

Board Diversity and Firm Performance: An Analysis Based on Fixed Effects Model

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Abstract. The purpose of this paper is to investigate the effect of board diversity on firm performance. In particular, this research focus on the correlation between the performance and the proportion of female directors or managers in the company. This article use data from China's stock market to conduct a regression analysis. The results indicate that firm performance improves with a higher proportion of female directors. The result still holds after a series of robustness checks. This paper provides some insights to understand the impact of board diversity and the role of females on the development of listed firms and the economy.

Keywords: board diversity; firm performance; audit quality.

1. Introduction

Managers play a very important role in companies. The personal characteristics and management style of the manager may influence the behavior of the company. Gender is an important personal trait for directors, and gender-diverse boards greatly impact corporate finance [1]. As the proportion of female directors on boards increases, a growing number of people pay more attention to the role of female directors in public companies. Existing research has examined the impact of female directors on the risk of stock price crashes, mandatory disclosure compliance, firm Investment, and so on [2]. Unlike the existing studies, this paper aims to find the impact of board gender diversity on firm performance based on the sample of the Chinese stock market.

In reality, more and more women are taking up leadership positions, showing their charm, and playing a leading role in the political and business arena. At present, female cadres in the country account for 39% of the cadre team. However, there are two totally opposite views concerning the impact of female directors and managers on the development of listed firms.

On the one hand, a large number of outstanding women with both ability and political integrity have taken up leadership positions at all levels and won praise for their outstanding performance [3]. Managers play a very important role in the company, and a gender-diversified board of directors greatly impacts corporate finance. For female managers, their personality characteristics often help companies invest successfully and benefit the company. Compared with the recklessness and carelessness of men, women are generally calmer and more patient, and these characteristics usually make female managers more stable and more competitive [4]. At the same time, the calmness of women will make the company more cautious about investment decisions and reduce the company's investment risk to a certain extent. According to data from a joint survey conducted by *the UN Women's Development Fund and the Association of Women Entrepreneurs*: if a company's average loss rate is 20%, the loss rate of a company managed by women is only 2%. Affinity is a unique force for women. It can make the company team more cohesive, strengthen the trust between company colleagues, and improve the work efficiency of subordinates from the side.

Meanwhile, because women usually have a lively and cheerful personality and a pragmatic and enterprising personality, they strongly appeal. Such female managers can gather people into a team,

complete their work more efficiently, and encounter emergencies. A report published in the Harvard Business Review in the United States shows that if there are three or more women on the board of directors, the collaboration between the board members will be stronger. They are more willing to communicate and discuss with each other [5]. From the company's perspective, due to the pragmatic and enterprising nature of women, within the company, female managers are more daring to expose the company's shortcomings and dark sides and take relevant measures to deal with these negative situations [6]. McKinsey once issued a report in which a survey showed that companies in which women hold management positions tend to achieve better performance than their competitors. This shows that the company led by female managers is better and shows that female managers can better enhance their company's strength through introspection.

Furthermore, female directors are more risk-averse. Based on psychological theories and research, women behave more cautiously and conservatively than men [7]. At the same time, female managers have a preference for reducing risk in the financial decision-making environment. For example, companies with a higher proportion of female directors have less risk of overinvestment during the financial crisis [8]. This means that female directors are more cautious in making investment decisions when faced with uncertainty.

In addition, female directors can increase the company's public disclosures. Existing evidence shows that gender-diversified boards publicly disclose more company-specific information and increase transparency [9]. According to an empirical analysis of 128 listed companies in Australia, the existing study proves that companies with a high proportion of women on the board of directors have a low rate of corporate fraud [10]. Another study investigates the relationship between the gender diversity of the board of directors of listed companies and mandatory disclosure compliance (measured according to the *International Financial Reporting Standards*) and finds a positive correlation [11]. All these research results show that female directors have a positive influence on the company's information disclosure. Internal information disclosure helps investors evaluate the effectiveness of internal control and the quality of financial reports and helps reduce the degree of information asymmetry between investors and the company. In summary, a higher proportion of women can have a positive effect on company performance.

Contrary to the above argument, there exists an opposite view concerning the impact of females in the development of listed firms. For example, recent research and analysis reports have shown that female managers often miss out on projects that should have been successful because of their conservative personalities and overly careful working style [12]. Female managers often miss many good opportunities because of their factors, such as excessive attention to family and too strong empathy. The analysis and research on managers' venture capital and business capabilities show that individuals with high achievement motivation can commit to the goal. This goal commitment encourages individuals to invest more time and energy to obtain better job performance [13]. At the same time, for female managers, the sense of responsibility is also a particularly important factor. Female managers will lead to biases in the choices of listed companies due to their heavy sense of responsibility. Female managers often grasp one or more deviation points to select corresponding problems. Still, this excessive sense of responsibility will cause slower follow-up of the project, which will affect the company's project strategy under certain circumstances. Changes in choice and time to follow up.

From the self-analysis of the success of female managers, self-effort and family support are particularly important. But on the contrary, by analyzing the disadvantages of female managers' failure, family is also an important factor affecting female managers. Faced with the pressure of competition from companies, many female managers will have conflicts and contradictions between family and work. At this time, it is more necessary for female managers to balance the two. Research results show that work-family conflict, as a source of stress, has many negative effects, such as physical and psychological discomfort, low work efficiency, attitude burnout, absenteeism and turnover, morale frustration, quality of life, and decline in mental health [14]. Female managers often have problems with their work standards due to life pressures and unresolvable interpersonal conflicts. By analyzing

multiple cases, the probability of this type of female manager is much higher than that of male managers. In addition, the excessive meticulousness and indecision of many women often make female managers hesitate and miss opportunities when making decisions. In the end, the company will likely lose the opportunity to choose a project or a crisis such as unfavorable competition. Part of female entrepreneurs is to enrich themselves or achieve their goals in a certain way, and such goals are often based on family considerations [15]. This further confirms that in the process of facing important corporate issues, female managers may have problems with decision-making on strategies and opportunities.

In traditional cases, some people think those female managers are more inclined to avoid risks than male managers because studies have shown that female CFOs adopt more cautious financial reporting policies and often show more risk aversion characteristics [16]. In addition, female managers are more willing to reduce the company's leverage ratio; they may reduce risks by reducing long-term debt, thereby making the company more capable of repaying debt. At the same time, many studies are indicating that female directors are more sensitive to reputation issues. As a result, female-led companies are more likely to have lower earnings management, financial manipulation, and security fraud. Based on the above discussion, a higher proportion of female directors will reduce the performance of listed companies.

Our study focuses on the sample from the Chinese stock markets, and this research has examined the effect of board gender diversity on the performance of listed firms. Our results suggest that the higher the proportion of female members taking place on the board, the better the company's performance. After a series of robustness checks, this conclusion still holds. In addition, we also find that the effect of gender diversity in the board is more significant in less organized companies or companies that have underperformed comparatively.

Our contributions are as follows. First of all, this study is dedicated to studying the influence and role of gender in the management of listed companies. We find those female executives seem to bring higher returns to the company and increase the company's transparency to a certain extent. Second, we have expanded the existing literature on the research on the factors affecting firm performance and used the full sample data by constructing models to organize and utilize it. Through the huge data stream, we seem to understand that companies managed by female executives will increase higher profitability than other companies. Finally, this article finds that the role of gender diversity is more significant in listed companies with poor corporate governance and provides a valuable reference for how to play the role of gender diversity.

In the rest of this paper, Section 2 mainly provides data and methodology based on various research analyses and investigations. In Section 3, this article compares the ratio of return on total assets and the proportion of female directors between companies through data analysis. Through comparison and analysis, it is concluded that women have a very significant positive impact on ROA. When more relevant control variables are included in the model, the conclusion is still valid. In summary, in Section 4, this study is summarized. It is concluded that the role of gender diversity in the board of directors is more significant in some listed companies with poor corporate governance. This article also provides hypothetical opinions on how listed companies can maximize gender diversity.

2. Methodology

2.1 Data source and sample selection

This study initially adopts the data of China's A-share listed companies from 2007 to 2018. Through the analysis of existing data, other types of analysis and experiments are extended. For example, this study eliminates the listed companies in the financial industry and determines the content and parts of the industry other than finance that is affected by gender diversity. At the same time, this study also chooses to exclude ST-listed companies and data sources for observations that cannot be calculated for control variables due to insufficient data.

2.2 Main variables

Following extant studies, we adopt return on assets (ROA) to measure firm performance, which can proxy for the profitability of a given company. Meanwhile, we select the proportion of female directors among all directors to measure board diversity. In addition, we also include some well-known control variables in our regression model, including firm size (*Size*), cash holding ratio (*Cash*), listed company's listing period (*Age*), financial leverage (*Lev*), book-to-market ratio (*BM*), and the percentage of independent directors in all managers (*Board*).

2.3 Regression model

The hypothesis to be tested is that firm performance is a function of female directors and other control variables. We propose the following regression model:

$$ROA_{i,t} = \beta_0 + \beta_1 female_{i,t} + \beta_n Controls_{k,i,t} + \varepsilon_{i,t} \quad (1)$$

where β_1 represents regression coefficient; ε is an error term; and control variables contain *Size*, *BM*, *Age*, *Lev*, *Cash*, and *Board*. A negative (positive) β_1 suggests that female directors tend to decrease (increase) firm performance. This study collects samples and data from the China Stock Market and Accounting Research (CSMAR) database. To exclude the impact of outliers, we also minorize all continuous variables at both of the 1% tails.

3. Empirical Results

3.1 Summary statistics

First of all, we conduct the summary statistics of our selected variables. As shown in Table I, we report the descriptive statistics of the ROA of the companies and the female proportion in the board (denote as *female*), respectively. The mean ROA amongst the listed companies is 0.04, and the maximum ROA is 0.22%, and the minimum ROA is -0.28%, which indicates that the mean value of ROA of our sample is 4%. There exist relatively high differences among the ROA of various listed firms. The female proportion in the board is between 0.00 and 0.45, with an average of 0.13, indicating that there are 13% female directors and managers among the top managers of our sample.

Table 1. Summary Statistics

Variable	N	mean	sd	min	p25	p50	p75	max
ROA	29414	0.04	0.07	-0.28	0.01	0.03	0.07	0.22
ROA_pre	26039	0.03	0.07	-0.29	0.01	0.03	0.06	0.23
femalep	28351	0.13	0.11	0	0	0.11	0.2	0.45
Size	29421	6.43	0.54	5.27	6.05	6.43	6.77	7.93
BM	27187	0.95	0.9	0.09	0.39	0.67	1.17	5.56
Lev	29416	0.42	0.23	0.02	0.24	0.41	0.58	1.16
Age	29421	9.91	6.31	1	4	9	15	24
Cash	23937	0.21	0.2	0.01	0.08	0.15	0.26	1.19
Board	29265	0.37	0.05	0.27	0.33	0.33	0.4	0.57

3.2 Baseline results

Table II analyzes the relationship between the ROA of the listed companies and the female proportion. The relationship between *ROA* and *femalep* is shown by their coefficient, which is significantly positive at the 1% significance level. Therefore, this follows our previous assumption that a higher proportion of female members on the board can positively affect firm performance.

Table 2. Baseline Results

Dependent variable =	ROA	ROA
	(1)	(2)
<i>femalep</i>	0.016*** (4.50)	0.019*** (5.88)
<i>Size</i>		0.041*** (42.91)
<i>BM</i>		-0.005*** (-9.36)
<i>Lev</i>		-0.091*** (-46.51)
<i>Age</i>		-0.001*** (-13.05)
<i>Cash</i>		0.043*** (19.88)
<i>Board</i>		-0.036*** (-5.16)
Constant	0.003 (0.86)	-0.166*** (-10.63)
Observations	28,345	22,487
R-squared	0.031	0.229
Industry FE	Yes	Yes
Year FE	Yes	Yes

3.3 Robustness checks

One may argue that our empirical results may be influenced by the endogeneity concerns such as reverse causality and omitted control variables. In this section, we adopt the following two approaches to ensure the correctness and stability of our empirical results. First, to exclude the influence of reverse causality, we use *femalep* to regress the ROA of the next period, and the result in Table III is still significantly positive at the 1% significance level.

Table 3. Robustness Check: The Impact On The Roa In The Next Period

Dependent variable =	ROA_pre	ROA_pre
	(1)	(2)
<i>femalep</i>	0.015*** (3.95)	0.018*** (4.66)
<i>Size</i>		0.034*** (31.67)
<i>BM</i>		-0.008*** (-13.28)
<i>Lev</i>		-0.049*** (-22.41)
<i>Age</i>		-0.001*** (-8.63)
<i>Cash</i>		0.048*** (19.53)
<i>Board</i>		-0.029*** (-3.66)
Constant	-0.012*** (-3.19)	-0.143*** (-8.45)
Observations	25,055	19,563
R-squared	0.026	0.144
Industry FE	Yes	Yes
Year FE	Yes	Yes

Second, to exclude the impact of omitted variables on our results, we incorporate additional control variables into the model. Specifically, we incorporate the following control variables into the model: *Mgshare* (management shareholding ratio), *INST* (institutional investor shareholding ratio), *Analy* (analyst following, which is measured by the number of analysts following a given listed company each year), and the result in Table IV is still valid. The above regression results indicate that our findings are not driven by the reserve causality and omitted controls variables.

Table 4. Robustness Check: Including Additional Controls Variables

Dependent variable	= ROA	ROA	ROA	ROA
	(1)	(2)	(3)	(4)
<i>femalep</i>	0.016*** (4.27)	0.019*** (4.91)	0.015*** (4.04)	0.015*** (3.96)
<i>Size</i>	0.036*** (32.63)	0.028*** (22.57)	0.015*** (11.53)	0.010*** (7.32)
<i>BM</i>	-0.007*** (-12.93)	-0.008*** (-13.50)	-0.007*** (-12.34)	-0.007*** (-12.34)
<i>Lev</i>	-0.048*** (-21.81)	-0.050*** (-22.84)	-0.050*** (-23.16)	-0.050*** (-23.03)
<i>Age</i>	-0.000*** (-4.08)	-0.001*** (-9.24)	-0.000 (-1.18)	0.000 (1.60)
<i>Cash</i>	0.047*** (19.26)	0.047*** (19.15)	0.041*** (17.15)	0.040*** (16.52)
<i>Board</i>	-0.033*** (-4.10)	-0.025*** (-3.19)	-0.028*** (-3.55)	-0.027*** (-3.46)
<i>Mgshare</i>	0.024*** (7.88)			0.024*** (7.69)
<i>INST</i>		0.023*** (9.86)		0.028*** (11.40)
<i>Analy</i>			0.001*** (25.25)	0.001*** (23.64)
Constant	-0.149*** (-9.40)	-0.109*** (-6.33)	-0.031* (-1.80)	-0.012 (-0.70)
Observations	19,547	19,563	19,563	19,547
R-squared	0.146	0.148	0.171	0.177
Industry FE	Yes	Yes	Yes	Yes
Year FE	Yes	Yes	Yes	Yes

3.4 Additional analysis

In addition to the above analyses, the conditional relationship between female directors in the company and the monitoring mechanisms (such as using the Big 4 auditors) is also worthy of attention. Whether the Big 4 auditors audit a given listed company or not, we divide our full sample into the following two sub-groups: Big 4 sample and non-Big 4 sample. Then, we re-estimate our regression model based on the above two sub-groups.

According to the results in Table V, we conclude the following findings: (1) The corporate governance of the companies that the Big 4 auditors did not audit is relatively weak. (2) The results show that the role of female directors is more significant in firms with weaker corporate governance mechanisms. (3) Female directors can play a complementary role to the imperfect governance and monitoring mechanisms of listed companies.

Table 5. Additional Analysis: The Impact Of Big4

0	ROA	ROA
	(1) Big4=1	(2) Big4=0
<i>femalep</i>	0.014	0.015***
	(0.97)	(3.72)
<i>Size</i>	0.010**	0.019***
	(2.45)	(11.48)
<i>BM</i>	-0.003**	-0.004***
	(-1.98)	(-5.37)
<i>Lev</i>	-0.097***	-0.094***
	(-13.00)	(-40.19)
<i>Age</i>	0.000	0.000
	(1.21)	(0.18)
<i>Cash</i>	0.042***	0.032***
	(4.33)	(11.96)
<i>Board</i>	-0.073***	-0.030***
	(-2.98)	(-3.47)
Constant	0.035	-0.051*
	(1.18)	(-1.70)
Observations	1,145	15,716
R-squared	0.370	0.276
Industry FE	Yes	Yes
Year FE	Yes	Yes

4. Conclusion

This paper investigates how the proportion of female directors or managers in the company affects firm performance using data from China's stock market. First of all, we find that board diversity has a significantly positive effect on firm performance. Secondly, as we take a further look at our regression results, we have discovered that the effect of board gender diversity is more influential amongst companies that are comparatively under-performed. For example, companies that have not been audited by Big 4 tend to perform better with a higher proportion of female members. This may suggest that firm performance is less affected once they are equipped with better corporate governance. Finally, our results are robust after carrying some robustness checks, and the findings still hold.

The explanation of this phenomenon is explained by the fact that women are considered more sensitive to a company's reputation and more risk-averse compared to men. Therefore, this paper provides some insights for the company's policymakers to construct a more balanced board structure to improve the company's earning and avoid risky decisions, which may be helpful on the stable development of listed firms and the whole capital markets.

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