Board Gender Diversity and Investment Efficiency - Evidence from Chinese Listed Companies

Sirui Yang, Yifan Wang, Qihang He

Henan University, Zhengzhou, 475000 Henan, China

Keywords: Board gender diversity, Investment efficiency, Overinvestment, Underinvestment, Female executives

Abstract: This paper examines and analyzes the specific efficiency and moderating effects of board gender diversity on investment efficiency in a systematic manner, using Shanghai and Shenzhen A-share listed companies from 2011-2019 as a research sample. It is found that gender diversity in the board of directors can significantly reduce the inefficient investment of firms and ultimately enhance investment efficiency. Further analysis found that the impact of female directors on firms' investment behaviour was mainly reflected in the suppression of firms' over-investment behaviour, with no significant impact on under-investment behaviour. The heterogeneity test concludes that the contribution of board diversity to corporate investment efficiency is more significant in highly productive state-owned enterprises in the East. The paper also analyses that female executives play a positive moderating role to a certain extent.

1. Introduction

As society progresses and develops, one-sided female values such as “raising a husband and children” are no longer the mainstream of society. In the business world, women workers are gradually gaining voice and decision-making power, and women directors are becoming an important force in corporate decision-making.

2. Methodology

2.1 The Impact of Board Diversity on Investment Efficiency

Numerous studies have shown that due to their personality traits, women directors are more willing to invest time and effort in fulfilling their board obligations[2], they tend to be more prepared than male directors to attend board meetings, and can open up new paths of thinking during collective board discussions, thus enhancing the rationality of board decisions on investments They can also open up new paths of thought during collective board discussions, thus enhancing the rationality and effectiveness of board decisions on investment and effectively avoiding opportunistic behaviour in inefficient investments. Secondly, women directors are more robust and prudent in formulating strategies and operating policies, and they are more attuned to long-term investment, social responsibility and corporate sustainability[1]. Such values can enhance the long-term value and sustainability of a business and attract investors who are more focused on the social impact and long-term value of the business.

Based on the above analysis, this paper proposes the first hypothesis

H1:Gender diversity on the board of directors has a positive impact on the efficiency of corporate investment.

2.2 Further Analysis of the Impact of Board Gender Diversity on Overinvestment and under-Investment

Overconfidence often leads to inefficient investment by the decision-making leaders of a business, including over-investment and under-investment. Although the psychological state of overconfidence is common to both male and female leaders[5], women are less likely to be overconfident than men[3]. In terms of risk-taking, women are more risk averse due to higher levels of monoamine oxidase, which biologically influences decision-making, and the social roles of childbirth and breastfeeding[4]. Female boards are more sensitive to the risks involved in the corporate investment process and tend to be more conservative and prudent in choosing to avoid risk when it comes to investment decisions and are reluctant to take risks in over-investment behaviour. Therefore, as the proportion of female directors continues to increase, over-investment by companies can be reduced.

Society tends to carry the stereotype that women are timid. When women become leaders in companies, they market themselves to these underlying social prejudices and are seen as unsuitable for leadership roles. However, in recent years, as women have become more aware and feminist, women directors have become more respected in companies and social perceptions of women leaders have gradually shifted from one-sided to objective, they are gradually becoming less associated with stereotypes such as 'timid decision makers'. Thus, the increasing proportion of women on boards will not have a significant impact on corporate underinvestment.

Based on this, the paper proposes a second hypothesis

H2a: Gender diversity on the board has a significant disincentive effect on corporate overinvestment.

H2b: Board gender diversity has no significant effect on corporate underinvestment.

2.3 The Moderating Effect of Female Executives on Board Gender Diversity and Investment Efficiency

Bart and Mcqueen's study measured the psychological aspects of the personalities of 624 executives and found that male executives had an authoritarian leadership style, while female executives had a more democratic leadership style. The results of this study suggest that executive teams with a higher proportion of women make more holistic investment judgements in the corporate investment process. Female executives are also subject to the same unfair treatment at work as female directors. Female executives and female directors can face gender discrimination in their lives and work together, creating a 'same-sex empathy' between female executives and female directors, and a better understanding between executives and the board of directors of each other's work pressures, which is conducive to sound investment decisions. Therefore, female executives have a positive moderating effect on the relationship between gender diversity on the board and investment efficiency.

Based on the above analysis, this paper proposes a third hypothesis

H3: Female executives have a positive moderating effect on the relationship between board gender diversity and investment efficiency.

3. Study Design

3.1 Indicator Construction

3.1.1 Selection of Explanatory Variables

Investment efficiency: Referring to Richardson's model, this paper measures the level of inefficient investment by the absolute value of the residuals obtained from the model regression. The larger the value, the more serious the inefficient investment and the less efficient the investment. The specific model is as follows:

$$Invest_t = \beta_0 + \beta_1 Growth_{t-1} + \beta_2 Lev + \beta_3 Cash_{t-1} + \beta_4 Age_{t-1} + \beta_5 Size_{t-1} + \beta_6 Returns_{t-1} + \beta_7 Invest_{t-1} + Year + Industry + \xi_t \quad (1)$$

3.1.2 Selection of Explanatory Variables

The existing literature generally uses the number of female directors as a proportion of the total number of directors (boardfem) to measure the degree of gender diversity on corporate boards.

3.2 Model Setting and Variable Definition

$$absinv = \beta_0 + \beta_1 boardfem + \sum controls + Firm\_F.E. + Year\_F.E. + \varepsilon (2)$$

In model (3),β_1 is the focus of attention in this paper, which is the regression coefficient of *boardfem*, for the specific impact of board gender diversity on the efficiency of corporate investment.

In accordance with the existing literature, control variables are also set in this paper. E.g. size, lev, top1, Roa, lndenp, lnboard.

Sample and data

This paper selects listed companies in Shanghai and Shenzhen A-shares from 2010-2019 as the research object and screens them according to the following steps (1) exclude financial listed companies; (2) exclude samples with missing financial data or insolvency; (3) exclude samples that were marked ST or *ST in the year. The samples were subjected to firm-level cluster regression to eliminate the interference of differences between data groups and to reasonably control for the effect of heteroskedasticity. The financial data used for the study were sourced from the CSMAR database. To avoid the effect of extreme values, the samples outside the 1% and 99% quartiles of the observations of the main variables are shrunk using the Winsorize method, and all data processing and model estimation is done using STATA15

4. Results and Discussion

4.1 Regression Analysis

Based on the setup of model (3), as shown in Table 1, combined with the results of descriptive statistics, it can be seen that for every unit standard deviation increase in the degree of gender diversity in the board of directors, the level of inefficient investment of the firm decreases by 0.0018 (=0.015*0.12) percentage points on average, which indicates that the increase in the proportion of female directors helps to reduce the inefficient investment of the firm, thus enhancing the investment efficiency of the firm.

This paper further analyses the perspective of underinvestment and overinvestment to explore the specific impact of female directors on the efficiency of corporate investment, and the regression results are shown in Column (2) and Column (3). According to column (2) in Table 3, it can be obtained that female directors do not have a significant inhibitory effect on underinvestment, indicating that H2 holds. Looking at column (3) in Table 3, it can be found that the regression coefficient of the degree of gender diversity in the board of directors on overinvestment is -0.013, which is significantly negatively correlated at the 1% level, indicating that the greater the proportion of female directors, the more it can inhibit overinvestment in the company.

Table 1 Regression Analysis

	(1)	(2)	(3)
VARIABLES	Absinv	Overinv	Underinv
Boardfem	-0.015**	-0.023	-0.013***
	(0.006)	(0.016)	(0.004)
Size	0.002**	0.006**	-0.004***
	(0.001)	(0.003)	(0.001)
Lev	0.017***	0.032**	0.003
	(0.005)	(0.014)	(0.003)
Top1	0.000***	0.001***	0.000**
	(0.000)	(0.000)	(0.000)
Roa	0.040***	0.084***	0.011***
	(0.003)	(0.013)	(0.002)
Lndenp	-0.011	-0.041	0.005
	(0.013)	(0.037)	(0.008)
Lnboard	0.003	-0.018	0.003
	(0.004)	(0.013)	(0.003)
Constant	-0.026	-0.070	0.099***
	(0.026)	(0.066)	(0.018)

Year Fe	YES	YES	YES
Observations	21571	7648	13923
R-squared	0.013	0.017	0.011

4.2 Heterogeneity Analysis

The regression results are shown in column (1)(2) of Table 2, with a regression coefficient of -0.024 and a t-value of 0.008, which is significantly negative at the 5% level, thus indicating that as the degree of gender diversity in the board of directors increases, inefficient investment in state-owned enterprises decreases, thus enhancing the investment efficiency of state-owned enterprises. In contrast, the regression coefficient of gender diversity in the board of directors on inefficient investment is smaller in non-SOEs, suggesting that the contribution of gender diversity in the board of directors to investment efficiency is weaker in non-SOEs.

The results of the regressions are shown in column (3)(4)(5) of Table 4. In the eastern region, every 1% increase in gender diversity in the board of directors is associated with a significant decrease of -0.0198 in inefficient investment, thus indicating that in the eastern region, board diversity is significantly and positively related to the investment efficiency of firms. However, in the Midwest region, the contribution of female directors to investment efficiency is weaker.

Based on the different productivity of the firms, this paper divides the sample into low and high productive firms, and the regression results are shown in table column (5)(6). The regression results are shown in Table (5)(6). In low-productivity firms, for every 1% increase in the proportion of female directors, the firm's inefficient investment decreases by -0.0141%; in high-productivity firms, the regression coefficient is -0.0244. Thus, the positive effect of board gender diversity on the firm's investment efficiency is more significant in high-productivity firms.

Table 2 Heterogeneity Analysis

	E	M	W	Non-S	S	High P	Low P
	(1)	(2)	(3)	(4)	(5)	(6)	(7)
Boardfem	-0.0198***	-0.0167	-0.00358	-0.009	-0.024***	-0.0141**	-0.0244**
	(0.00601)	(0.0138)	(0.0149)	(0.008)	(0.008)	(0.00615)	(0.0114)
_cons	-0.0845***	-0.0291	-0.000915	-0.096***	-0.089**	-0.0843***	0.108**
	(0.0235)	(0.0470)	(0.0524)	(0.035)	(0.039)	(0.0247)	(0.0431)
X	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Time FE	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	15,131	3,528	2,912	12519	9052	16,269	5,293
R-squared	0.005	0.008	0.008	0.019	0.009	0.004	0.008

4.3 Analysis of Regulatory Effects

As can be seen from Table 3, the regression coefficient of the interaction term between the proportion of female executives and board gender diversity on the level of inefficient investment is -0.062, and it passes the statistical significance test at the 5% confidence level. It can be found that the interaction effect of female executives and board gender diversity has a more pronounced positive effect on efficient investment. This implies that in firms with a higher proportion of female executives, the increase in board gender diversity due to an enhanced proportion of female directors will contribute to the original positive effect on investment efficiency, which means female executives have a positive moderating effect to a certain extent.

Table 3 Analysis of Regulatory Effects

	(1)
	Absinv
Boardfem_topfem	-0.062**
	(0.027)
C_boardfem	-0.001
	(0.006)
C_topfem	-0.001
	(0.005)
Constant	-0.242***

	(0.032)
X	YES
Year Fe	YES
Observations	21571
R-squared	0.050

5. Conclusion

This paper makes the following policy recommendations. First, from a macro perspective, we should follow the example of countries such as Sweden and Norway in establishing a statutory proportion of female directors, thereby helping enterprises to reduce inefficient investment and ultimately improve investment efficiency. Secondly, from the perspective of micro-enterprises, especially the highly productive state-owned enterprises in the east, attention should be paid to the great role played by women at the level of corporate governance, giving female workers the opportunity and possibility of promotion.

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