using the RE factor model. Results for the first-stage IV are presented in Table in the Appendix. Definitions of variables are provided in Table A1. Standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	TVOL	TVOL	SVOL	SVOL	IVOL	IVOL
% Women	0.001	0.011*	-0.000	0.007*	0.001**	0.004
	(0.001)	(0.006)	(0.000)	(0.004)	(0.000)	(0.003)
Board Size	0.001	-0.003	0.003	-0.001	-0.003	-0.002
	(0.004)	(0.005)	(0.003)	(0.003)	(0.003)	(0.003)
% Independent	0.001	0.001	0.000	0.000	0.001*	0.000
	(0.001)	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)
Duality	0.000	0.002	-0.001	0.001	0.002	0.002
	(0.014)	(0.014)	(0.009)	(0.010)	(0.010)	(0.009)
CEO Tenure	-0.002*	-0.001	-0.001*	-0.001	-0.001	0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)
Firm Age	-0.001	-0.011**	0.000	-0.007*	-0.002	-0.004
	(0.002)	(0.005)	(0.001)	(0.004)	(0.001)	(0.003)
Ln(Assets)	-0.007	0.005	-0.003	0.004	-0.003	0.001
	(0.010)	(0.012)	(0.007)	(0.008)	(0.007)	(0.008)
Leverage	0.049	0.055	0.008	0.013	0.042	0.044
	(0.044)	(0.052)	(0.029)	(0.035)	(0.031)	(0.032)
Constant	-0.077***	-0.083***	-0.024**	-0.036***	-0.058***	-0.052***
	(0.016)	(0.019)	(0.011)	(0.013)	(0.011)	(0.012)
MTB	-0.026***	-0.029***	-0.015***	-0.020***	-0.011***	-0.009***
	(0.004)	(0.004)	(0.002)	(0.003)	(0.003)	(0.003)
ROA	0.280**	0.262*	0.134	0.166*	0.172*	0.127
	(0.139)	(0.144)	(0.090)	(0.098)	(0.097)	(0.089)
Observations	1040	990	1040	990	1040	990
R^2	0.512	0.459	0.384	0.299	0.456	0.501
Anderson (p)		0.001		0.001		0.001
Sargan (p)		0.410		0.183		0.889
Firm FE	YES	YES	YES	YES	YES	YES
Time Effects	YES	YES	YES	YES	YES	YES
Regression type	OLS	IV (2^{nd} stage)	OLS	IV (2^{nd} stage)	OLS	IV (2^{nd} stage)

Table 5: Board gender diversity and risk-adjusted returns

This table reports results for the effect of board gender diversity on risk-adjusted returns, where risk-adjusted measure is obtained using the RE factor model. Definitions of variables are provided in Table A1. Standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% respectively.

	(1)	(2)	(3)
	Alpha RE	% Women	Alpha RE
% Women	-0.001		-0.002
	(0.001)		(0.006)
PEERS		0.202***	
		(0.064)	
GEI		0.133*	
		(0.070)	
Board Size	-0.001	0.390***	0.001
	(0.004)	(0.147)	(0.004)
% Independent	-0.000	0.020	-0.001
	(0.001)	(0.026)	(0.001)
Duality	0.000	0.242	0.001
	(0.012)	(0.484)	(0.012)
CEO Tenure	-0.000	-0.049	0.000
	(0.001)	(0.037)	(0.001)
Firm Age	0.002	0.787***	0.003
	(0.001)	(0.064)	(0.006)
Ln(Assets)	-0.019**	-1.441***	-0.019
	(0.009)	(0.385)	(0.013)
Leverage	-0.026	-2.218	-0.016
	(0.039)	(1.644)	(0.041)
Constant	0.283**	1.417	0.261**
	(0.125)	(7.184)	(0.130)
Observations	1804	1750	1750
R^2	0.061		0.135
Anderson (p)			0.001
Sargan (p)			0.160
Firm FE	YES	YES	YES
Time Effects	YES	YES	YES
Regression type	OLS	IV (1st stage)	IV (2nd stage)

Table 6: Board gender diversity and risk management strategies

This table reports the regression results for the effect of board gender diversity on measures of diversification. Panel A and B presents the results for geographic diversification measures. Panel C presents the results for property type diversification measure. Lastly, Panel D reports the results for tenant diversification measure. Definitions of variables are provided in Table A1. Standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% respectively.

Panel A and B

	Panel A: Geographic diversification			***Panel B: Distance to headquarters***		
	(1)	(2)	(3)	(4)	(5)	(6)
	HHI G	% Women	HHI G	DIST	% Women	DIST
% Women	0.000		0.008***	-0.009		-0.633***
	(0.000)		(0.003)	(0.014)		(0.185)
PEERS		0.210**			0.218**	
		(0.085)			(0.086)	
GEI		0.255***			0.245**	
		(0.097)			(0.096)	
Board Size	-0.004*	0.333	-0.006**	0.128	0.376*	0.364**
	(0.002)	(0.218)	(0.003)	(0.088)	(0.220)	(0.166)
% Independent	0.001***	0.061*	0.001	-0.032**	0.053	0.003
	(0.000)	(0.036)	(0.000)	(0.014)	(0.036)	(0.027)
Duality	0.000	-0.586	0.004	0.776***	-0.500	0.525
	(0.006)	(0.703)	(0.008)	(0.283)	(0.709)	(0.491)
CEO Tenure	-0.000	-0.077	0.000	0.037	-0.097*	-0.015
	(0.001)	(0.057)	(0.001)	(0.023)	(0.057)	(0.042)
Firm Age	-0.000	0.737***	-0.007**	0.135***	0.734***	0.721***
	(0.001)	(0.095)	(0.003)	(0.033)	(0.098)	(0.181)
Ln(Assets)	-0.019***	-1.081**	-0.011*	-0.162	-1.133**	-0.890**
	(0.005)	(0.526)	(0.006)	(0.211)	(0.527)	(0.420)
Leverage	-0.099***	-4.254*	-0.070**	2.772***	-5.065**	-0.319
	(0.021)	(2.350)	(0.027)	(0.940)	(2.373)	(1.851)
MTB	0.002	1.870**	-0.010	-0.631*	1.875**	0.407
	(0.008)	(0.849)	(0.010)	(0.341)	(0.855)	(0.659)
ROA	0.004**	0.299	0.001	-0.182**	0.293	0.077
	(0.002)	(0.195)	(0.002)	(0.077)	(0.197)	(0.153)
Constant	0.767***	-15.962	0.781***	15.358***	-14.64	15.354***
	(0.064)	(9.782)	(0.076)	(2.901)	(10.021)	(4.978)
Observations	996	996	996	982	982	982
R^2	0.931		0.905	0.967		0.904
Anderson (p)			0.001			0.000
Sargan (p)			0.114			0.000
Firm FE	YES	YES	YES	YES	YES	YES

Time Effects	YES	YES	YES	YES	YES	YES
Regression type	OLS	IV (1st stage)	IV (2nd stage)	OLS	IV (1st stage)	IV (2nd stage)

Panel C and D

	Panel C: Property type diversification			***Panel D: Tenant diversification***		
	(7)	(8)	(9)	(10)	(11)	(12)
	HHI P	% Women	HHI P	HHI T	% Women	HHI T
% Women	-0.001***		-0.006**	-0.000		0.001
	(0.000)		(0.003)	(0.000)		(0.002)
PEERS		0.222**			0.088	
		(0.086)			(0.139)	
GEI		0.247***			0.386***	
		(0.096)			(0.144)	
Board Size	-0.001	0.321	0.001	-0.001	0.281	-0.001
	(0.002)	(0.219)	(0.003)	(0.002)	(0.323)	(0.002)
% Independent	0.001***	0.058	0.002***	-0.000	-0.044	0.000
	(0.000)	(0.036)	(0.000)	(0.000)	(0.058)	(0.000)
Duality	0.011	-0.559	0.009	0.013**	-1.208	0.015***
	(0.008)	(0.702)	(0.008)	(0.006)	(0.940)	(0.005)
CEO Tenure	-0.000	-0.076	0.000	-0.000	-0.142*	0.000
	(0.001)	(0.056)	(0.001)	(0.000)	(0.077)	(0.000)
Firm Age	0.006***	0.704***	0.011***	0.002**	0.925***	0.001
	(0.001)	(0.105)	(0.003)	(0.001)	(0.169)	(0.002)
Ln(Assets)	-0.012**	-1.109**	-0.018**	-0.036***	-0.650	-0.034***
	(0.006)	(0.525)	(0.007)	(0.005)	(0.781)	(0.004)
Leverage	-0.092***	-4.017*	-0.112***	-0.070***	-2.674	-0.081***
	(0.027)	(2.388)	(0.029)	(0.025)	(4.523)	(0.023)
MTB	0.004	1.890**	0.012	0.002	-2.696*	-0.007
	(0.010)	(0.850)	(0.011)	(0.009)	(1.633)	(0.009)
ROA	0.005**	0.256	0.007***	-0.008***	1.223***	-0.006*
	(0.002)	(0.199)	(0.003)	(0.003)	(0.466)	(0.003)
Constant	0.998***	-19.156*	0.983***	0.568***	-21.245	0.566***
	(0.088)	(10.401)	(0.089)	(0.059)	(13.316)	(0.050)
Observations	996	996	996	538	515	515
R^2	0.927		0.926	0.804		0.759
Anderson (p)			0.001			0.011
Sargan (p)			0.040			0.578
Firm FE	YES	YES	YES	YES	YES	YES
Time Effects	YES	YES	YES	YES	YES	YES
Regression type	OLS	IV (1st stage)	IV (2nd stage)	OLS	IV (1st stage)	IV (2nd stage)

Table 7: Moderating effect of board gender diversity on the link between geographical concentration and firm risk

This table reports the result for the effect of geographic concentration on firm risk, with the moderating effect of women on the board. Panel A presents the results where the sample is split into top 30 (High), middle 40 (Mid), and bottom 30 (Low) percentiles based on women on the board. Panel B presents the results where the sample is split into above (High) and below (Low) median women on the board. Definitions of variables are provided in Table A1. Standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% respectively.

	Panel A			***Panel B***	
	(1)	(2)	(3)	(4)	(5)
	TVOL	TVOL	TVOL	TVOL	TVOL
	High	Mid	Low	High	Low
HHI G	0.292*	0.077	0.010	0.204*	0.030
	(0.162)	(0.182)	(0.139)	(0.122)	(0.110)
Board Size	0.018**	0.007	-0.016	0.009*	0.000
	(0.007)	(0.007)	(0.011)	(0.005)	(0.007)
% Independent	-0.000	-0.002*	0.003*	-0.001	0.001
	(0.001)	(0.001)	(0.002)	(0.001)	(0.001)
Duality	-0.008	0.051**	-0.018	-0.008	-0.004
	(0.023)	(0.023)	(0.035)	(0.017)	(0.024)
CEO Tenure	0.000	-0.003	-0.003	-0.001	-0.004*
	(0.002)	(0.002)	(0.003)	(0.001)	(0.002)
Firm Age	-0.006**	0.006**	-0.009**	-0.002	0.001
	(0.002)	(0.003)	(0.004)	(0.002)	(0.003)
Ln(Assets)	0.031*	-0.035*	0.024	0.016	-0.007
	(0.017)	(0.019)	(0.024)	(0.014)	(0.017)
Leverage	0.148**	0.092	-0.180	0.154***	-0.127
	(0.071)	(0.088)	(0.123)	(0.056)	(0.082)
MTB	-0.008	-0.099***	-0.048	-0.026	-0.144***
	(0.026)	(0.029)	(0.045)	(0.021)	(0.030)
ROA	-0.018***	-0.019**	-0.053***	-0.019***	-0.035***
	(0.006)	(0.008)	(0.008)	(0.005)	(0.006)
Constant	-0.478*	0.609**	0.203	-0.202	0.359*
	(0.255)	(0.302)	(0.281)	(0.203)	(0.200)
Observations	269	415	307	463	527
R^2	0.618	0.566	0.537	0.538	0.513
Firm FE	YES	YES	YES	YES	YES
Time Effects	YES	YES	YES	YES	YES

Table 8: Board gender diversity and firm performance robustness tests

This table presents the results for the effect of board gender diversity on firm performance. PEERS and Gay Rights are used as instruments for % Women. Definitions of variables are provided in Table A1. Standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% respectively.

	(1)	(2)	(3)	(4)
	% Women	ROA	% Women	ROE
% Women		0.284***		1.103**
		(0.085)		(0.476)
PEERS	0.165***		0.166***	
	(0.064)		(0.064)	
Gay Rights	0.222***		0.206**	
	(0.085)		(0.085)	
Board Size	0.372**	-0.258***	0.386***	-0.677**
	(0.146)	(0.055)	(0.146)	(0.302)
% Independent	0.019	-0.011	0.012	0.023
	(0.026)	(0.008)	(0.026)	(0.045)
Duality	0.084	0.160	0.048	0.411
	(0.477)	(0.151)	(0.478)	(0.814)
CEO Tenure	-0.046	0.013	-0.043	0.154**
	(0.036)	(0.012)	(0.036)	(0.064)
Firm Age	0.960***	-0.327***	0.857***	-0.999**
	(0.069)	(0.092)	(0.063)	(0.465)
Ln(Assets)	-1.566***	0.699***	-1.630***	2.234**
	(0.380)	(0.181)	(0.383)	(1.022)
Leverage	-0.566	1.027*	-0.859	-4.366
	(1.647)	(0.525)	(1.661)	(2.863)
Constant	-9.597	-0.329	-0.971	-13.798
	(7.590)	(1.645)	(7.394)	(9.743)
Observations	1749	1749	1746	1746
R^2		0.698		0.200
Anderson (p)		0.001		0.001
Sargan (p)		0.507		0.666
Firm FE	YES	YES	YES	YES
Time Effects	YES	YES	YES	YES
Regression type	IV (1st stage)	IV (2nd stage)	IV (1st stage)	IV (2nd stage)

Table 9: Board gender diversity and firm risk robustness tests

This table presents the results for the effect of board gender diversity on firm risk, with risk computed using the RE factor model. PEERS and Gay Rights are used as instruments for % Women. Definitions of variables are provided in Table A1. Standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	% Women	TVOL	% Women	SVOL	% Women	IVOL
% Women		0.015**		0.010**		0.006
		(0.007)		(0.004)		(0.004)
PEERS	0.220***		0.219***		0.220***	
	(0.085)		(0.085)		(0.085)	
Gay Rights	0.252**		0.249**		0.253**	
	(0.116)		(0.116)		(0.116)	
Board Size	0.335	-0.004	0.331	-0.002	0.348	-0.003
	(0.220)	(0.005)	(0.220)	(0.004)	(0.220)	(0.003)
% Independent	0.056	0.000	0.057	0.000	0.056	0.000
	(0.036)	(0.001)	(0.036)	(0.001)	(0.036)	(0.001)
Duality	-0.398	0.003	-0.409	0.002	-0.394	0.003
	(0.707)	(0.016)	(0.707)	(0.011)	(0.707)	(0.009)
CEO Tenure	-0.075	-0.001	-0.073	-0.001	-0.076	0.000
	(0.056)	(0.001)	(0.056)	(0.001)	(0.056)	(0.001)
Firm Age	0.783***	-0.014**	0.786***	-0.009**	0.782***	-0.006
	(0.093)	(0.006)	(0.093)	(0.004)	(0.093)	(0.004)
Ln(Assets)	-1.064**	0.010	-1.062**	0.007	-1.066**	0.003
	(0.528)	(0.014)	(0.528)	(0.009)	(0.529)	(0.008)
Leverage	-3.283	0.070	-3.190	0.022	-3.444	0.051
	(2.347)	(0.057)	(2.350)	(0.039)	(2.345)	(0.034)
MTB	1.458*	-0.088***	1.449*	-0.039***	1.563*	-0.055***
	(0.868)	(0.021)	(0.866)	(0.014)	(0.863)	(0.013)
ROA	0.243	-0.030***	0.242	-0.021***	0.250	-0.010***
	(0.197)	(0.005)	(0.197)	(0.003)	(0.197)	(0.003)
Constant	-13.763	0.268*	-13.793	0.170	-14.023	0.130
	(10.075)	(0.157)	(10.070)	(0.106)	(10.080)	(0.093)
Observations	990	990	990	990	990	990
R^2		0.351		0.175		0.460
Anderson (p)		0.001		0.001		0.001
Sargan (p)		0.911		0.465		0.480
Firm FE	YES	YES	YES	YES	YES	YES
Time Effects	YES	YES	YES	YES	YES	YES
Regression type	IV (1^{st} stage)	IV (2^{nd} stage)	IV (1^{st} stage)	IV (2^{nd} stage)	IV (1^{st} stage)	IV (2^{nd} stage)

Table 10: Board gender diversity and risk-adjusted returns robustness tests

This table reports the results for the effect of board gender diversity on risk-adjusted returns, with risk-adjusted returns computed using the RE factor model. PEERS and Gay Rights are used as instruments for % Women. Definitions of variables are provided in Table A1. Standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% respectively.

	(1)	(2)
	% Women	Alpha RE
% Women		0.000
		(0.006)
PEERS	0.207***	
	(0.064)	
Gay Rights	0.195**	
	(0.085)	
Board Size	0.406***	0.000
	(0.148)	(0.004)
% Independent	0.016	-0.001
	(0.026)	(0.001)
Duality	0.227	0.000
	(0.484)	(0.012)
CEO Tenure	-0.047	0.000
	(0.037)	(0.001)
Firm Age	0.813***	0.002
	(0.063)	(0.006)
Ln(Assets)	-1.450***	-0.017
	(0.384)	(0.013)
Leverage	-1.914	-0.013
	(1.634)	(0.041)
Constant	-1.238	0.249*
	(7.379)	(0.129)
Observations	1750	1750
R^2		0.139
Anderson (p)		0.000
Sargan (p)		0.108
Firm FE	YES	YES
Time Effects	YES	YES
Regression type	IV (1^{st} stage)	IV (2^{nd} stage)

Table 11: Risk management strategy robustness tests

This table reports the results for the effect of board gender diversity on measures of diversification. PEERS and Gay Rights are used as instruments for % Women. Panel A and B report results for the geographic diversification measures, Panel C reports the results for property type diversification measure, and Panel D reports the results for tenant diversification measure. Definitions of variables are provided in Table A1. Standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% respectively.

Panel A and B

	Panel A: Geographic diversification		***Panel B: Distance to headquarters***	
	(1)	(2)	(3)	(4)
	% Women	HHI G	% Women	DIST
% Women		0.019***		-0.753***
		(0.006)		(0.226)
PEERS	0.224***		0.231***	
	(0.085)		(0.086)	
Gay Rights	0.258**		0.254**	
	(0.117)		(0.116)	
Board Size	0.341	-0.010**	0.387*	0.410**
	(0.219)	(0.005)	(0.221)	(0.192)
% Independent	0.055	0.000	0.048	0.010
	(0.036)	(0.001)	(0.036)	(0.031)
Duality	-0.592	0.010	-0.505	0.476
	(0.704)	(0.014)	(0.710)	(0.561)
CEO Tenure	-0.070	0.001	-0.091	-0.024
	(0.056)	(0.001)	(0.057)	(0.048)
Firm Age	0.781***	-0.018***	0.776***	0.834***
	(0.094)	(0.005)	(0.097)	(0.220)
Ln(Assets)	-1.068**	0.002	-1.122**	-1.030**
	(0.526)	(0.012)	(0.528)	(0.488)
Leverage	-3.472	-0.023	-4.296*	-0.914
	(2.341)	(0.050)	(2.362)	(2.148)
MTB	1.798**	-0.030	1.808**	0.607
	(0.851)	(0.019)	(0.857)	(0.764)
ROA	0.269	-0.004	0.261	0.126
	(0.197)	(0.004)	(0.199)	(0.178)
Constant	-13.900	0.803***	-12.924	15.353***
	(10.061)	(0.137)	(10.289)	(5.677)
Observations	996	996	982	982
R^2		0.687		0.875
Anderson (p)		0.001		0.001
Sargan (p)		0.001		0.000
Firm FE	YES	YES	YES	YES
Time Effects	YES	YES	YES	YES

Regression type	IV (1st stage)	IV (2nd stage)	IV (1st stage)	IV (2nd stage)

Panel C and D

	Panel C: Property type diversification		***Panel D: Tenant diversification***	
	(5)	(6)	(7)	(8)
	% Women	HHI P	% Women	HHI T
% Women		-0.001		0.002
		(0.003)		(0.003)
PEERS	0.238***		0.100	
	(0.086)		(0.140)	
Gay Rights	0.259**		0.381**	
	(0.117)		(0.193)	
Board Size	0.329	-0.001	0.282	-0.001
	(0.219)	(0.002)	(0.324)	(0.002)
% Independent	0.053	0.001***	-0.053	0.000
	(0.036)	(0.000)	(0.058)	(0.000)
Duality	-0.571	0.012	-1.251	0.017***
	(0.703)	(0.007)	(0.944)	(0.006)
CEO Tenure	-0.070	0.000	-0.139*	0.000
	(0.056)	(0.001)	(0.078)	(0.001)
Firm Age	0.739***	0.006**	1.005***	-0.001
	(0.104)	(0.003)	(0.165)	(0.003)
Ln(Assets)	-1.096**	-0.012*	-0.751	-0.033***
	(0.526)	(0.006)	(0.785)	(0.005)
Leverage	-3.171	-0.091***	-1.966	-0.078***
	(2.377)	(0.027)	(4.537)	(0.026)
MTB	1.829**	0.003	-2.587	-0.003
	(0.852)	(0.010)	(1.639)	(0.011)
ROA	0.219	0.005**	1.182**	-0.008*
	(0.201)	(0.002)	(0.469)	(0.004)
Constant	-18.148*	0.999***	-17.859	0.563***
	(10.861)	(0.081)	(14.372)	(0.055)
Observations	996	996	515	515
R^2		0.938		0.716
Anderson (p)		0.001		0.079
Sargan (p)		0.825		0.516
Firm FE	YES	YES	YES	YES
Time Effects	YES	YES	YES	YES
Regression type	IV (1st stage)	IV (2nd stage)	IV (1st stage)	IV (2nd stage)

Appendix A

Table A1: Variable description

Variable	Definition	Source
Board characteristics		
% Women	The percentage of women on the board in a fiscal year.	Boardex
Board Size	The number of directors on the board in a fiscal year.	Boardex
% Independent	The percentage of independent directors on the board in a fiscal year.	Boardex
Duality	A dummy equal to one if CEO is also the chairman of the board and zero otherwise in a fiscal year.	Boardex
CEO Tenure	The number of years since the CEO's position in a fiscal year.	Boardex
Firm characteristics		
Firm Age	The number of years since the firm has been listed on the stock exchange in a fiscal year.	S&P Capital IQ
Ln(Assets)	The natural logarithm of book value of assets in a fiscal year.	S&P Capital IQ
Leverage	The ratio of total debt divided by total assets in a fiscal year.	S&P Capital IQ
Performance variables		
MTB	Market value of total assets divided by the book value of total assets in a fiscal year.	Compustat
ROA	The percentage of net income divided by total assets in a fiscal year.	S&P Capital IQ
ROE	The percentage of net income to shareholders equity in a fiscal year.	S&P Capital IQ
Risk variables		
IVOL	Standard deviation of the residuals times the square root of 52 in a fiscal year obtained by regressing the monthly excess returns on Fama and French three factor, five factor, and a real estate factor model.	CRSP
SVOL	Obtained by subtracting IVOL from TVOL in a fiscal year.	CRSP
TVOL	Standard deviation of the monthly excess returns times the square root of 52 in a fiscal year.	CRSP
Diversification variables		
HHI G	Herfindahl index as a measure of geographic diversification in a fiscal year.	S&P Capital IQ
DIST	Square root of distance of properties to headquarters divided by the total number of properties in a fiscal year.	S&P Capital IQ
HHI P	Herfindahl index as a measure of property type diversification in a fiscal year.	S&P Capital IQ
HHI T	Herfindahl index as a measure of tenant diversification computed using the top 30 tenants in a fiscal year.	S&P Capital IQ
Risk-adjusted return variables		
Alpha 3	The alpha coefficient obtained by regressing the monthly excess returns on Fama and French three factors in a fiscal year.	CRSP
Alpha 5	The alpha coefficient obtained by regressing the monthly excess returns on Fama and French five factors in a fiscal year.	CRSP
Alpha RE	The alpha coefficient obtained by regressing the monthly excess returns on Fama and French three factors with an additional real estate factor in a fiscal year.	CRSP

Table A2: Gender Equality Index indicators

Variables	Description
Economic Sphere	
Civilian labor force participation	Percentage of women relative to men in the labor force.
Civilian labor force in managerial and administrative positions	Percentage of women in managerial and administrative positions relative to men in non-farm occupations.
Civilian labor force members rates of employment	Percentage of employed women relative to men in the labor force.
Median income	Median income of full-time female workers relative to men.
Political Sphere	
State house offices held	Percentage of members of state house who are women relative to men.
State senate offices held	Percentage of members of state senate who are women relative to men.
Legal Sphere	
Fair Employment Practices Law	State has passed the Fair Employment Practices Act.
Fair Employment Personal Suits	Women can personally file a law suit under the state's Fair Employment Practices Act.
Equal Pay Law	State has passed Equal Pay Laws.
Equal Pay Personal Suits	Women can personally file a law suit under equal pay laws.
Public Accommodation Law	States have sex discrimination laws in public accommodations.
Housing Law	States have sex discrimination laws in housing.
Financing Law	States have sex discrimination laws in areas of financing.
Education Law	States have sex discrimination laws in education.
Civil relief for victims	Statutes that provide civil relief to victims who have been through abuse.
Abuse a crime	Statutes that define physical abuse as a criminal offense of a family member.
Warrantless Arrests	Statutes which allow warrantless arrests on probable cause of domestic violence.
Mandatory Reporting	Statutes which require reporting of family violence by relevant agencies.
Funds for shelters	Statutes that provide funds for shelters of family violence victims.
Paid Leave	Statutes which provide maternity paid leave for women.

Table A3

Board gender diversity and firm risk: First-stage IV results. This table reports the results for the effect of the instrumental variables and a set of control variables on the percentage of women on the board. Definitions of variables are provided in Table A1. Standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% respectively.

	(1)	(2)	(3)
	% Women	% Women	% Women
	TVOL	SVOL	IVOL
PEERS	0.207**	0.206**	0.207**
	(0.085)	(0.085)	(0.085)
GEI	0.242**	0.239**	0.244**
	(0.096)	(0.096)	(0.096)
Board Size	0.327	0.323	0.340
	(0.219)	(0.219)	(0.219)
% Indpendent	0.062*	0.062*	0.061*
	(0.036)	(0.036)	(0.036)
Duality	-0.393	-0.404	-0.389
	(0.706)	(0.706)	(0.707)
CEO Tenure	-0.081	-0.079	-0.083
	(0.056)	(0.056)	(0.056)
Firm Age	0.741***	0.745***	0.740***
	(0.094)	(0.094)	(0.094)
Ln(Assets)	-1.078**	-1.075**	-1.080**
	(0.528)	(0.528)	(0.528)
Leverage	-4.052*	-3.955*	-4.213*
	(2.361)	(2.364)	(2.358)
Constant	1.540*	1.532*	1.638*
	(0.866)	(0.865)	(0.861)
MTB	0.274	0.273	0.280
	(0.195)	(0.195)	(0.195)
ROA	-15.331	-15.328	-15.733
	(9.821)	(9.816)	(9.820)
Observations	990	990	990
Firm FE	YES	YES	YES
Time Effects	YES	YES	YES
Regression type	IV (1^{st} stage)	IV (1^{st} stage)	IV (1^{st} stage)

Table A4: Board gender diversity and firm risk: Fama and French three factor model

This table reports the results for the effect of board gender diversity on firm risk, with risk computed using the Fama and French three factor model. Risk is measured as systematic and idiosyncratic volatility respectively. Definitions of variables are provided in Table A1. Standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	SVOL	% Women	SVOL	IVOL	% Women	IVOL
% Women	-0.000		0.005*	0.001*		0.006
	(0.000)		(0.003)	(0.001)		(0.004)
PEERS		0.209**			0.206**	
		(0.085)			(0.085)	
GEI		0.243**			0.241**	
		(0.096)			(0.096)	
Board Size	0.002	0.326	0.000	-0.002	0.336	-0.003
	(0.002)	(0.219)	(0.002)	(0.003)	(0.219)	(0.003)
% Independent	0.000	0.061*	0.000	0.001*	0.061*	0.001
	(0.000)	(0.036)	(0.000)	(0.001)	(0.036)	(0.001)
Duality	0.001	-0.382	0.002	-0.001	-0.403	-0.001
	(0.007)	(0.706)	(0.007)	(0.011)	(0.707)	(0.010)
CEO Tenure	-0.001**	-0.081	-0.001	-0.001	-0.081	0.000
	(0.001)	(0.056)	(0.001)	(0.001)	(0.056)	(0.001)
Firm Age	0.001	0.748***	-0.004	-0.002**	0.740***	-0.007*
	(0.001)	(0.094)	(0.003)	(0.001)	(0.094)	(0.004)
Ln(Assets)	-0.010*	-1.083**	-0.005	0.003	-1.075**	0.010
	(0.005)	(0.528)	(0.006)	(0.008)	(0.528)	(0.009)
Leverage	0.012	-4.004*	0.013	0.039	-4.142*	0.044
	(0.022)	(2.360)	(0.026)	(0.034)	(2.361)	(0.037)
MTB	-0.025***	1.438	-0.032***	-0.053***	1.669*	-0.051***
	(0.008)	(0.874)	(0.010)	(0.012)	(0.857)	(0.014)
ROA	-0.010***	0.273	-0.012***	-0.017***	0.279	-0.016***
	(0.002)	(0.195)	(0.002)	(0.003)	(0.195)	(0.003)
Constant	0.175**	-15.600	0.195***	0.123	-15.513	0.090
	(0.069)	(9.800)	(0.072)	(0.107)	-9.835	-0.103
Observations	1040	990	990	1040	990	990
R^2	0.438		0.412	0.417		0.424
Anderson (p)			0.000			0.001
Sargan (p)			0.850			0.293
Firm FE	YES	YES	YES	YES	YES	YES
Time Effects	YES	YES	YES	YES	YES	YES
Regression type	OLS	IV (1^{st} stage)	IV (2^{nd} stage)	OLS	IV (1^{st} stage)	IV (2^{nd} stage)

Table A5: Board gender diversity and firm risk: Fama and French five factor model

This table presents the results for the impact of board gender diversity on firm risk, with risk computed using the Fama and French five factor model. Risk is measured as systematic and idiosyncratic volatility. Definitions of variables are provided in Table A1. Standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	SVOL	% Women	SVOL	IVOL	% Women	IVOL
% Women	-0.000		0.005	0.001**		0.006
	(0.000)		(0.003)	(0.000)		(0.004)
PEERS		0.207**			0.207**	
		(0.085)			(0.085)	
GEI		0.243**			0.241**	
		(0.096)			(0.096)	
Board Size	0.003	0.323	0.000	-0.003	0.339	-0.003
	(0.002)	(0.219)	(0.003)	(0.003)	(0.219)	(0.003)
% Independent	0.000	0.061*	0.000	0.001**	0.061*	0.001
	(0.000)	(0.036)	(0.000)	(0.000)	(0.036)	(0.001)
Duality	0.004	-0.392	0.004	-0.003	-0.398	-0.002
	(0.008)	(0.706)	(0.008)	(0.010)	(0.707)	(0.010)
CEO Tenure	-0.001**	-0.081	-0.001	-0.001	-0.081	0.000
	(0.001)	(0.056)	(0.001)	(0.001)	(0.056)	(0.001)
Firm Age	0.001	0.750***	-0.004	-0.003**	0.737***	-0.007*
	(0.001)	(0.094)	(0.003)	(0.001)	(0.095)	(0.004)
Ln(Assets)	-0.011*	-1.080**	-0.006	0.004	-1.076**	0.011
	(0.006)	(0.528)	(0.007)	(0.007)	(0.528)	(0.008)
Leverage	0.018	-4.034*	0.017	0.032	-4.133*	0.041
	(0.025)	(2.360)	(0.029)	(0.032)	(2.361)	(0.035)
MTB	-0.024***	1.460*	-0.034***	-0.053***	1.676*	-0.050***
	(0.009)	(0.872)	(0.011)	(0.012)	(0.856)	(0.013)
ROA	-0.012***	0.273	-0.015***	-0.014***	0.279	-0.013***
	(0.002)	(0.195)	(0.002)	(0.003)	(0.195)	(0.003)
Constant	0.211***	-15.664	0.237***	0.084	-15.444	0.047
	(0.078)	(9.799)	(0.080)	(0.101)	(9.843)	(0.096)
Observations	1040	990	990	1040	990	990
R^2	0.450		0.434	0.398		0.403
Anderson (p)			0.000			0.001
Sargan (p)			0.433			0.517
Firm FE	YES	YES	YES	YES	YES	YES
Time Effects	YES	YES	YES	YES	YES	YES
Regression type	OLS	IV (1^{st} stage)	IV (2^{nd} stage)	OLS	IV (1^{st} stage)	IV (2^{nd} stage)

Table A6: Board gender diversity and risk-adjusted returns: Fama and French three factor and five factor model

This table reports the results for the effect of board gender diversity on risk-adjusted returns, with risk-adjusted returns computed using the Fama and French three and five factor models. Definitions of variables are provided in Table A1. Standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% respectively.

	(1)	(2)	(3)	(4)	(5)	(6)
	Alpha 3	% Women	Alpha 3	Alpha 5	% Women	Alpha 5
% Women	0.000		0.005	0.000		0.003
	(0.000)		(0.004)	(0.001)		(0.005)
PEERS		0.204***			0.205***	
		(0.064)			(0.064)	
GEI		0.134*			0.134*	
		(0.070)			(0.070)	
Board Size	-0.001	0.390***	-0.002	-0.002	0.390***	-0.002
	(0.002)	(0.147)	(0.003)	(0.003)	(0.147)	(0.004)
% Independent	-0.000	0.021	-0.000	0.000	0.020	-0.000
	(0.000)	(0.026)	(0.000)	(0.001)	(0.026)	(0.001)
Duality	0.012	0.240	0.010	0.029***	0.238	0.029***
	(0.008)	(0.484)	(0.008)	(0.010)	(0.484)	(0.010)
CEO Tenure	-0.001	-0.049	-0.000	-0.001	-0.049	-0.001
	(0.001)	(0.037)	(0.001)	(0.001)	(0.037)	(0.001)
Firm Age	-0.000	0.785***	-0.004	-0.002	0.780***	-0.004
	(0.001)	(0.064)	(0.004)	(0.001)	(0.065)	(0.005)
Ln(Assets)	-0.003	-1.444***	0.006	0.005	-1.447***	0.011
	(0.006)	(0.385)	(0.009)	(0.008)	(0.385)	(0.011)
Leverage	-0.014	-2.219	0.007	0.029	-2.220	0.049
	(0.025)	-1.644	-0.027	(0.033)	(1.643)	(0.035)
Constant	0.083	1.46	0.015	-0.013	1.769	-0.075
	(0.080)	(7.185)	(0.086)	(0.106)	(7.195)	(0.112)
Observations	1804	1750	1750	1804	1750	1750
R^2	0.259		0.268	0.224		0.285
Anderson (p)			0.001			0.000
Sargan (p)			0.845			0.346
Firm FE	YES	YES	YES	YES	YES	YES
Time Effects	YES	YES	YES	YES	YES	YES
Regression type	OLS	IV (1^{st} stage)	IV (2^{nd} stage)	OLS	IV (1^{st} stage)	IV (2^{nd} stage)

Table A7: Board gender diversity and firm risk: alternative test 1.

This table presents the results for the impact of board gender diversity on firm risk, with risk computed using Fama and French three factor model, and with PEERS and Gay Rights as instruments for % Women. Risk is measured as systematic and idiosyncratic volatility. Definitions of variables are provided in Table A1. Standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% respectively.

	(1)	(2)	(3)	(4)
	% Women	SVOL	% Women	IVOL
% Women		0.005*		0.009**
		(0.003)		(0.005)
PEERS	0.221***		0.218**	
	(0.085)		(0.085)	
Gay Rights	0.254**		0.250**	
	(0.116)		(0.116)	
Board Size	0.334	-0.001	0.343	-0.004
	(0.220)	(0.002)	(0.220)	(0.004)
% Independent	0.056	0.000	0.056	0.000
	(0.036)	(0.000)	(0.036)	(0.001)
Duality	-0.386	0.003	-0.408	0.000
	(0.707)	(0.007)	(0.707)	(0.011)
CEO Tenure	-0.074	-0.001	-0.075	0.000
	(0.056)	(0.001)	(0.056)	(0.001)
Firm Age	0.790***	-0.005	0.780***	-0.010**
	(0.093)	(0.003)	(0.094)	(0.004)
Ln(Assets)	-1.070**	-0.004	-1.061**	0.014
	(0.528)	(0.007)	(0.529)	(0.010)
Leverage	-3.233	0.015	-3.377	0.057
	(2.347)	(0.027)	(2.347)	(0.041)
MTB	1.357	-0.033***	1.591*	-0.056***
	(0.875)	(0.010)	(0.858)	(0.015)
ROA	0.242	-0.013***	0.248	-0.018***
	(0.197)	(0.002)	(0.197)	(0.004)
Constant	-14.032	0.196***	-13.842	0.096
	(10.062)	(0.074)	(10.087)	(0.112)
Observations	990	990	990	990
R^2		0.373		0.314
Anderson (p)		0.001		0.001
Sargan (p)		0.929		0.842
Firm FE	YES	YES	YES	YES
Time Effects	YES	YES	YES	YES
Regression type	IV (1^{st} stage)	IV (2^{nd} stage)	IV (1^{st} stage)	IV (2^{nd} stage)

Table A8: Board gender diversity and firm risk: alternative test 2

This table presents the results for the impact of board gender diversity on firm risk, with risk computed using Fama and French five factor model, and with PEERS and Gay Rights as instruments for % Women. Risk is measured as systematic and idiosyncratic volatility. Definitions of variables are provided in Table A1. Standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% respectively.

	(1)	(2)	(3)	(4)
	% Women	SVOL	% Women	IVOL
% Women		0.007**		0.008*
		(0.004)		(0.004)
PEERS	0.220***		0.220***	
	(0.085)		(0.085)	
Gay Rights	0.254**		0.249**	
	(0.116)		(0.116)	
Board Size	0.33	-0.001	0.346	-0.003
	(0.220)	(0.003)	(0.220)	(0.003)
% Independent	0.056	0.000	0.056	0.000
	(0.036)	(0.000)	(0.036)	(0.001)
Duality	-0.397	0.005	-0.403	-0.002
	(0.707)	(0.009)	(0.707)	(0.010)
CEO Tenure	-0.075	-0.001	-0.075	0.000
	(0.056)	(0.001)	(0.056)	(0.001)
Firm Age	0.792***	-0.006*	0.778***	-0.009**
	(0.093)	(0.004)	(0.094)	(0.004)
Ln(Assets)	-1.067**	-0.003	-1.062**	0.013
	(0.528)	(0.008)	(0.529)	(0.009)
Leverage	-3.262	0.025	-3.369	0.048
	(2.346)	(0.032)	(2.347)	(0.037)
MTB	1.377	-0.037***	1.599*	-0.053***
	(0.874)	(0.012)	(0.858)	(0.014)
ROA	0.242	-0.016***	0.248	-0.014***
	(0.197)	(0.003)	(0.197)	(0.003)
Constant	-14.126	0.241***	-13.743	0.050
	(10.061)	(0.087)	(10.094)	(0.101)
Observations	990	990	990	990
R^2		0.326		0.341
Anderson (p)		0.001		0.001
Sargan (p)		0.945		0.889
Firm FE	YES	YES	YES	YES
Time Effects	YES	YES	YES	YES
Regression type	IV (1^{st} stage)	IV (2^{nd} stage)	IV (1^{st} stage)	IV (2^{nd} stage)

Table A9: Board gender diversity and risk-adjusted returns: alternative test

This table reports the results for the effect of board gender diversity on risk-adjusted returns, with risk-adjusted returns computed using Fama and French three factor and five factor models. PEERS and Gay Rights are used as instruments for % Women. Definitions of variables are provided in Table A1. Standard errors are reported in parentheses. ***, **, and * denote statistical significance at the 1%, 5%, and 10% respectively.

	(1)	(2)	(3)	(4)
	% Women	Alpha 3	% Women	Alpha 5
% Women		0.003		0.001
		(0.004)		(0.005)
PEERS	0.209***		0.210***	
	(0.064)		(0.064)	
Gay Rights	0.195**		0.197**	
	(0.085)		(0.085)	
Board Size	0.406***	-0.001	0.407***	-0.001
	(0.148)	(0.003)	(0.148)	(0.004)
% Independent	0.016	-0.000	0.016	-0.000
	(0.026)	(0.000)	(0.026)	(0.001)
Duality	0.225	0.011	0.223	0.029***
	(0.484)	(0.007)	(0.484)	(0.010)
CEO Tenure	-0.047	-0.000	-0.047	-0.001
	(0.037)	(0.001)	(0.037)	(0.001)
Firm Age	0.811***	-0.003	0.806***	-0.003
	(0.063)	(0.004)	(0.063)	(0.005)
Ln(Assets)	-1.452***	0.004	-1.455***	0.009
	(0.384)	(0.008)	(0.384)	(0.011)
Leverage	-1.911	0.004	-1.916	0.045
	-1.634	-0.026	(1.633)	(0.034)
Constant	-1.188	0.026	-0.917	-0.062
	(7.385)	(0.083)	(7.389)	(0.110)
Observations	1750	1750	1750	1750
R^2		0.299		0.294
Anderson (p)		0.000		0.000
Sargan (p)		0.482		0.194
Firm FE	YES	YES	YES	YES
Time Effects	YES	YES	YES	YES
Regression type	IV (1^{st} stage)	IV (2^{nd} stage)	IV (1^{st} stage)	IV (2^{nd} stage)