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Females on Boards and Default Risk in the Chinese Real Estate Industry

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This study examines the relationship between female directors on boards and default risk in the Chinese real estate industry. While gender diversity is commonly viewed as an effective governance tool in boards to lower the risk of general market firms, we find that there is little influence with female directors in mitigating the default risk in our sample Chinese real estate firms. Nonetheless, once we partition our sample firms into state-owned enterprises (SOEs) and non-state-owned enterprises (non-SOEs), we observe a significant influence of female directors in lowering the default risk of non-SOEs. We further find that the significant relationship between female board representation and default risk in non-SOEs is attributed to non-SOE firms with high financial constraints and a critical mass of female directors. Our results are robust with a matched sample design, an instrumental variable approach, alternative measures of key variables, and inclusion of additional controls. Overall, our findings highlight the particular circumstances in which board gender diversity is effective in mitigating default risk in the unique environment of the Chinese real estate industry.

Keywords

Female directors, Board gender diversity, Default risk, Chinese real estate, SOEs and Non-SOEs

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1. Introduction

With the call for gender equality, many nations have introduced boardroom quotas that require female representation. As more women have broken the glass ceiling and become the decision-makers in various industries, the impacts that they may have on companies have attracted vast academic interest. Female directors are shown to have enriched the diversity of expertise and occupational background in the boardroom (Hillman et al., 2002; Kim and Starks, 2016). Besides, females are intrinsically different from males in terms of values and personality. The extant literature shows that women are more risk averse, less overconfident, and more ethically sensitive than men (for e.g., Barber and Odean (2001); Hudgens and Fatkin (1985); Kelley et al. (1990); Sexton and Bowman-Upton (1990)). Both professional and personality differences may influence board decisions and organization outcomes. Previous studies generally find that firms with greater board gender diversity are associated with less risk-taking behaviors, less fraud-committing activities, higher board effectiveness, greater transparency, higher firm value, and better environmental, social, governance (ESG) performance, thus indicating that female directors do indeed play a crucial role in firm governance (for e.g., Adams and Ferreira (2009); Faccio et al. (2016); Gul et al. (2011); Kim and Starks (2016); Levi et al. (2014); Romano et al. (2020); Wang et al. (2022)).

Unfortunately, women decision-makers are still underrepresented, especially in certain traditionally male-dominated industries. For instance, Adams and Kirchmaier (2016) show that board gender diversity is generally lower in the finance and science, technology, engineering, and math (STEM) industries. For the real estate sector, the World Economic Forum (2022) reports that the real estate industry continues to be dominated by men, with only 29% of leadership positions (director, vice-president (VP), chief experience officer (CXO), and partner) held by women. A 2020 survey by Real Estate Balance (2022) shows that the percentage of women in the real estate industry at senior levels in the United Kingdom (UK) has declined sharply. The reason why real estate firms have less female representation could be that the industry is more traditional, and the culture is not that supportive of gender equality. According to the survey, real estate employees consider culture to be one of the biggest challenges to achieving gender equality in this industry.

The gender-inequality situation is even worse in China, as Chinese women are less likely to be promoted to decision-making roles than women in other countries, despite similar labor force participation and mid-level promotion rates (Han et al., 2023). In the Chinese real estate sector, women are the minority on the boards. According to Yang et al. (2023), 35% of the 31 Chinese real estate companies rated by MSCI have an all-male board. Of the remaining companies with female directors, women hold only 16% of the board seats, far behind the global standard of 30%. The severe underrepresentation of female directors on the boards of Chinese real estate firms motivates us to examine the

importance of female board directors and shed light on the merits of increasing female board representation in the Chinese real estate industry.

In this study, we examine the relationship between female representation on boards and default risk for Chinese real estate firms. Our research focuses on the role of female directors in the unique context of Chinese real estate companies for the reason that these companies perform poorly in terms of board gender diversity. We examine default risk as our outcome variable, as one important feature of the Chinese real estate industry is its overreliance on debt (Chu et al., 2023),[1] and default risk has therefore become a significant concern for Chinese real estate investors. In recent years, the Chinese real estate industry has been described as the 'Gray Rhino', which is one of the biggest threats to the stability of the financial system in China. Both the onshore and offshore bond markets of China have witnessed increasing default rates and amounts driven by real estate developers, with an onshore default rate of 8.2% and an amount of $429 billion RMB (1 USD = 6.8979 CNY or 62 billion US dollars), and an offshore default rate of 25% and an amount of $52 billion US dollars in 2022 (Chang and Li, 2023). Considering the dangers of default in the Chinese real estate industry, we focus on default risk and investigate whether the presence of female directors helps to mitigate such risk. As female directors are shown to have vital effects on corporate governance and risk-taking behaviors (Adams and Ferreira, 2009; Ali et al., 2018; Faccio et al., 2016; Levi et al., 2014; Switzer and Wang, 2013; Yeh, 2017), we propose that the presence of female directors could have a risk reduction effect in Chinese real estate firms.

One unique feature of the Chinese real estate industry, and Chinese firms in general, is the dominance of state-owned enterprises (SOEs), a major difference between the Chinese and Western economies (Bhat et al., 2019). Although the Chinese government has introduced reforms to bring in non-state capital, SOEs still account for the majority of Chinese listed companies (Usman et al., 2018; Wang and Yang, 2021). This feature is particularly apparent in the Chinese real estate industry, as 63% of the sample observations in this study belong to SOEs. We propose that the ownership structure of Chinese real estate firms could also have a significant bearing on the relationship between female directors and default risk. First, SOEs have a comparative advantage in accessing capital (Brandt and Li, 2003; Megginson et al., 2014), which could be explained by the soft budget constraint. Kornai (1979, 1986) documents that governments might soften budget constraints by providing financial subsidies, reducing taxes, or offering other forms of support for SOEs when they incur losses. Easier access to capital and fewer financial constraints may mitigate the need for female board representation to monitor default risk in SOEs. Second, studies based on the critical mass theory contend that women directors have a significant impact

[1] In particular, the average debt-to-equity ratio of listed real estate companies in mainland China is 90.9% in the third quarter of 2020 (Guo and Wang, 2020), whereas the adjusted debt-to-equity ratio is 73% for Chinese companies in the first half of 2021 (Chan and Tan, 2021).

on firms only when they hold a critical number of board seats (for e.g., Schwartz-Ziv (2017); Torchia et al. (2011)). Since SOEs have lower female representation on boards (McGuinness, 2018), it may be harder for female directors to exert an influence on SOEs. The dominance of SOEs in the Chinese economy and the crucial differences between SOEs and non-SOEs motivate us to further investigate whether the effect of female board representation on default risk differs across SOEs and non-SOEs. Based on the financial constraint argument and the critical mass theory, we propose that female board directors could more significantly reduce default risk in non-SOEs when compared to SOEs.

To conduct our empirical analyses, we collect data that cover 106 listed Chinese real estate firms from 2000 to 2022. To measure default risk, we use the KMV-Merton distance-to-default as a proxy for the likelihood of default (for e.g., Wang et al. (2009)). We measure female board representation, or board gender diversity, by the percentage of female directors on board. We regress default risk on board gender diversity by controlling for firm fundamentals and other governance features. Our regressions on the total sample show female board representation has little influence on mitigating default risk in the Chinese real estate sector. However, when we partition the sample into SOEs and non-SOEs, we show that female representation on boards reduces default risk significantly for non-SOEs. On the contrary, this effect is not significant for SOEs. We further show that our findings can be explained by the financial constraint argument and the critical mass theory. Specifically, we find that the significant relationship between default risk and female board representation is apparent for non-SOEs with high financial constraints. We also find that female representation on boards is significantly lower in SOEs than non-SOEs in our sample. Correspondingly, we find the significant effect of female representation on board on default risk is concentrated in non-SOEs with a critical mass (i.e., 20% or more) of female directors.

We conduct a series of additional and robustness tests to corroborate our findings. We first construct a balanced sample by matching SOEs and non-SOEs with similar characteristics. We next address the endogeneity issue, by using the average female representation on boards in real estate firms in the same city as an instrumental variable (Wang et al., 2022). Both the matched sample and the instrumental variable regressions produce consistent results. We conduct further robustness tests by replacing the main independent and dependent variables with alternative measures. For female representation, we use the logarithm of the total number of female directors (plus one). For default risk, we use the violation of the three red lines policy as a proxy.[2] The regression results based on these two alternative measures are both consistent with our

[2] The "three red lines" policy was imposed by the Chinese government to circumvent the overleverage problem and reduce the inherent risk in the Chinese real estate industry. The number of red lines exceeded by firms reflects their financial condition and reaction speed to the policy change.

main findings. Moreover, we consider additional variables which may affect our main results. After controlling for the gender of the chief executive officer (CEO) and chief financial officer (CFO), and with the inclusion of location fixed effects and additional board characteristics, we continue to obtain similar findings.

Our study makes two main contributions. First, we investigate the effect of female directors on board for the Chinese real estate industry. Our results bear significant policy implications, as women are heavily underrepresented on the board of Chinese real estate firms. We show that female representation on boards may not have the intended effect of risk mitigation for the industry as a whole, and these results could be attributed to the dominance of SOEs in the industry. Second, we further investigate the effectiveness of female directors in monitoring default risk in SOEs versus non-SOEs. We show that the effect of female board representation on default risk becomes significant for non-SOEs, and these findings could be explained by the fact that: (1) non-SOEs are more vulnerable to financial constraint, while SOEs are supported by the government, and (2) non-SOEs have higher representation of female directors relative to SOEs, which allows women directors to reach a critical mass to exert an impact. Overall, our findings show while at first glance female board representation or board gender diversity may not seem to be an effective governance mechanism for the Chinese real estate industry, it is simply due to the dominance of SOEs in the real estate sector. For non-SOEs, female board directors serve as effective monitors and safeguards of the default risk of a real estate company. We further explore what makes female directors effective in non-SOEs. In so doing, we highlight the particular circumstances in which female board representation is especially useful in the mitigation of default risk under the unique environment of the Chinese real estate industry.

2. Literature Review and Hypothesis Development

2.1 Related Literature

2.1.1 Females on Boards and Default Risk

Various experimental and empirical studies have shown that women are different from men in terms of background, values, and personality, which may impact their decisions when they act as directors and consequently influence board decisions and organization outcomes. First, empirical evidence has highlighted the correlation between female directors and the risk-taking decisions of firms. Studies show that women are more risk averse and less overconfident compared to men (Barber and Odean, 2001; Hudgens and Fatkin, 1985; Sexton and Bowman-Upton, 1990), which may lead to the risk avoidance behaviors of firms. Levi et al. (2014) find that firms with greater gender diversity tend to have fewer acquisition bids and lower bid premiums. Loukil and Yousfi (2016) document a positive relationship between female

representation on boards and cash ratio, which implies that the companies take less risk. Researchers also focus on the governance effect of gender differences. Adams and Ferreira (2009) observe that diverse boards are associated with stronger governance measured by meeting attendance by directors, meeting frequency, and equally-paid compensation. They then show that board diversity can add value to firms with weak governance. Likewise, Gul et al. (2011) document that a gender diverse board, which is a substitute for weakly governed corporates, has a positive impact on the informativeness of stock prices.

Since risk-taking behaviors and corporate governance are associated with default risk (Ali et al., 2018; Switzer and Wang, 2013; Yeh, 2017), there is a plausible link between the presence of female directors on a board and the default risk of a firm. Few studies in the literature have addressed this potential relationship. Examining non-financial firms in the U.S., Cao et al. (2015) report that board gender diversity has a negative relationship with the default risk of a firm, measured in two ways - actual default and the distance-to-default (DD) model in Merton (1974). In particular, they find that female representation on boards exhibits a more favorable effect on default risk after an Accounting and Auditing Enforcement Releases (AAER) event. In a recent study, Abinzano et al. (2023) document similar findings.

2.1.2 Board Gender Diversity in Real Estate

The extant studies that examine board gender diversity in real estate generally focus on three topics: the underrepresentation of female directors, characteristics of firms with boards that are very gender diverse, and the effects that female directors may bring to firms. Dimovski et al. (2016) provide evidence of the underrepresentation of female directors in the case of real estate management and development companies in Australia, which suggests that the inclusion of female directors is not considered important by these companies. The real estate literature that investigates the possible determinants of greater board gender diversity documents that real estate firms with larger initial public offerings (IPOs), firm and board size, and percentage of institutional investors tend to hire more female directors (Dimovski and Brooks, 2005; Dimovski et al., 2013; Schrand et al., 2018).

In terms of the effects that female directors may bring to firms in the real estate context, the extant studies mainly focus on firm value and performance, while no studies in the literature has particularly analyzed default risk. For U.S. real estate investment trusts (REITs), Schrand et al. (2018) find that female representation on boards cannot impact market performance measured by price per net asset value or operating performance measured by operating income per share. They further show that only female executive directors can have a positive effect on market performance. Noguera (2020) highlights that only

when female directors reach a critical mass on boards of REITs will they exert a positive effect on firm performance measured by return on assets. Using the same proxy for performance, Ajayi and Akinsomi (2022) report a significant relationship between the educational background of female directors and REIT performance, while they find board gender diversity in general has an insignificant effect. A recent study by Devine et al. (2023) analyzes the investment decisions of REITs and documents that female CEOs and board gender diversity lead to longer investment holding horizons, and more geographically-focused and environmentally-friendly investments, which they interpret as risk-avoidance decisions.

2.2 Hypothesis Development

2.2.1 Females on Boards and Default Risk of Chinese Real Estate Firms

Previous experimental and empirical studies document that women are more risk averse and less overconfident than their male counterparts, which may lead to risk-avoidance outcomes for firms with women serving on boards (for e.g., Barber and Odean (2001); Hudgens and Fatkin (1985); Levi et al. (2014); Loukil and Yousfi (2016); Sexton and Bowman-Upton (1990)). In addition, female directors can enrich the professional background of the board and may ask questions from different perspectives (Carter et al., 2003; Hillman et al., 2002), which are essential for effective monitoring by the board. Since risk-taking decisions and corporate governance are associated with the default risk of a firm (Ali et al., 2018; Switzer and Wang, 2013; Yeh, 2017), it is reasonable to argue that board gender diversity may influence default risk. Given the severity of female underrepresentation in the Chinese real estate industry and its high potential default risk, we analyze the relationship between female representation on boards and default risk in this unique context. Despite that earlier studies have investigated the effect of female directors on default risk for general market firms (Abinzano et al., 2023; Cao et al., 2015), it remains an unexplored research question under the Chinese real estate industry setting. We therefore propose the following hypothesis:

H1: Female representation on boards is negatively related to the default risk of Chinese real estate firms.

2.2.2 SOEs versus Non-SOEs

State ownership may impact the effect that female directors have on default risk. First, based on the agency theory, there may be a principal-principal problem in SOEs. The state, the majority shareholder, aims to pursue public interest, while the goal of the private shareholder is to maximize profit. This principal-principal problem may affect the effectiveness of the board (Calabrò et al., 2013). From a competitive market perspective, Wang et al. (2022) argue that the monitoring effect of female directors is higher in non-SOEs because

female directors in non-SOEs need to be more active in monitoring to compete with SOEs. In addition, the extant literature has shown that SOEs have advantages in accessing capital compared to non-SOEs, with more financing sources and lower cost of debt (Boubakri et al., 2021; Brandt and Li, 2003; Ge et al., 2020; Megginson et al., 2014). The lower financial constraints of SOEs may mitigate the need for female directors to mitigate the default risk of SOEs. In the case of non-SOEs, the need for female directors to monitor default risk may be more essential. In addition, there are different representations of females on boards between SOEs and non-SOEs. SOEs are shown to have low female representation on boards (McGuinness, 2018). According to the critical mass theory, women need to reach a critical mass on boards to have a significant impact (Schwartz-Ziv, 2017; Torchia et al., 2011). In the case of SOEs, boards are more dominated by male directors, and female directors may not have a voice that is loud enough to influence board and corporate decisions. In the case of non-SOEs, greater representation of female directors may allow these directors to reach a critical mass to exert an impact that affects board and corporate decisions. The above arguments lead to the following hypothesis:

H2: Female representation on boards is more negatively related to default risk for Chinese real estate non-SOEs when compared to Chinese real estate SOEs.

3. Methodology

To measure our dependent variable, we use the KMV-Merton model to calculate the default risk of a firm. The KMV-Merton model is based on the model in Merton (1974) and developed by KMV Corporation. The model in Merton (1974) makes two crucial assumptions. The first assumption is that firm value follows a standard geometric Brownian motion:

$$dV = \mu V d_1 + \sigma_V V dW \tag{1}$$

where V is the total value of the firm assets, μ is the expected return on assets, σ_V is the volatility of the firm assets and dW is a standard Wiener process. The second assumption is that a firm has only one liability due in period T. Under these two assumptions, the equity value of a firm can be calculated by using the Black-Scholes-Merton (BSM) formula:

$$E = VN(d_1) - Fe^{-rT}N(d_2) \tag{2}$$

$$d_1 = \frac{\ln\left(\frac{V}{F}\right) + (r + 0.5\sigma_V^2)T}{\sigma_V\sqrt{T}} \tag{3}$$

$$d_2 = \frac{\ln\left(\frac{V}{F}\right) + (r - 0.5\sigma_V^2)T}{\sigma_V\sqrt{T}} \tag{4}$$

where E is the market value of the equity value of a firm, $N(d)$ is the cumulative density function of the standard normal distribution, F is the default point, equal to the book value of the liabilities of a firm, and r is the risk-free rate. Based on the assumption that Merton (1974) makes in that the equity value of a firm is a function of the firm value and time, we apply Ito's lemma and the BSM formula to get:

$$\sigma_E = N(d_1)\left(\frac{V}{E}\right)\sigma_V \tag{5}$$

where σ_E is the volatility of the equity value. Then, by combining Equations (2) and (5), we can derive the value of V and σ_V, as all the other variables in Equations (2) and (5) can be calculated or observed from the market data. Once V and σ_V are solved, the *DD* is calculated in this equation:

$$DD = \frac{V - F}{V * \sigma_V} \tag{6}$$

DD captures the distance between the market value of the assets of a firm and the default point. Therefore, a lower *DD* of a company results in higher probability of default.[3]

For our key variable of interest, we measure female board representation (i.e., board gender diversity) with FEMALE, by the percentage of female directors on the board (for e.g., Adams and Ferreira (2009); Cao et al. (2015); Isabel et al. (2023)). Following previous research studies (for e.g., Abinzano et al. (2023); Aretz et al. (2018); Cao et al. (2015)), we include leverage (LEV), defined as the ratio of total liabilities to total assets, return on assets (ROA), defined as a percentage of net income to total assets, firm size (SIZE), measured by the natural logarithm of the book value of the total assets, market-to-book ratio (MB), defined as the ratio of the market value of equity to the book value of equity, institutional investor holdings (INSINVESTOR), defined as the percentage of institutional investor holdings to total outstanding shares, and dividend payout ratio (DIVIDENDPAY), as the firm-level control variables. In addition, we account for two board characteristics commonly used in the default literature (Abinzano et al., 2023; Cao et al., 2015): board size (BOARDSIZE), measured as the natural logarithm of the number of board members of a firm, and board independence (INDEPENDENCE), measured as the ratio of independent directors to the total number of board directors. As the extant literature documents that government ownership structure is associated with financial distress (for e.g., Li et al. (2008)), we control for SOE in our main regressions, a dummy variable that equals to 1 if the firm is an SOE and zero

[3] We choose the KMV-Merton model to measure default risk for the following reasons. First, market-based models that use the BSM theory outperform accounting-based models in measuring default risk (Hillegeist et al., 2004). Second, according to Zhang and Zhou (2017), the KMV-Merton model is more applicable to Chinese listed companies. To mitigate the problem of potential outliers, we winsorize the independent variable *DD* at the top and bottom 1% levels.

otherwise. Table 1 presents the definition of the variables that we use in the regression.

To examine the effect of female directors on the default risk of Chinese real estate firms, we use all firm-year observations to run the following model:

$$DD_{i,t} = \alpha + \beta_1 Female_{i,t} + \varphi Controls_{i,t} + \varepsilon_{i,t} \quad (7)$$

Then, to further examine whether the impact of board gender diversity on default risk differs between SOEs and non-SOEs, we run the regression by using Equation (7) separately for SOEs and non-SOEs (with the exclusion of the SOE control variable). We include year fixed effects in all of the regressions to control for time-variant effects. The standard errors are clustered at the firm level.

Table 1 Definition of Variables

Variables	Definition
DD	Distance to default, calculated by using KMV model. A larger DD indicates lower default risk.
FEMALE	Female board diversity, the percentage of female directors on the board.
LEV	Leverage level, defined as the ratio of the total liabilities to the total assets.
ROA	Return on assets, defined as a percentage of net income to total assets.
SIZE	Firm size, measured by the natural logarithm of the book value of total assets.
MB	Market-to-book ratio, defined as the ratio of the market value of equity to the book value of equity.
BOARDSIZE	Board size, measured as the natural logarithm of the number of board directors of a firm.
INDEPENDENCE	Board independence, measured as the ratio of independent directors to the total number of board directors
INSINVESTOR	Institutional investor holdings, defined as a percentage of institutional investor holdings to total outstanding share.
DIVIDENDPAY	Dividend payout ratio.
SOE	Dummy variable, value equals 1 if the firm is an SOE. Otherwise, 0.

(Continued…)

(Table 1 Continued)

Variables	Definition
AVERAGEFEMALE	The average percentage of female directors on boards in real estate firms in a city.
LNFEMALE	The natural logarithm of the total number of female directors plus one.
REDLINES	Number of Three Red Lines that the firms exceed.
FEMALECEO	Dummy variable, value equals 1 if the CEO is female. Otherwise, 0.
FEMALECFO	Dummy variable, value equals 1 if the CFO is female. Otherwise, 0.
FINABG	Percentage of directors with a financial background on the board.
OVERSEABG	Percentage of directors with an overseas background on the board.
EDUCATION	Percentage of directors with a Bachelor's degree on the board.
BOARDTENURE	Average tenure of directors on the board.
FEMALEFINA	Percentage of female directors with a financial background to the total number of female directors on the board.
FEMALEOVERSEA	Percentage of female directors with an overseas background to the total number of female directors on the board.
FEMALEEDU	Percentage of female directors with a Bachelor's degree to the total number of female directors on the board.

4. Sample Selection and Descriptive Statistics

To empirically test the hypotheses, we construct a sample by using Chinese A-share real estate companies that trade on the Shanghai and Shenzhen stock exchanges. The data of board and firm-level characteristics are collected from the China Stock Market & Accounting Research (CSMAR) database over the sample period of 2000 to 2022. We also supplement our sample with financial statement data from the WIND database. After excluding sample firms with special treatment (ST) status, and firms with missing variables, we obtain our final sample of 1,980 firm-year observations from 106 firms.

Table 2 presents the descriptive statistics for the total sample. Panel A shows the summary statistics of the dependent, explanatory, and control variables in our main analysis. The mean DD value is -1.210.[4] The mean value of FEMALE is 0.129, which means on average about 13% of the board directors are female. In line with the argument that women are underrepresented on the boards of Chinese real estate firms, we also note that 32% of our firm-year observations have no female director at all on the board. Moreover, we find that SOEs dominate the real estate industry, as 63% of the sample observations belong to SOEs.

Table 2 Summary Statistics

Panel A. Summary Statistics of Full Sample

Variable	Obs.	Mean	Median	SD	Max	Min
DD	1,980	-1.210	0.428	4.784	3.598	-24.974
FEMALE	1,980	0.129	0.111	0.125	0.714	0.000
LEV	1,980	0.604	0.637	0.187	1.143	0.023
ROA	1,980	0.022	0.026	0.073	0.255	-1.690
SIZE	1,980	22.792	22.654	1.627	28.293	18.616
MB	1,980	1.890	1.893	26.643	67.686	-955.941
BOARDSIZE	1,980	2.156	2.197	0.219	2.890	0.693
INDEPENDENCE	1,980	0.342	0.333	0.109	0.667	0.000
INSINVESTOR	1,980	50.736	54.874	24.710	104.540	0.000
DIVIDENDPAY	1,980	0.049	0.000	0.129	2.050	0.000
SOE	1,980	0.630	1.000	0.483	1.000	0.000

[4] We notice companies experienced high volatility and financial distress during certain crisis periods such as the COVID-19 period, and therefore, the *DD* values of these firm-year observations are extremely low, which lowered the mean value of the total sample.

Panel B. Differences between Non-SOEs and SOEs

Variable	Non-SOE	SOE	Difference
DD	-1.170	-1.235	0.065
FEMALE	0.153	0.114	0.039***
LEV	0.594	0.610	-0.019**
ROA	0.022	0.022	0.000
SIZE	22.656	22.872	-0.237***
MB	2.914	1.289	1.691*
BOARDSIZE	2.124	2.174	-0.051***
INDEPENDENCE	0.349	0.339	0.011**
INSINVESTOR	49.798	51.285	-1.536*
DIVIDENDPAY	0.051	0.047	0.004

Panel B reveals the differences between the SOEs and non-SOEs. In line with the finding in McGuinness (2018) with the Hong Kong IPO market, female representation is significantly higher in non-SOEs and lower in SOEs, with our sample showing a mean value of 15.3% in non-SOEs compared to 11.4% in SOEs. In addition, non-SOEs have significantly lower leverage, smaller firm size, larger market-to-book ratio, smaller board size, more board independence, and lower institutional holdings. These significant differences imply that the SOEs and non-SOEs do indeed carry distinct board and firm characteristics.

5. Main Empirical Results

Column (1) of Table 3 presents the result of the main regression with the full sample. We find that female representation on boards has no significant relationship with default risk for the full sample in the Chinese real estate industry. This result does not support H1, and could be explained by the potentially different effect that female directors have in SOEs and non-SOEs, which we will examine later for H2. For the control variables, we find that default risk is higher for firms with higher leverage, and a larger size and market-to-book ratio. Default risk is also significantly and negatively related to the dividend payout ratio.

We further examine the impact of female directors on default risk in the non-SOE and the SOE subsamples. The results for non-SOEs are presented in Column (2) and the results for SOEs are presented in Column (3) of Table 3, respectively. The findings show that female directors significantly reduce default risk in non-SOEs while no significant correlation is observed in the SOE sample. These findings support H2. We find one standard deviation increase in female representation (15.4%) can increase the DD by 0.369 in the non-SOE subsample. Based on the average default rate of our sample, this change implicates a default rate reduction of 11%. To put it differently, a 1% female representation increase in non-SOEs can reduce the default rate by 0.6%.

Table 3 Impact of Female Director on Default Risk

	(1) Full Sample DD	(2) Non-SOE DD	(3) SOE DD
FEMALE	0.973	2.949**	-2.115
	(0.848)	(2.045)	(-1.281)
LEV	-10.269***	-9.035***	-10.772***
	(-10.571)	(-7.399)	(-8.491)
ROA	0.795	1.031	1.183
	(0.628)	(0.795)	(0.562)
SIZE	-0.810***	-1.015***	-0.699*
	(-2.768)	(-3.396)	(-1.673)
MB	-0.004**	0.019	-0.005*
	(-2.130)	(0.458)	(-1.918)
BOARDSIZE	0.505	0.478	0.302
	(0.622)	(0.433)	(0.277)
INDEPENDENCE	2.523	1.950	2.391
	(1.216)	(0.533)	(0.872)
INSINVESTOR	-0.003	0.002	-0.008
	(-0.222)	(0.155)	(-0.433)
DIVIDENDPAY	3.511***	3.457***	3.422
	(3.288)	(4.135)	(1.580)
SOE	0.301		
	(0.883)		
Constant	21.921***	25.059***	20.840**
	(3.502)	(3.790)	(2.305)
Year FE	Yes	Yes	Yes
N	1,980	732	1,248

Notes: This table reports the regression results for the impact of female directors on default risk. Columns (1), (2) and (3) report the regression results for the full, non-SOE and SOE samples. Robust standard errors are clustered at firm level and t-values are reported in parentheses. ***, **, and * denote significance at the < 1%, 5% and 10% levels respectively.

The distinct and significant effect of non-SOEs can be explained by the financial constraint argument and the critical mass theory. First, the financial constraints that SOEs and non-SOEs face are different. The extant literature shows that SOEs have advantages in accessing capital (Brandt and Li, 2003; Megginson et al., 2014). Specifically, SOEs have higher leverage (Dewenter and Malatesta, 2001), lower cost of debt (Ge et al., 2020), and more financing sources compared to non-SOEs (Boubakri et al., 2021), which can be explained by state guarantees to pay back the loan. Therefore, fewer financial constraints may mitigate the need for female directors to monitor the default risk for SOEs. On the other hand, non-SOEs face more binding financial constraints that may require female directors to serve a more active monitoring role. To examine this possible argument, we divide non-SOEs into two groups based on their

financial constraints and then run the regression specification separately. We use the Whited and Wu (WW; 2006) index as a proxy for financial constraint. The WW index includes cash flow, dividend payment, leverage, firm size, and sales and industry growth rates to measure the financial constraint of a firm. The cut-off point for the two sub-groups is the median of the WW index. Columns (1) and (2) of Panel A in Table 4 present the results for the non-SOE sample with low and high financial constraints, respectively. In line with the financial constraint argument, female board representation is significantly correlated with default risk only in the group with low accessibility to financing (i.e., high financial constraint).

Table 4 Additional Analyses of Female Directors on Default Risk in Non-SOEs

Panel A. Non-SOEs with Different Financial Constraints

	(1) Low Constraint DD	(2) High Constraint DD
FEMALE	3.623	2.441**
	(1.580)	(2.102)
LEV	-19.351***	-5.820***
	(-7.815)	(-7.674)
ROA	-0.223	0.518
	(-0.023)	(0.527)
SIZE	-0.213	-0.371**
	(-0.384)	(-2.228)
MB	0.565*	-0.001
	(1.738)	(-0.057)
BOARDSIZE	0.720	-0.657**
	(0.266)	(-2.551)
INDEPENDENCE	4.598	-1.319
	(0.420)	(-0.873)
INSINVESTOR	0.001	-0.020*
	(0.030)	(-1.805)
DIVIDENDPAY	4.048***	0.745
	(3.711)	(0.621)
Constant	10.573	13.127***
	(0.868)	(3.816)
Year FE	Yes	Yes
N	350	345

Panel B. Non-SOEs with Different Proportions of Female Directors

	(1) Female Token DD	(2) Critical Mass DD
FEMALE	5.552	5.296***
	(1.599)	(3.932)
LEV	-10.300***	-5.411***
	(-6.750)	(-3.194)
ROA	2.503	-0.209
	(1.266)	(-0.159)
SIZE	-0.866*	-1.470***
	(-1.921)	(-3.269)
MB	0.057	-0.014
	(0.377)	(-0.467)
BOARDSIZE	0.467	0.406
	(0.333)	(1.264)
INDEPENDENCE	2.588	-2.172
	(0.528)	(-0.353)
INSINVESTOR	-0.004	0.025
	(-0.242)	(1.678)
DIVIDENDPAY	4.197***	-1.212
	(3.511)	(-0.846)
Constant	22.317**	32.126***
	(2.158)	(3.663)
Year FE	Yes	Yes
N	486	246

Notes: This table reports the regression results for the impact of female directors on default risk in non-SOEs. Panel A reports the results in non-SOEs with different levels of financial constraint. Financial constraint is measured by using the WW index. The cutting point is the median of the WW index. Columns (1) and (2) report the regression results for the non-SOE samples with low and high financial constraints. Panel B reports the results in non-SOEs with different proportions of females on boards. Columns (1) and (2) report the regression from non-SOE sample with less than 20% and higher than or equal to 20% of female directors. Robust standard errors are clustered at firm level and t-values are reported in parentheses. ***, **, and * denote significance at the < 1%, 5% and 10% levels respectively.

Second, another explanation for the significant effect observed in non-SOEs is based on the critical mass theory, which argues that female representation must reach a minimum level to have a significant influence (Schwartz-Ziv, 2017; Torchia et al., 2011). On the other hand, a small proportion of women directors, known as "female tokens", cannot make a difference in a male-dominated group (Kanter, 1977). Since the proportion of female directors is significantly lower in SOEs (as shown in Panel B of Table 2), the intended effect of lowering the default risk by board gender diversity may be more difficult to achieve in SOEs, thus resulting in the non-significant results of the SOE sample. Following the extant literature (for e.g., Pandey et al. (2020); Sattar et al. (2022)), we use 20% as the critical mass point and examine the effect of female directors on default risk in the token group and the critical mass group separately. Columns (1) and (2) of Panel B in Table 4 report the regression results of the non-SOE token group and non-SOE critical mass group respectively. We find that only in the non-SOE sample with at least 20% female representation on the board will female board representation have a significant effect on lowering the default risk.[5]

6. Robustness Checks

6.1 Regression with Matching Sample

There is a substantial difference in the number of observations between SOEs and non-SOEs, as the number of observations in the SOE sample outweighs those in the non-SOE sample. SOEs and non-SOEs are also significantly different for several firm-level characteristics. As shown in Table 2, non-SOEs have a lower leverage level, smaller firm size, and a larger market-to-book ratio. A concern about these differences is that the different effects of board gender diversity on default risk between non-SOEs and SOEs are the results of the different characteristics between these two samples. To address this concern, we further match the non-SOEs and SOEs based on their financial leverage, firm size, return on asset, and market-to-book ratio.[6] We rerun the main regressions with the matched sample and present the results in Table 5. We continue to observe similar findings that, only in non-SOEs, female representation on boards significantly reduces default risk.

[5] We also use 10%, 15%, and 25% as the critical mass points and find the effect of female representation on default risk also exists for these points. The effect increases with degree of female representation, with the most substantial increases from 15% to 20%.

[6] The subsamples are matched by year so the matching sample can be different in different years. In every single year, we match the non-SOEs with the SOEs with the closest financial leverage, firm size, return on asset, and market-to-book ratio.

Table 5 Regression with Matching Sample

	(1) Full Sample DD	(2) Non-SOE DD	(3) SOE DD
FEMALE	1.760	2.949**	-1.360
	(1.483)	(2.045)	(-0.771)
LEV	-8.568***	-9.035***	-7.871***
	(-8.049)	(-7.399)	(-5.248)
ROA	2.081	1.031	5.321*
	(1.623)	(0.795)	(1.915)
SIZE	-0.908***	-1.015***	-0.718
	(-3.369)	(-3.396)	(-1.599)
MB	0.075*	0.019	0.173***
	(1.670)	(0.458)	(2.851)
BOARDSIZE	0.596	0.478	0.303
	(0.730)	(0.433)	(0.233)
INDEPENDENCE	3.876*	1.950	5.555*
	(1.674)	(0.533)	(1.691)
INSINVESTOR	-0.010	0.002	-0.038**
	(-0.923)	(0.155)	(-2.208)
DIVIDENDPAY	3.908***	3.457***	4.827**
	(3.718)	(4.135)	(2.161)
SOE	0.599*		
	(1.860)		
Constant	21.628***	25.059***	17.637*
	(3.748)	(3.790)	(1.806)
Year FE	Yes	Yes	Yes
N	1,464	732	732

Notes: This table reports the regression results for the impact of female directors on default risk after matching. The SOEs and non-SOEs are matched by their leverage, return on asset, firm size, and market-to-book ratio. Columns (1), (2) and (3) report the regression results for the full, non-SOE, and SOE samples, respectively. Robust standard errors are clustered at the firm level and t-values are reported in parentheses. ***, **, and * denote significance at the < 1%, 5% and 10% levels respectively.

6.2 Instrumental Variable

The number of female directors on a board is an endogenous variable because directors are elected by shareholders. Firms with low default risk could also attract shareholders who prefer more female directors. In addition, certain types of women (and certain types of men) may be attracted to be directors of lower-risk companies. For example, women directors may be more risk averse, and prefer to sit on boards of companies with less default risk. To deal with the issues of endogeneity, we adopt the two stage least square (2SLS) regression framework with instrumental variables. To disentangle the causal effect of

gender diversity on financial statement fraud, Wang et al. (2022) use the average number of female leaders in an industry in a province as an instrumental variable to estimate gender diversity in a firm. There are other papers that use similar instrumental variables (for e.g., Liu et al. (2014); Liu et al. (2016)). Following this method, we use the average proportion of female directors in the real estate industry in a particular city as the instrumental variable.[7] However, some cities have a limited number of real estate firms. To mitigate the potential influence of individual firms on the average value, we focus on cities with more than six real estate firms after matching the SOE and the non-SOE subsamples. We then perform the 2SLS regression and the results are shown in Table 6. The first-stage regressions show that the average proportion of female directors in a city significantly predicts FEMALE at a firm, thus implying that the instrumental variable is significantly correlated with the endogenous variable. The second-stage results are consistent with the main regression results presented in Table 3, which shows that female representation on boards can only reduce the default risk in non-SOEs.

6.3 Alternative Measurement

In our next robustness tests, we consider alternative measures of the independent and dependent variables. For female representation on boards, besides the percentage of female directors, we also use the total number of female directors. We calculate the logarithm of the total number of female directors (plus one) as an alternative measure of board gender diversity. Replacing FEMALE with LNFEMALE, we repeat our regressions. The results presented in Table 7 continue to show that non-SOEs with a larger number of female directors have a larger DD.

We also investigate the "three red lines" as a proxy for default risk. The "three red lines" scheme was imposed in 2020 by the Chinese government to supervise the overleverage problem and reduce risk in the real estate industry. The government restricts debt financing if a firm crosses these three red lines.[8] The more that the red lines are violated, the lower the limit the firm is allowed by the government to further raise debt capital. Hence, the "three red lines" in essence serves as an indicator of the default risk of real estate firms. When a firm violates more red lines, it has a higher default risk since its future financing activity will be limited. The number of red lines crossed by a firm can also reflect its reaction speed to the policy. We use the variable REDLINES, with a

[7] We also check the Cragg-Donald Wald F statistic (41.25) to examine whether this instrumental variable is a weak instrumental variable. This statistic is higher than the Stock-Yogo test critical value at 10% (16.38) (Stock and Yogo, 2005) and proves that it is not weak.

[8] The first red line refers to the debt ratio excluding advanced proceeds that should not exceed 70% of the assets. The second red line requires that the net gearing ratio is not more than 100%. Lastly, the third red line dictates that the cash to short-term debt ratio should be more than 1.

Table 6 Instrumental Variable Regression

	(1)	(2)	(3)	(4)	(5)	(6)
	Full Sample		Non-SOE		SOE	
	First FEMALE	2SLS DD	First FEMALE	2SLS DD	First FEMALE	2SLS DD
FEMALE		0.460		6.342**		-12.060
		(0.125)		(2.081)		(-1.465)
AVERAGEFEMALE	1.633***		3.460**		0.778*	
	(2.872)		(2.660)		(1.739)	
LEV	0.016	-9.389***	0.086	-12.295***	-0.082	-10.980***
	(0.187)	(-6.125)	(0.627)	(-6.675)	(-0.825)	(-6.149)
ROA	0.076	3.144**	0.106	0.135	-0.248	4.338
	(0.603)	(2.113)	(0.576)	(0.075)	(-1.339)	(0.933)
SIZE	0.006	-0.462	-0.014	0.261	0.011	-0.411
	(0.467)	(-1.331)	(-0.298)	(0.771)	(0.793)	(-1.000)
MB	0.001	0.151	-0.014	0.164	0.003	0.240***
	(0.181)	(1.521)	(-0.967)	(1.314)	(0.650)	(3.025)
BOARDSIZE	-0.155	0.284	-0.221	0.274	-0.044	-0.057
	(-1.662)	(0.223)	(-1.243)	(0.130)	(-0.695)	(-0.037)
INDEPENDENCE	-0.002	2.318	0.388	-6.823*	0.052	6.108
	(-0.008)	(0.661)	(0.664)	(-1.783)	(0.230)	(1.468)

(Continued…)

(Table 6 Continued)

	(1)	(2)	(3)	(4)	(5)	(6)
	Full Sample		Non-SOE		SOE	
	First FEMALE	2SLS DD	First FEMALE	2SLS DD	First FEMALE	2SLS DD
INSINVESTOR	-0.002	-0.034***	-0.002	-0.015	-0.001	-0.061***
	(-1.156)	(-2.593)	(-0.883)	(-1.025)	(-1.557)	(-2.692)
DIVIDENDPAY	-0.029	3.756**	0.034	1.367	-0.031	4.769*
	(-0.992)	(2.015)	(0.435)	(0.999)	(-0.925)	(1.918)
SOE	-0.071*	0.260				
	(-1.683)	(0.517)				
Constant	0.169	13.247*	0.695	-1.342	-0.166	13.254
	(0.632)	(1.700)	(1.107)	(-0.251)	(-0.616)	(1.364)
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	594	594	209	209	385	385

Notes: This table reports the instrumental variable regression results for the impact of female directors on default risk after matching. The SOEs and non-SOEs are matched by their leverage, return on asset, firm size, and market-to-book ratio. The sample includes real estate firms in a city with more than 6 real estate firms. The instrumental variable is the average percentage of females on boards in real estate firms in a city. Columns (1) and (2), (3) and (4), and (5) and (6) report the 2SLS regression results for the full, non-SOE and SOE samples, respectively. Robust standard errors are clustered at the firm level and t-values are reported in parentheses. ***, **, and * denote significance at the < 1%, 5% and 10% levels respectively.

value that equals the number of red lines crossed, as an alternative measure of risk of default. We restrict this analysis to the period since the policy was issued in 2020, with REDLINES as the dependent variable in our main regressions. The results are shown in Table 8. We find that, in the non-SOEs, firms with more female directors on the board have fewer red line violations. On the other hand, we do not observe any significance of female board representation on the REDLINES measure in the total sample and the SOE subsample.

Table 7 Regression with Alternative Measure of Female

	(1) Full Sample DD	(2) Non-SOE DD	(3) SOE DD
LNFEMALE	0.176	0.859*	-0.443
	(0.595)	(1.972)	(-1.240)
LEV	-10.263***	-9.115***	-10.799***
	(-10.601)	(-7.464)	(-8.471)
ROA	0.810	1.018	1.152
	(0.640)	(0.802)	(0.549)
SIZE	-0.811***	-0.994***	-0.694
	(-2.769)	(-3.327)	(-1.662)
MB	-0.004**	0.019	-0.005*
	(-2.133)	(0.460)	(-1.914)
BOARDSIZE	0.415	0.010	0.507
	(0.506)	(0.009)	(0.461)
INDEPENDENCE	2.549	1.971	2.327
	(1.231)	(0.541)	(0.846)
INSINVESTOR	-0.002	0.002	-0.007
	(-0.219)	(0.175)	(-0.426)
DIVIDENDPAY	3.494***	3.451***	3.426
	(3.254)	(4.130)	(1.575)
SOE	0.284		
	(0.834)		
Constant	22.157***	25.584***	20.349**
	(3.552)	(3.880)	(2.256)
Year FE	Yes	Yes	Yes
N	1,980	732	1,248

Notes: This table reports the regression results for the impact of female directors on default risk with alternative measure of female. Female representation is measured by logarithm of total number of female directors. Columns (1), (2) and (3) report the regression results for the full, non-SOE and SOE samples. Robust standard errors are clustered at the firm level and t-values are reported in parentheses. ***, **, and * denote significance at the < 1%, 5% and 10% levels respectively.

Table 8 Regression with Three Red Lines

	(1) Full Sample REDLINES	(2) Non-SOE REDLINES	(3) SOE REDLINES
FEMALE	-0.304	-0.708*	0.329
	(-0.918)	(-1.878)	(0.607)
LEV	2.555***	1.527***	2.956***
	(5.683)	(3.290)	(5.060)
ROA	-1.347*	-0.964	-2.524
	(-1.691)	(-1.624)	(-1.070)
SIZE	-0.017	0.050	-0.029
	(-0.243)	(0.499)	(-0.354)
MB	0.048	-0.057	0.100**
	(0.971)	(-0.727)	(2.095)
BOARDSIZE	-0.820**	-0.860	-0.831**
	(-2.164)	(-1.128)	(-2.209)
INDEPENDENCE	-0.544	-1.186	0.011
	(-0.532)	(-0.504)	(0.010)
INSINVESTOR	-0.000	0.007	-0.005
	(-0.047)	(1.485)	(-0.842)
DIVIDENDPAY	-0.049	-0.294*	0.059
	(-0.345)	(-1.708)	(0.260)
SOE	-0.098		
	(-0.739)		
Constant	1.526	0.722	1.363
	(0.932)	(0.203)	(0.779)
Year FE	Yes	Yes	Yes
N	252	94	158

Notes: This table reports the regression results for the impact of female directors on default risk with "three red lines". The dependent variable is replaced with the number of three red lines exceeded by the firm. Columns (1), (2) and (3) report the regression results for the full, non-SOE and SOE samples. Robust standard errors are clustered at the firm level and t-values are reported in parentheses. ***, **, and * denote significance at the < 1%, 5% and 10% levels respectively.

6.4 Additional Control Variables

Lastly, we control for additional variables to mitigate the interference from other possible factors. Our first concern is related to the presence of female executives. First, the number of female directors and the presence of female executives can be correlated. Hence, we further control female CEO and CFO in our robustness check. Table 9 shows the regression results that control for FEMALECEO and FEMALECFO. The results are consistent with our main findings.

Table 9 Regression with Controls for Gender of CEO and CFO

	(1) Full DD	(2) Non-SOE DD	(3) SOE DD
FEMALE	1.677	4.092***	-1.605
	(1.454)	(2.942)	(-0.953)
LEV	-10.219***	-8.949***	-10.670***
	(-10.430)	(-7.332)	(-8.508)
ROA	0.691	0.674	1.140
	(0.539)	(0.530)	(0.554)
SIZE	-0.808***	-1.078***	-0.657
	(-2.752)	(-3.408)	(-1.598)
MB	-0.004**	0.015	-0.005*
	(-1.994)	(0.382)	(-1.892)
BOARDSIZE	0.424	0.267	0.261
	(0.517)	(0.241)	(0.241)
INDEPENDENCE	2.811	2.527	2.535
	(1.368)	(0.729)	(0.942)
INSINVESTOR	-0.001	0.004	-0.005
	(-0.098)	(0.345)	(-0.279)
DIVIDENDPAY	3.492***	3.352***	3.565*
	(3.350)	(3.947)	(1.764)
SOE	0.259		
	(0.752)		
FEMALECEO	-0.746	-0.694	-1.327
	(-1.135)	(-1.217)	(-1.115)
FEMALECFO	-0.367	-0.703	-0.285
	(-1.171)	(-1.435)	(-0.761)
Constant	22.067***	26.785***	20.016**
	(3.513)	(3.819)	(2.269)
Year FE	Yes	Yes	Yes
N	1,945	721	1,224

Notes: This table reports the regression results for the impact of female directors on default risk with additional control variables. Columns (1) to (3) report the results that control for female CEO and CFO. Columns (1), (2), and (3) report the regression results for the full, non-SOE and SOE samples, respectively. Robust standard errors are clustered at the firm level and t-values are reported in parentheses. ***, **, and * denote significance at the < 1%, 5% and 10% levels respectively.

Second, location may also affect our results. In different cities, economic development levels are different, and female employment is also different. Meanwhile, for real estate firms, their locations significantly affect their products and sales. Moreover, firms in different cities may have different financial accessibility which affects default risk. We address these geographical issues by including location fixed effects as a robustness check. Table 10 shows,

after controlling for location fixed effects, a significant effect of female directors on default risk in non-SOEs.

Table 10 Regression with Location Fixed Effects

	(1) Full DD	(2) Non-SOE DD	(3) SOE DD
FEMALE	1.179	2.720*	0.132
	(1.143)	(1.821)	(0.083)
LEV	-9.608***	-6.661***	-10.206***
	(-9.727)	(-4.418)	(-8.017)
ROA	0.145	2.151	-0.397
	(0.115)	(1.408)	(-0.207)
SIZE	-0.881***	-1.300***	-0.784**
	(-3.019)	(-3.424)	(-2.112)
MB	-0.004*	0.016	-0.004
	(-1.876)	(0.455)	(-1.502)
BOARDSIZE	0.297	0.584	-0.332
	(0.433)	(0.507)	(-0.372)
INDEPENDENCE	2.720	-0.399	1.841
	(1.403)	(-0.119)	(0.740)
INSINVESTOR	0.002	0.005	0.002
	(0.186)	(0.374)	(0.118)
DIVIDENDPAY	3.781***	3.754***	3.250*
	(3.715)	(4.646)	(1.669)
SOE	0.066		
	(0.186)		
Constant	23.406***	30.060***	24.269***
	(3.995)	(3.552)	(3.027)
Year FE	Yes	Yes	Yes
Location FE	Yes	Yes	Yes
N	1,980	732	1,248

Notes: This table reports the regression results for the impact of female directors on default risk with additional fixed effects. Columns (1)-(3) report the results that control for location fixed effects. Columns (1), (2), and (3) report the regression results for the full, non-SOE and SOE samples, respectively. Robust standard errors are clustered at the firm level and t-values are reported in parentheses. ***, **, and * denote significance at the < 1%, 5% and 10% levels respectively.

Third, other board characteristics may affect our results. For example, if there are more directors with a financial background on the board, the board may be more effective at monitoring financial distress, thereby reducing the risk of default for the firm. Therefore, we include additional board characteristics to address this concern as shown in Table 11, with average board tenure, and

percentage of directors with financial, education, and overseas backgrounds as additional controls. In Table 12, we control for percentage of female directors with financial, education, and overseas backgrounds. After controlling for these factors, we find that our results remain robust. Moreover, we find directors and female directors with an overseas background on average are associated with a lower default risk (i.e., larger *DD*).

Table 11 Regression with Additional Board Characteristics as Controls

	(1) Full DD	(2) Non-SOE DD	(3) SOE DD
FEMALE	1.769	4.420**	-2.021
	(1.209)	(2.285)	(-0.908)
LEV	-13.297***	-9.451***	-15.492***
	(-6.757)	(-5.827)	(-5.234)
ROA	2.198	-1.332	8.563
	(0.882)	(-0.785)	(1.521)
SIZE	-0.581	-1.140***	-0.315
	(-1.384)	(-3.589)	(-0.502)
MB	0.283*	-0.057	0.560**
	(1.899)	(-0.543)	(2.638)
BOARDSIZE	0.206	-0.323	0.210
	(0.133)	(-0.190)	(0.094)
INDEPENDENCE	3.475	2.069	3.568
	(0.873)	(0.323)	(0.689)
INSINVESTOR	-0.010	-0.005	-0.019
	(-0.798)	(-0.368)	(-0.930)
DIVIDENDPAY	3.523***	3.742***	2.998
	(3.372)	(4.098)	(1.500)
FINABG	1.468	4.402*	0.708
	(0.913)	(1.678)	(0.402)
OVERSEABG	7.921***	9.551***	7.685
	(3.207)	(4.733)	(1.636)
EDUCATION	-0.562	-1.417*	-0.122
	(-1.008)	(-1.976)	(-0.174)
BOARDTENURE	0.010	0.006	0.012
	(0.790)	(0.310)	(0.624)
SOE	0.676		
	(1.559)		
Constant	16.192*	27.779***	12.427
	(1.893)	(2.948)	(0.972)
Year FE	yes	yes	yes
N	1,376	562	814

Notes: This table reports the regression results with additional board characteristics as controls. We include board average tenure, and percentage of directors with financial, education, and overseas backgrounds as additional controls. Columns (1), (2), and (3) report the regression results for the full, non-SOE and SOE samples, respectively. Robust standard errors are clustered at the firm level and t-values are reported in parentheses. ***, **, and * denote significance at the < 1%, 5% and 10% levels respectively.

Table 12 Regression with Additional Female Director Characteristics as Controls

	(1) Full DD	(2) Non-SOE DD	(3) SOE DD
FEMALE	1.144	3.432**	-2.712
	(0.790)	(2.010)	(-1.152)
LEV	-13.648***	-10.659***	-15.353***
	(-7.119)	(-6.072)	(-5.298)
ROA	2.334	-0.657	8.292
	(0.825)	(-0.342)	(1.417)
SIZE	-0.509	-0.940**	-0.329
	(-1.289)	(-2.502)	(-0.558)
MB	0.281*	-0.006	0.532***
	(1.940)	(-0.052)	(2.681)
BOARDSIZE	0.217	0.208	0.050
	(0.142)	(0.128)	(0.023)
INDEPENDENCE	3.948	3.738	4.081
	(1.003)	(0.574)	(0.801)
INSINVESTOR	-0.009	0.002	-0.021
	(-0.729)	(0.161)	(-0.962)
DIVIDENDPAY	3.520***	3.666***	3.321
	(3.361)	(3.739)	(1.648)
FEMALEFINA	0.024	0.828	0.131
	(0.029)	(0.562)	(0.136)
FEMALEOVERSEA	4.874**	4.468***	4.756
	(2.623)	(3.414)	(1.513)
FEMALEEDU	-0.162	-0.700	0.160
	(-0.322)	(-1.145)	(0.250)
SOE	0.471		
	(1.084)		
Constant	15.362*	22.827**	13.646
	(1.953)	(2.406)	(1.150)
Year FE	yes	yes	yes
N	1,376	562	814

Notes: This table reports the regression results with additional female director characteristics as controls. We include the percentage of female directors with financial, education, and overseas backgrounds. Columns (1), (2), and (3) report the regression results for the full, non-SOE and SOE samples, respectively. Robust standard errors are clustered at the firm level and t-values are reported in parentheses. ***, **, and * denote significance at the < 1%, 5% and 10% levels respectively.

7. Conclusion

This paper examines the relationship between female representation on boards and default risk. We find that more women on a board could significantly reduce the default risk of Chinese real estate firms, but this effect is only apparent for non-SOEs. We further investigate these interesting findings and offer two explanations. First, non-SOEs are subject to higher financial constraints, while SOEs are supported by the government and have easier access to capital. Consequently, we find that the effect of female representation on default risk is significant when firms face high financial constraints. Second, female representation on boards is significantly lower in SOEs than non-SOEs. We propose that only when female representation exceeds a critical mass would these female directors have an impact on the board. Consistently, we find that the effect of female board representation is significant only when there is a critical mass of female directors.

In summary, this study furthers current understanding of the relationship between female representation on boards and default risk in the Chinese real estate industry, thereby providing important implications for both the academia and industry. The Chinese real estate industry is still predominantly male-dominated, and female representation remains low. Our study emphasizes the importance of female representation on boards, by showing that female directors can reduce the default risk of non-SOEs, especially those with high financial constraints and a critical mass of female directors. In so doing, we highlight the particular circumstances where female board directors are most needed to cope with the debt crisis in the Chinese real estate industry.

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