Study on the influence of female executives on corporate performance

Yiran Feng [1, *]

[1]Shanghai Jiaotong University, Shanghai, China;

* fyran2002@sjtu.edu.cn

Abstract. With the gradual expansion of the team size of female executives, the influence of female on corporate performance has attracted the attention of many scholars at home and abroad. This paper takes Chinese A-share listed companies from 2008 to 2020 as the research sample to explore the influence of female executives on corporate performance and the moderating effect of enterprise scale on this influence. The study shows that increasing the proportion of female executives has a positive effect on corporate performance, but the expansion of enterprise scale has a weakening effect on the positive effect. When the enterprise scale reaches a certain degree, the partial effect of the proportion of female executives on corporate performance turns from positive to negative. This paper provides new empirical evidence for relevant theoretical research, and has certain guiding significance for optimizing the allocation of corporate executive team, bringing female executives' superiority into full play, so as to improve corporate performance and promote the high-quality development of enterprises.

Keywords: female executives; enterprise scale; corporate performance

1. Introduction

With the rapid development of economy and culture, women have gradually taken more roles in society, and more women have emerged in economic activities and taken hold in enterprise management. More and more women who are behind the scene are moving to the stage, breaking through the "ceiling" of career development and becoming senior managers in enterprises. More than 70 percent of companies are committed to creating a more inclusive corporate culture and attracting more female talent in a fierce competition for talent, and 90 percent of mid-market companies have at least one female senior manager, according to the 2022 Women in Business Survey report released on March 4 by Zhi Tong. The number of female executives in mid-market companies globally rose to 32% from 31% in 2021, and the report expects that figure to reach 34% in 2025 as companies become more inclusive. The total number and proportion of female executives in each year are calculated based on the data of executives in the corporate governance database of 4204 enterprises in CSMAR from 2008 to 2020, as shown in Figure 1. As can be seen from the figure, gender diversity in China's senior management team has been on the rise in recent decades. The proportion of female senior management in the team has increased from 12% in 2008 to 17.5% in 2020. In terms of the total number, the total number of female senior management was

less than 3,000 before 2015, but exceeded 5,000 in 2020. The increase in both the proportion and the total number means the increasing participation of women in senior management.

Figure 1 Total number and proportion of female executives

女性高管总数及占比
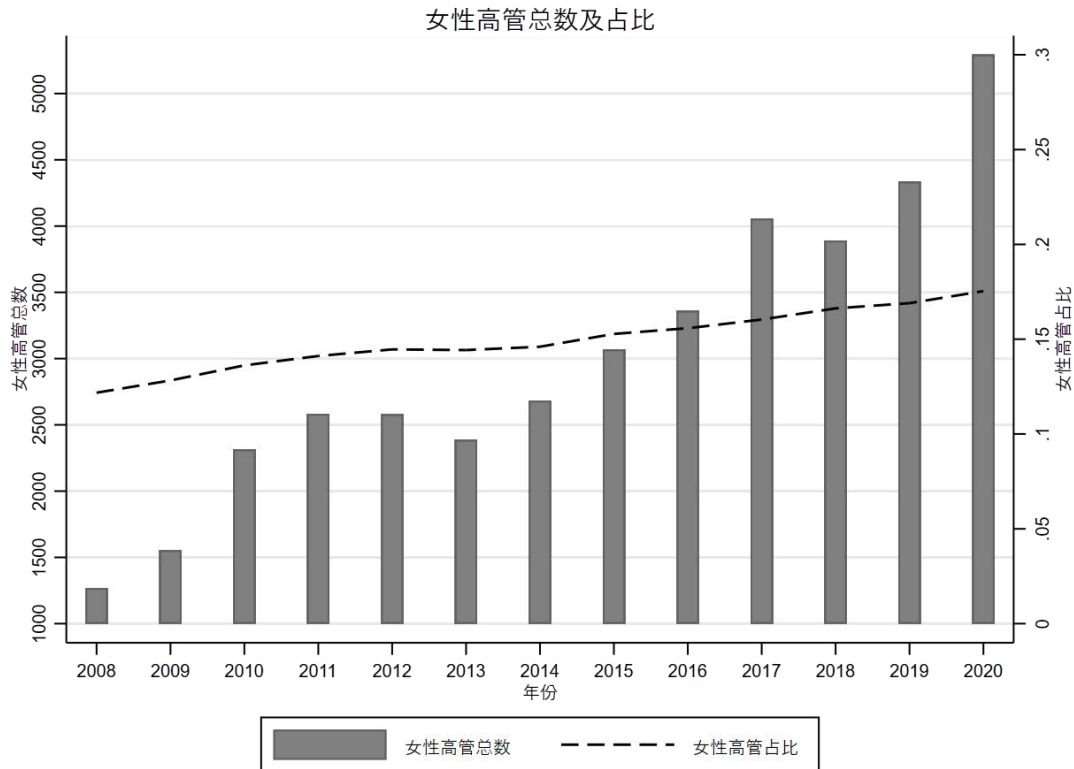
数据源于国泰安数据库中2008至2020年董监高个人特征文件

2. Literature Review and Research hypotheses

In the context of increasing gender diversity in senior management teams, the influence of female executives on corporate performance has attracted extensive attention from scholars at home and abroad (Adams & Ferreira, 2009; Lee, Marshall, Rallis, & Moscardi, 2015; Xu Yan, 2018; Ren Ruoxue, 2020). Numerous theoretical studies show that increasing female participation in senior management teams has a positive effect on enterprise performance. The first is leadership style theory, that is, compared with male managers, female managers are more inclined to democratic and participative leadership style. Women have a greater ability of observation and acuity. They often able to capture more detailed information and have better language expression ability. They can better handle interpersonal relationships. Based on these advantages, women usually adopt the mode of "flexible management". Through the guidance and education, such as way to motivate employees to combine personal interest and organization, so as to realize the management goal. Male managers, on the other hand, tend to adopt a more direct command guidance approach. The second is agency theory. The main conflicts of agency costs are caused by the inconsistent interests of creditors and shareholders, which are manifested as overinvestment and underinvestment of enterprises (Jensen & Meckling, 2019). Since shareholders have limited liability but share residual income, when the income of an investment is higher than the cost of using debt, shareholders tend to choose this project, even though the project has a low probability of success. If the project fails, the main loss will be borne by creditors. Overinvestment refers to this type of investment for the enterprise is not optimal. Psychological studies show that, compared with men, women are more risk-averse and more cautious and conservative in project selection, which can

reduce overinvestment. In this way, gender diversity of senior management members helps reduce the agency costs of enterprises (Jurkus, Park & Woodard, 2011).

Female executives can influence corporate performance in a number of ways. Women may have different perspectives on important strategic issues, especially those related to female customers, employees and partners (Daily et al., 1999). Generally speaking, they are more heterogeneous groups with different knowledge and perspectives, and will consider more comprehensive solutions. This results in higher quality decisions (Wiersema & Bantel, 1992; Van Knippenberg et al., 2004). On the other hand, the emergence of female members of the executive means that even if women promotion inherent barriers exist in the workplace, the enterprise culture is still friendly to women and the affirmation of women' progress and achievement makes the women at the middle and lower management company staff have a greater motivation for work , improve personal performance, and contribute to the team in the enterprise to obtain more opportunities for advancement. In addition, the diversity of an enterprise's senior management team makes the enterprise more attractive to high-quality female talents, because they believe that they can realize their value more in a gender-inclusive enterprise, and the introduction of high-quality talents has a positive imfluence on the enterprise's performance.

Although many theoretical studies have shown that female executives have a positive influence on corporate performance, empirical studies on this issue at home and abroad have drawn different or even opposite conclusions. Some studies have provided evidence that female executives have a positive influeence on corporate performance (e.g., Carter et al., 2003; Smith et al., 2006; Campbell & Minguez-Vera, 2008; Arun et al., 2015; Reguera-Alvarado et al., 2015; Wang Hui, 2022), and some studies showed that there was no obvious relationship between them (e.g., Klein, 1998; Kochan et al., 2003; Rose, 2007; Wang & Clift, 2009; Dobbin & Jung, 2010; Carter et al., 2010), as well as having negative effects (e.g., Zahra & Stanton, 1988; Adams & Ferreira, 2009; Ahern & Dittmar, 2012; Kuang Xuewen et al., 2012; Terjesen et al., 2016). Among them, after controlling enterprise size, industry and some corporate governance measures, Carter et al. (2003) took Fortune 1000 enterprises as samples to study the relationship between director diversity and corporate value, and found that there was a significant positive correlation between the proportion of women on the board of directors and corporate value. Smith et al. (2006) took 2500 listed companies in Denmark as their research samples. After controlling for company characteristics such as industry, company age and number of employees, they found that the proportion of female executives was significantly positively correlated with enterprise performance. Kochan, etc. (2003) to the fortune 500 employees in more than 26000 people in the IT industry enterprises as the research object, analysis of racial and gender diversity and corporate performance, the relationship between the ethnic diversity research shows that only under certain conditions can be a positive impact on corporate performance, and there is no evidence that gender diversity is related to the enterprise performance. Adams and Ferreira(2009) took American enterprises as samples and found that gender diversity had a negative impact on corporate performance. In addition, their research results showed that mandatory gender quota of directors would reduce corporate performance. Kuang (2012) took the data of listed companies in Shanghai and Shenzhen from 2006 to 2010 as samples, and the empirical results showed that increasing female directors reduced the financial performance of enterprises.

Different empirical findings may stem from data from different countries and different periods of time, and from different measures of corporate performance. In fact, corporate characteristics and organizational environment will influence the relationship between female executives and corporate performance (Dwyer, Richard, & Chadwick, 2003; Kochan et al., 2003), such as corporate culture, organizational structure, corporate strategic objectives, etc. Van Knippenberg et al. (2004) proposed that moderator variables should be included in the study of the impact of gender diversity on corporate performance. Dezso et al. (2012) take the input of enterprises to innovation as the moderator variables, and believe that the positive effect of female proportion in top managers on enterprise performance is obvious only when enterprises attach importance to innovation. For the

following reasons, enterprise size is selected as the moderator variable in this paper. Gender-diverse executive teams are more creative and have more information and perspectives, which leads to more effective decision-making and improves business performance. However, enterprise size will promote or limit the daily business activities of the enterprise, such as intra-group discussion, information processing and decision implementation, etc., so that the gender diversity of the senior management team will have different degrees of impact on the enterprise performance. Large enterprises usually have more complex hierarchical structure (Nelson, 1985), more resistance to internal information circulation, more extensive distribution of rights (Papadakis, 2006), and managers have less discretionary power, which may weaken the positive effect. On the other hand, small-scale enterprises are more flexible, with faster information transmission, more efficient decision implementation and less resistance to adjusting strategy and planning, so that the corporate performance is more closely related to the decision-making of the senior management team. Therefore, this paper includes an interaction term between enterprise size and the proportion of female executives in the model to explore the influence of female executives on corporate performance and the moderating effect of enterprise size on this influence.

Most of the existing researches on the relationship between female executives and corporate performance take the listed companies of developed countries as samples, and the researches on emerging markets and developing countries are relatively lacking. Due to the great difference in market environment and system mode between China and foreign countries, the existing researches do not have useful guidance for Chinese enterprises. This paper takes Chinese enterprises as the research object to explore the influence of female executives on corporate performance and the moderating effect of enterprise size. Based on the above analysis, the hypotheses are as follows:

Hypothesis 1: Female executives have a positive influence on corporate performance.

Hypothesis 2: The increase of enterprise size weakens the positive influence of female executives on enterprise performance.

3. Study Design

3.1 Sample selection and data sources

This paper takes A-share listed companies from 2008 to 2020 as the research sample, and the sample data is from the series database of Guo tai 'an (China Stock Market Transaction Data - Listed Company Research). The female executive variables were obtained according to the personal characteristics files of Dong Jiangao in the National Guo tai 'an Database. In order to prevent abnormal samples influence research conclusion, the initial sample are filtered according to the following principles: (1) Excluding ST or PT samples of listed companies. Due to abnormal financial conditions or deficit for three consecutive years, the asset-liability ratio of such companies is often more than 100 %, which is of no reference significance. (2) Financial listed companies are excluded. Considering that their accounting system and scope of main business activities are significantly different from those of ordinary enterprises, such companies are excluded. (3) Samples with serious data loss at the senior management team and enterprise level were removed. (4) In order to avoid the influence of extreme values on the empirical results, the variables with obvious outliers were tailed bilaterally at the 1st and 99th quantiles. After the above screening, the data of 4,204 companies were finally retained.

3.2 Definition and selection of variables

1. Explained variables: There are many indicators to measure enterprise performance, which are mainly divided into two categories: one is market indicators, such as Tobin's Q; One is financial indicators, such as return of Total assets (ROA). Tobin's Q is the ratio of a firm's market value to its replacement cost, which reflects the firm's value in the capital market (market value = year-end stock closing price * total shares + total liabilities). Return of Total Assets (ROA) is expressed by the ratio of net profit to total assets, which is obtained from

financial statements and reflects the level of business activities of enterprises. Considering the calculation bias in accounting measurement, the rate of return measured by accounting may be different from the true economic rate of return (Benston, 1985). While accounting numbers may be distorted by tax laws, accounting regulations, and earnings management, Tobin's Q values use a risk-adjusted discount rate and minimize possible biases caused by tax laws and accounting conventions. Therefore, Tobin's Q value is used as the explained variable in this study (natural logarithm is used to correct skewness). In order to ensure the robustness of the research results, return on total assets (ROA) and turnover of total assets (ATO) are used as the alternative variables of enterprise performance in the robustness test.

2. Explanatory variable: femrate is used to represent the degree of gender diversity in the senior management team. Senior executives, senior managers for short, refer to the personnel in the management of a company who hold important positions, are responsible for the operation and management of the company and master important information of the company, mainly including the manager, deputy manager, chief financial officer, secretary of the board of directors of the listed company and other personnel stipulated in the articles of association of the company.

3. Control variables: variables that may have an impact on enterprise performance at the executive team level and enterprise level are included in the model, and dummy variables of time, industry and enterprise nature are included.

(1) Senior management team: The total number of senior management team (Numexcu), the average age of senior management team (age) and the average degree of senior management team (degree) are included in the model as control variables. Considering that a large scale (total number of executives) may reduce the efficiency of decision-making, and the average age and educational background of the senior management team are important factors affecting the experience and level of the senior management team, the influence of the above three variables on enterprise performance should be controlled.

(2) Enterprise: Enterprise size (lev), asset-liability ratio (Lev) and largest shareholder shareholding rate (LargestholderRate) are added into the model as control variables. Enterprise size is closely related to scale economy and team management cost. In this paper, the natural logarithm of total assets is used to represent enterprise size and is included in the model to control its impact on enterprise performance. Asset-liability ratio refers to the enterprise's ability to use the funds provided by creditors to carry out business activities. When the asset-liability ratio is high, the financial risk is high. When the cash flow is insufficient, the capital chain breakage may occur, affecting the daily business activities of the enterprise. The shareholding ratio of the largest shareholder reflects the ownership concentration of the enterprise, which is an important index to measure the stability and structure of the enterprise, so its influence on the enterprise performance should be controlled.

(3) Dummy variable: time dummy variable (year) was included to control the time effect; industry dummy variable (industry) was included to control the difference of different industries; The dummy variable of enterprise nature (equityid) was included to control the differences among state-owned enterprises, foreign capital, private enterprises and other types of enterprises. Due to the different property rights of enterprises, the policy support, tax incentives and financial subsidies given by the government are significantly different, which have different effects on the development of enterprises.

4. Moderator variable: Considering that the relationship between female executives and enterprise performance may be affected by enterprise size, an interaction term was included in the model to test the role of moderating variable (size).

Specific variable definitions and calculation methods are shown in Table 1:

Table 1 Variable definition and calculation method

types of variables	variable name	Variable abbreviation	Variable calculation
explained variable	Tobin Q value	Tobins_Q	firm market value/replacement cost of assets
explaining variable	Percentage of women in senior management	femrate	number of female executives/total number of executives
control variable	executive Team Size	Numexcu	total number of executives on the team
	Average age of the senior management team	age	the average age of the senior management team
	average education level of senior management team	degree	1= technical secondary school and below, 2= junior college, 3= undergraduate, 4= Master's degree, 5= Doctoral degree, 6= Other (education published in other forms, such as honorary doctorate, etc.), 7=MBA/EMBA.
	enterprise scale	size	natural log of ending total assets
	asset-liability ratio	lev	total liabilities/total assets
	maximum shareholder ownership ratio	LargestholderRate	the shareholding ratio of the largest shareholder of the enterprise
	time dummy variable	year	from 2008 to 2020, a total of 12 dummy variables were set
	Industry dummy variable	industry	according to the 2012 edition of China Securities Regulatory Commission industry classification code for classification
	enterprise nature dummy variable	eqiutyid	equity nature code 1= state-owned enterprise, 2= private enterprise, 3= foreign capital, 4= other

3.3 Model Building

In this paper, the fixed effect model is adopted for empirical test, and the following model is constructed for hypothesis 1 and hypothesis 2:

Model 1: Examine the relationship between the proportion of female executives and corporate performance

$Tobins\_Q_{i,t}=\alpha_0+\alpha_1\ femrate_{i,t}+\alpha ControlVariables_{i,t}+\eta_i+\varphi_i+\psi_t+\omega_{i,t}$

In this mode i represents firm, t represents time, η_i represents industry fixed effect, φ_i represents firm nature fixed effect, ψ_t represents time fixed effect, Tobins_Q measures firm performance, femrate measures gender diversity in the executive team, and ControlVariables is a set of control variables. If assumption 1 is true, α_1 should be significantly positive.

Model 2: Test the moderating effect of firm size on the relationship between female executives and firm performance

$$Tobins\_Q_{i,t}=\beta 0+\beta 1\ femrate_{i,t}+\beta 2\ femrate_{i,t}*size_{i,t}+\beta ControlVariables_{i,t}+\eta i+\varphi i+\psi t+\omega i,t$$

Size measures enterprise size, and femrate*size is the interaction term between the proportion of women in the senior management team and enterprise size. If hypothesis 2 is true, $\beta 2$ should be significantly negative.

4. Empirical Results and Analysis

4.1 Descriptive Statistics

As shown in Table 2, the value of Tobin's Q (after taking the natural logarithm) in the sample is 0.673, that is, the value of Tobin's Q is about exp(0.673)=1.96, which means that on average, the market value of an enterprise is 96% higher than its capital replacement cost, and there is a large difference in Tobin's Q value between different enterprises. The average proportion of women in the executive team is 16.1%, and the degree of gender diversity in the executive team of each enterprise is quite different. The average number of senior management team members is 7, the maximum is 45, the minimum is 1, the average age is 47, the median education level is 3.3, indicating that more than half of the senior management team members have at least a bachelor's degree. The scale, asset-liability ratio and ownership concentration of different enterprises are quite different.

Table 2 Descriptive statistics

Variable	Mean	p50	SD	Min	Max
Tobins Q	0.673	0.558	0.549	-0.395	9.603
femrate	0.161	0.143	0.167	0	1
Numexcu	6.991	6	3.572	1	45
age	46.77	46.91	3.950	28	70
degree	3.357	3.333	0.697	1	7
size	22.01	21.84	1.376	10.84	28.64
lev	0.435	0.424	0.220	0.0500	1.019
Largesthol~e	34.65	32.41	15.06	8.630	75.01

4.2 Empirical Regression Results

Column (1) of Table 3 is the regression model without explanatory variables and only with control variables. All control variables except age are obvious. The total number of senior management team, enterprise size and shareholding ratio of the largest shareholder are negatively correlated with enterprise performance, while the average education level of senior management team, asset-liability ratio and enterprise performance are significantly positively correlated. Results show that a small, highly educated senior team work more efficient and small-scale enterprises have stronger profitability. The samples show that disadvantages of concentration of ownership outweigh advantages. The possible reasons   when shareholders have too much power to be checked, lack of democratic decision-making process will reduce the quality of decision-making, which is not conducive to improve enterprise performance. Asset-liability ratio is positively correlated with corporate performance. Contrary to the expected sign, the possible explanation is that enterprises in the sample make insufficient use of financial leverage, so increasing financial leverage can improve corporate performance.

Table 3 Regression analysis of the proportion of female executives and corporate performance (Tobins_Q)

	Tobins_Q		
	(1)	(2)	(3)
Numexcu	-0.0214***	-0.0213***	-0.0213***
	(-32.92)	(-32.72)	(-32.73)
age	-0.0001	0.0001	0.0001
	(-0.11)	(0.17)	(0.14)
degree	0.0235***	0.0241***	0.0243***
	(4.88)	(5.02)	(5.05)
size	-0.2422***	-0.2419***	-0.2318***
	(-56.63)	(-56.57)	(-47.96)
lev	0.2180***	0.2181***	0.2186***
	(12.87)	(12.87)	(12.91)
Largest~e	-0.0054***	-0.0054***	-0.0054***
	(-17.51)	(-17.46)	(-17.55)
femrate		0.0550***	1.2754***
		(2.96)	(4.67)
femrate*size			-0.0560***
			(-4.48)
_cons	5.5452***	5.5167***	5.2983***
	(44.56)	(44.21)	(39.56)
year	Yes	Yes	Yes
industry	Yes	Yes	Yes
equityid	Yes	Yes	Yes
N	29884	29884	29884
F	169.9904	168.4603	167.1434
R2	0.3996	0.3998	0.4003

t statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Column (2) of Table 3 shows the regression model with the proportion of women in the senior management team. It can be seen from the regression results that the proportion of women in senior management is significantly positively correlated with corporate performance at the 1% level, and hypothesis 1 has been verified. The former coefficient of the proportion of women in the senior management team is 0.055, that is, when the proportion of women in the senior management team increases by 0.1, Tobin's Q value will increase by 0.55%. Specifically, the average total assets in the sample are 3.62 billion (calculated according to the mean value of variable size), and the mean value of Tobin's Q (after log removal) is 1.96, so the average market value of the enterprise is 7.09 billion (36.2*1.96), and the increase of Tobin's Q value by 0.55% is 1.97, so the enterprise value is 7.13 billion (36.2*1.97). Therefore, a 10% increase in the proportion of women in the senior management team increases the enterprise value by 40 million yuan on average, which is also significant in practical sense.

Column (3) of Table 3 shows the regression model in which the interaction term between the proportion of women in the senior management team and the enterprise size is added. According to the regression results, the coefficient of the interaction term is significantly negative at the 1% level. Hypothesis 2 is verified, and the increase of enterprise size weakens the positive effect of female executives on enterprise performance. According to Model 2, $\triangle$Tobins_Q/$\triangle$femrate=$\beta1+\beta2$*size. According to the regression results, $\beta1$ is significantly positive and $\beta2$ is significantly negative. The values of $\triangle$Tobins_Q/$\triangle$femrate calculated according to different percentiles of size are shown in Table 4. As the enterprise size increases, the positive effect of female executives on enterprise performance decreases. When the enterprise size is less than the 75th percentile in the sample, the

partial effect of female executives on enterprise performance is positive, and when the enterprise size exceeds the 75th percentile, the partial effect of female executives on enterprise performance turns negative. This indicates that the relationship between female executives and corporate performance is largely dependent on the size of the company.

Table 4 The moderating effect of firm size on the relationship between female executives and firm performance

Percentage of size	size	$\triangle$Tobins_Q/$\triangle$femrate
10%	20.488	0.128
25%	21.065	0.096
50%	21.842	0.052
75%	22.770	0.000
90%	23.786	-0.057

4.3 Robustness Test

Considering that there are multiple measurement index of corporate performance, Tobin's Q value is replaced by return on Total Assets (ROA) and turnover on total assets (ATO) to test the robustness of the regression results. Return on total assets (ROA) is an index used to measure the financial performance of an enterprise (ROA = net profit/average total assets), which reflects the income status of an enterprise. The higher the return on total assets, the stronger the profitability. Total assets turnover is an index used to measure the operating status of enterprise assets (total assets turnover = net sales revenue/average total assets), which reflects the turnover speed of all assets from input to output during the operation of the enterprise, and reflects the management quality and utilization efficiency of all assets of the enterprise. The higher the turnover of total assets, the stronger the sales ability of the enterprise, the better the benefit of asset investment. Regression analysis was conducted again on the model (no changes were found except for the explained variables), and the results were shown in Tables 5 and 6.

Table 5 Regression analysis of the proportion of female executives and corporate performance (ROA)

	ROA		
	(1)	(2)	(3)
Control variables	Yes	Yes	Yes
year	Yes	Yes	Yes
industry	Yes	Yes	Yes
equityid	Yes	Yes	Yes
femrate		0.0251**	0.3792**
		(2.02)	(2.13)
femrate*size			-0.0163**
			(-2.00)
_cons	-0.7767***	-0.7890***	-0.8517***
	(-9.68)	(-9.80)	(-9.86)

t statistics in parentheses * $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

Table 6 Regression analysis of the proportion of female executives and corporate performance (ATO)

	ATO		
	(1)	(2)	(3)
Control variables	Yes	Yes	Yes
year	Yes	Yes	Yes
industry	Yes	Yes	Yes
equityid	Yes	Yes	Yes
femrate		0.0352**	0.9431***
		(2.10)	(3.92)
femrate*size			-0.0417***
			(-3.78)
_cons	1.2537***	1.2364***	1.0770***
	(11.52)	(11.33)	(9.21)

t statistics in parentheses * p < 0.1, ** p < 0.05, *** p < 0.01

In column (2) of Table 5, the coefficient before the proportion of female executives is 0.0251, which is significant at 5%; in column (3), the coefficient before the proportion of female executives is 0.3792, which is significant at 5%; the coefficient before the interaction term between female executives and enterprise scale is -0.0163, which is significant at 5%. It is the same as the conclusion obtained when Tobin's Q value is used as the enterprise performance measurement index. Hypothesis 1 and Hypothesis 2 are verified. In column (2) of Table 6, the coefficient before the proportion of female executives is 0.0352, which is significant at the 5% level; in column (3), the coefficient before the proportion of female executives is 0.9431, which is significant at the 1% level; the coefficient before the interaction term between the proportion of female executives and the enterprise scale is -0.0417, which is significant at the 1% level. Therefore, hypothesis 1 and Hypothesis 2 are verified again. It can be seen that the conclusions obtained in this paper are still robust after the performance indicators of enterprises are replaced by return on total assets and turnover of total assets.

4.4 Endogenous Problem

The main possible endogeneity problem in this paper is "reverse causality". The above empirical studies conclude that female executives have a positive impact on corporate performance, but some theoretical studies show that conversely, higher corporate performance may encourage companies to hire more female executives, thereby increasing the proportion of women in the senior management team. Fewer women have experience in senior management positions, which may make them self-select into more successful enterprises (Farrell and Hersch, 2005). In addition, companies with better performance are more likely to increase the proportion of women in the senior management team under social pressure, so as to conform to the ideal norms of gender diversity and improve the social image of the company in terms of inclusiveness, or because companies with better performance have more freedom and resources to do so. Therefore, the proportion of women in the senior management team in the model may endogenously depend on corporate performance.

This paper uses instrumental variables to deal with this endogeneity problem, using two instrumental variables: (1) the average ratio of women in the executive team of all other enterprises in the same industry lags by one period (L_aver_femrate) (Faccio, Marchica, & Mura, 2011); (2) The proportion of women in senior management team lags one period (L_femrate) (Gregory-Smith et al., 2014). The use of lagged period is to consider that there is little correlation between the non-observed factors affecting enterprise performance in the current period and the instrumental

variables in the lagged period. Good instrumental variables need to meet the two conditions of exogeneity and correlation. First, overidentification test is conducted on instrumental variables, and the test results are shown in Table 6. It can be seen that the null hypothesis of "all instrumental variables are exogenous" cannot be rejected in the two models. Then the test of weak instrumental variables is conducted, as shown in Table 6. The F statistic is large, and the null hypothesis is rejected, that is, there is no problem of weak instrumental variables.

The regression results using instrumental variables are shown in Table 6. In Model 1, the coefficient before the proportion of female executives is significantly positive at the 1% level, with a value of 0.1206, which is larger than the coefficient obtained using the fixed effect method. Model 2 female executives before proportion coefficient is significant at the 1% level for positive, interaction coefficient at the 1% level significantly negative, visible instrumental variable method is used to deal with endogenous problem after the conclusion remains the same, namely female executives have a positive effect on corporate performance, and the increase of enterprise scale to weaken this effect.

Table 6 Instrumental variable regression analysis of the proportion of female executives and corporate performance (Tobins_Q)

	Tobins_Q	
	IV	IV
Numexcu	-0.0114***	-0.0113***
	(-10.90)	(-9.87)
age	-0.0004	0.0002
	(-0.48)	(0.24)
degree	0.0255***	0.0307***
	(4.99)	(5.40)
size	-0.2540***	-0.0856**
	(-55.40)	(-2.33)
lev	0.1985***	0.2068***
	(11.06)	(10.51)
LargestholderRate	-0.0052***	-0.0058***
	(-15.94)	(-15.32)
femrate	0.1206***	20.2582***
	(3.23)	(4.66)
femrate*size		-0.9147***
		(-4.64)
Test of over-identification restrictions		
Sargan statistic (p-value)	0.4337	0.6433
Test of weak IV		
F test of excluded instruments of femrate	4351.9	2901.8
F test of excluded instruments of femrate*size		2940
year	Yes	Yes
industry	Yes	Yes
equityid	Yes	Yes
N	26162	26162
F	147.0766	122.3955
r2	0.3929	0.2765

t statistics in parentheses * p < 0.1, ** p < 0.05, *** p < 0.01

5. Conclusion and Suggestion

Taking Chinese listed companies as the research object, this paper empirically analyzes whether the participation of female executives in enterprise management has an impact on enterprise performance, and whether this impact is moderated by enterprise size. The conclusions are as follows: (1) Female executives have a positive effect on corporate performance; (2) The increase of enterprise size weakens the positive effect of female executives on enterprise performance. Mentioned in the literature review, the existing research for female executives and the relationship between the corporate performance results are not consistent. And combined with this paper, when the large size of enterprise is reached, female executives for partial effect of enterprise performance turn from positive to negative, which may explain the reason of different conclusions in the existing research, which ignores the function of moderator variables (such as enterprise scale).

As can be seen from Figure 1, although the number and proportion of women in China's senior management team have been on the rise, they are still relatively low on the whole. On the one hand, this is closely related to the traditional male-dominated business environment. On the other hand, compared with some European countries, China has less favorable policies for the inauguration and promotion of women. Therefore, China can learn from the experience of Western countries to create a favorable system and legal environment for the working of female executives and implement relevant policies to increase the proportion of female managers in listed companies. At the enterprise level, for small or moderate enterprises, the number of female members in the management level can be appropriately increased, and the speaking right and participation of female members in enterprise management can be increased, so that the positive effect of female executives on enterprise performance can be given full play. This can be achieved by attracting talented female external managers and consciously promoting female internal members to the executive team. But larger companies need to be more cautious about increasing the number of women in their executive teams.

References

[1] Xu Yan. Research on the Influence of Female Executives on Corporate Performance [D]. Hunan University,2018.

[2] Ren Ruoxue. Research on the Influence of Female Participation in Executive Team on Innovation Performance of Listed companies [D]. Yunnan University of Finance and Economics,2020.

[3] Wang Hui. The Influence of Female Executive Characteristics on Firm Performance [J]. Jiangsu Business Theory,2022(02):108-111.

[4] Kuang Xuewen, Peng Diyun, Lin Ni. Do Women Directors Improve Financial Performance? -- Based on empirical evidence of listed companies in China [J]. Jiangxi Social Sciences,2012,32(04):218-223.

[5] Adams R B, Ferreira D. Women in the boardroom and their impact on governance and performance[J]. Journal of financial economics, 2009, 94(2): 291-309.

[6] Lee L E, Marshall R, Rallis D, et al. Women on boards[J]. Global Trends, 2015.

[7] Jensen M C, Meckling W H. Theory of the firm: Managerial behavior, agency costs and ownership structure[M]//Corporate Governance. Gower, 2019: 77-132.

[8] Jurkus A F, Park J C, Woodard L S. Women in top management and agency costs[J]. Journal of Business Research, 2011, 64(2): 180-186.

[9] Daily C M, Certo S T, Dalton D R. A decade of corporate women: Some progress in the boardroom, none in the executive suite[J]. Strategic management journal, 1999, 20(1): 93-100.

[10] Wiersema M F, Bantel K A. Top management team demography and corporate strategic change[J]. Academy of Management journal, 1992, 35(1): 91-121.

[11] Van Knippenberg D, De Dreu C K W, Homan A C. Work group diversity and group performance: an integrative model and research agenda[J]. Journal of applied psychology, 2004, 89(6): 1008.

[12] Carter D A, Simkins B J, Simpson W G. Corporate governance, board diversity, and firm value[J]. Financial review, 2003, 38(1): 33-53.

[13] Smith N, Smith V, Verner M. Do women in top management affect firm performance? A panel study of 2,500 Danish firms[J]. International Journal of productivity and Performance management, 2006.

[14] Campbell K, Mínguez-Vera A. Gender diversity in the boardroom and firm financial performance[J]. Journal of business ethics, 2008, 83(3): 435-451.

[15] Arun T G, Almahrog Y E, Aribi Z A. Female directors and earnings management: Evidence from UK companies[J]. International Review of Financial Analysis, 2015, 39: 137-146.

[16] Reguera-Alvarado N, de Fuentes P, Laffarga J. Does board gender diversity influence financial performance? Evidence from Spain[J]. Journal of Business Ethics, 2017, 141(2): 337-350.

[17] Klein A. Firm performance and board committee structure[J]. The Journal of Law and Economics, 1998, 41(1): 275-304.

[18] Kochan T, Bezrukova K, Ely R, et al. The effects of diversity on business performance: Report of the diversity research network[J]. Human Resource Management: Published in Cooperation with the School of Business Administration, The University of Michigan and in alliance with the Society of Human Resources Management, 2003, 42(1): 3-21.

[19] Rose C. Does female board representation influence firm performance? The Danish evidence[J]. Corporate governance: An international review, 2007, 15(2): 404-413.

[20] Wang Y, Clift B. Is there a "business case" for board diversity?[J]. Pacific Accounting Review, 2009.

[21] Dobbin F, Jung J. Corporate board gender diversity and stock performance: The competence gap or institutional investor bias[J]. NCL Rev., 2010, 89: 809.

[22] Carter D A, D'Souza F, Simkins B J, et al. The gender and ethnic diversity of US boards and board committees and firm financial performance[J]. Corporate Governance: An International Review, 2010, 18(5): 396-414.

[23] Zahra S A, Stanton W W. The implications of board of directors composition for corporate strategy and performance[J]. International journal of management, 1988, 5(2): 229-236.

[24] Ahern K R, Dittmar A K. The changing of the boards: The impact on firm valuation of mandated female board representation[J]. The quarterly journal of economics, 2012, 127(1): 137-197.

[25] Terjesen S, Couto E B, Francisco P M. Does the presence of independent and female directors impact firm performance? A multi-country study of board diversity[J]. Journal of Management & Governance, 2016, 20(3): 447-483.

[26] Dwyer S, Richard O C, Chadwick K. Gender diversity in management and firm performance: The influence of growth orientation and organizational culture[J]. Journal of Business Research, 2003, 56(12): 1009-1019.

[27] Dezsö C L, Ross D G. Does female representation in top management improve firm performance? A panel data investigation[J]. Strategic management journal, 2012, 33(9): 1072-1089.

[28] Nelson R R. An evolutionary theory of economic change[M]. harvard university press, 1985.

[29] Papadakis V M. Do CEOs shape the process of making strategic decisions? Evidence from Greece[J]. Management Decision, 2006.

[30] Farrell K A, Hersch P L. Additions to corporate boards: The effect of gender[J]. Journal of Corporate finance, 2005, 11(1-2): 85-106.

[31] Faccio M, Marchica M T, Mura R. Large shareholder diversification and corporate risk-taking[J]. The Review of Financial Studies, 2011, 24(11): 3601-3641.

[32] Gregory-Smith I, Main B G M, O'Reilly III C A. Appointments, pay and performance in UK boardrooms by gender[J]. The Economic Journal, 2014, 124(574): F109-F128.