# The Impact of Female Leader Participation on Corporate Financial Performance

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#### Abstract

As women occupy an increasingly important position in global companies, female leaders' impact on their corporate financial performance has increasingly aroused attention. The research is to investigate the relationship between female leader participation and corporate financial performance from Chinese listed firms. This paper uses China's A-share non-financial listed firms from 2011 to 2018 as a sample, and Heckman two-stage model and propensity score matching are used to explore the relationship between female leader participation and financial performance, and further explore the relationship between female leader participation and financial performance, and further explore the reasons that affect the relationship between them under the background of such variables as business ownership and social responsibility. The results indicate that female leader participation can promote corporate financial performance and it's more obvious in state-owned firms in China. Corporate social responsibility plays an intermediary effect on the relationship between female leader participation. This paper enriches the research on the relationship between female leader participation and corporate financial performance. Guide firms to employ female leaders reasonably to achieve a high level of governance.

Keywords: Female Leader, Financial Performance, Business Ownership, Social Responsibility

#### 1. Introduction

#### **1.1 Background and Importance of the Problem**

Female position in the global labor market has been promoted continuously with the development of a social economy. The uniqueness and charm of female leadership have attracted more and more attention. In recent years, listed firms in many countries have introduced numerous initiatives to promote female leaders into management ranks. The European Commission, for example, has proposed that women should make up no less than 40% of the boards of all listed firms in Europe by 2020. With the implementation of various measures, female executives are playing an increasingly important role in corporate governance, and the management diversification of listed firms is becoming increasingly obvious. Glass, C. et al. (2016) points out that the participation of female leaders in the executive team has a positive impact on corporate social responsibility and financial performance improvement. Combining with the current economic condition in China, corporate financial performance plays an important role in stabilizing firm value as well as stimulating firm development.

9

#### **1.2 Research Question**

With extension and expansion of the theory of stakeholder, the theory of social responsibility strategic management, and other theories, firms have to undertake increasing social responsibility and improve their financial performance with the help of good social responsibility. Under such circumstances, what value can female leaders create for corporate financial performance and whether the unique gender advantage and management style of female leaders can promote the undertaking of corporate social responsibility and improve firm financial performance are urgent problems to be solved by firms. So, based on previous research defects, this paper tests the impact of female leaders in each proportion range on corporate financial performance to provide references for female leader participate in China. Therefore, research on the previous issues in this paper further fills in the impact of female leaders participation on financial performance and enriches the mechanism among female leaders, social responsibility, and corporate financial performance.

#### **1.3 Research Objective**

The contribution of this paper is to establish a variety of models and use different methods to verify the relationship between female leader participation and corporate financial performance, which provides further empirical support for the research on female leader ability to improve firm financial performance. Meanwhile, from the perspective of business ownership and social responsibility, it provides new evidence for the research on female leader participation and corporate financial performance to guide China's firms to absorb more female leaders into management ranks and participate in corporate governance.

#### 2. Literature Review

#### 2.1 Related Concepts and Theories

#### **Female Leader**

After analyzing concepts of female leaders, Sue, Hayward (2007) defines female leaders from both broad and narrow perspectives: from a narrow perspective, it refers to female employees with leadership ability; In a broad sense, it's not necessarily strictly limited to a female group, but also includes the leadership abilities of male leaders with feminine characteristics. Chen, F.(2005) believes that female leaders can adapt to the trend of the environment development, the lead director of corporate development, and promote continuous corporate progress through the establishment of a closed-loop from goal planning through implementation to achievement feedback.

#### **Financial Performance**

Financial performance refers to the corporate financial changes brought about by the operating policies implemented by management ranks. The measurement of financial performance is an objective evaluation by constructing a financial index system. This evaluation can analyze corporate financial performance from aspects of its profitability, operating ability, growth ability, and solvency, and can provide useful information for management ranks, investors, and other stakeholders.

# 2.2 Conceptual Framework

Based on the previous theoretical analysis, the paper constructs the research hypothesis model shown in Figure 1.



Figure 1 Research Hypothesis Model

# 2.3 Research Hypothesis

# Female Leader and Financial Performance

The impact of management gender composition on corporate governance and financial performance has been increasingly discussed by scholars. Lin, J.B. (2014) points out that the complexity of corporate operation requires the development of a diversified management structure. Carter, et al. (2003) and Ren, T., et al. (2010) do a survey of the United States and China's listed firms and find that female leader participation can make the firm better understand the market, and is helpful to obtain external support of consumers as well as get internal development momentum from the firm. Xie, T. (2015) points out that the more firms can dig and search for development motivation from the inside, the better they will develop in the changing environment. Smith, et al. (2006) and Kuang, X.W., et al. (2012) find that gender diversity in management ranks can make decisions from a broader perspective, thus ensure the scientificity of decisions. Female leaders who enter management ranks through the election have a significant correlation with corporate financial performance. However, if gender diversity in the management ranks is due to external social pressure, then this positive effect will not be obvious. Research on the relationship between female leaders and corporate financial performance is often analyzed from the perspectives of female gender characteristics, female leadership characteristics, situational environmental factors, corporate property rights, and corporate life cycle. Shrader, et al. (1997) examined 200 large companies from the Wall Street Journal and found a positive correlation between the proportion of female executives and ROS, ROA, ROI, and ROE. Shen, X.R. and Wang, F.Z. (2019) pointed out that the addition of female executives can make up for the negligence of male executives in the implementation of decisions; in terms of interpersonal relationships, female executives are handled more flexibly, which also helps to increase investment efficiency and improve finance. Performance. Green, C.P. & Homroy, S.(2018) studied the direct relationship between female leaders and financial performance and found that female executives have a direct positive effect on the company's financial performance. The research by Hu, Q. and Zhou, D.M. (2016) found that companies are in different life cycle stages, and female directors will have different impacts on company performance. For companies in the start-up stage, recession stage, and elimination stage, female directors have no significant impact on corporate performance. In these stages, it is more beneficial to choose

11

courageous and adventurous executives; while companies in the growth stage and mature stage, due to female directors' not overconfident, cautious, and steady personality traits, female directors have a significant role in improving corporate performance. Through meta-regression analysis, Li, W.W., et al. (2019) believe that the participation of women in the executive team can make it achieve gender diversity, bring firm a more dominant market position, and improve corporate financial performance. Therefore, the paper puts forward hypothesis 1.

H1: Female leader participation can positively affect financial performance

# Business ownership, female leader and financial performance

The influence of management ranks on financial performance varies with business ownership. Therefore, the differentiation of business ownership can better help to understand the impact of female leaders' participation on corporate financial performance. According to Ye, C.G., et al. (2016), even though the agency problem exists in all kinds of firms with different business ownership, the principal-agent model and the degree of authorization are also different, so the degree of inefficiency caused by the agency problem accordingly varies. Different from non-state-owned firms, Huang, S.J. (2006) points out that the goals set by state-owned firms are more about the realization of non-economic goals, while non-state-owned firms pursue the maximization of profits. Due to different operational objectives pursued by the two property-right firms, female leader participation, and their discourse status is relatively weak in non-state-owned firms, female leaders cannot have a substantial effect on financial performance.

H2: Compared to non-state-owned firms, female leader participation in state-owned firms has a more significant impact on corporate financial performance.

# Female leader and corporate social responsibility

According to the theory of social role, Lyu, Y. (2014) and Zhou Z.J. (2014) points out that female leaders often behave in a kind, loving, compassionate way to conform to the "gender role" to meet the social expectation, showing "public" altruistic social behaviors. Boulouta (2013) also points out that in corporate governance, women are likely to follow the female gender stereotype and pay more attention to "soft" issues such as corporate social responsibility. Li, J.L., et al. (2019) believe that the empathy effect unique to female leaders could generate unconscious altruistic behaviors. Therefore, in corporate governance, female leaders pay more attention to the fulfillment of social responsibility than male leaders. Hahn, et al. (2015) believe that female leader participation can improve the relationship among stakeholders such as external investors, governments, and customers, thereby better assume social responsibility to stakeholders. Thus, the paper proposes hypothesis 3: H3: Female leader participation has a positive impact on corporate social responsibility.

# Female leader, social responsibility and financial performance

According to the theory of stakeholder and the theory of signaling, Hill, et al. (1992) point out that corporate social responsibility is a signaling mechanism and firm is a contract concluded by all stakeholders. The firm expects to obtain various resources from different stakeholders to ensure development. However, due to information asymmetry, stakeholders cannot judge which firms to establish contracts with because of the lack of incomplete real situation. Gary, et al. (2002) find that the firm can alleviate this problem by sending a signal of social responsibility to stakeholders. Wang, H.Z. et al. (2020) point out that a firm's social responsibility activities can bring good financial returns, and the construction of social responsibility as a long-term business is more conducive to improving financial performance. Zhang, Z.G., et al. (2013) believe that it is difficult for stakeholders to timely grasp relevant information due to excessive irrational factors in the trading market. Meanwhile, it takes a certain amount of time for a firm to improve its financial performance from assuming social responsibility, thus the impact of corporate social responsibility on its financial performance is a gradual process with a lag.

H4: Corporate social responsibility in the current period will have a positive impact on its financial performance of the lagging period.

H5: Corporate social responsibility plays a mediating role between female leader participation and corporate financial performance.

# 3. Research Methodology

#### **3.1 Research Design**

This paper takes A-share non-financial listed firms in China from 2011 to 2018 as the sample, and conducts secondary screening according to the following conditions: (1) Since the measurement of corporate financial performance in the paper needs to lag one period, we eliminate the firms that have been listed for less than one year in the sample period; (2)Eliminate firms with variable value exceptions and missing data; (3)Eliminate ST, \*ST, and PT firms. Eventually, we obtain a sample of 475 firms, with a total of 48916 valid observations. Corporate social responsibility data come from Rankins CSR Ratings (RKS) database, female leader measurement data, and other financial data that come from the GTA database. The relevant variables have Winsorize tail reduction processing at 1% and 99% levels. Excel and Stata15.0 are used to analyze the data.

# 3.2 Data Collection

#### **Dependent Variable**

Corporate financial performance (FP) is the dependent variable of the paper. In previous empirical studies, the indicators to measure corporate financial performance are mainly divided into two categories: one is accounting indicators such as sales profit rate and profit growth rate, and the other is market indicators such as return on equity. Cai, Q.F. (2013) points out that China's stock market has policy guidance and market irrationality. Therefore, to reduce the influence of capital structure and the correlation between the profit index and the leverage index, and make financial performance index more truly show the level of female leaders, the paper selects the following model to measure financial performance:

# $FP_{i,t} = EBIT_{i,t} / Assrt_{i,t}$

In this model, EBIT represents earnings before interest, and tax and assets represent total assets. Sub i is the enterprise, and t is the year.

# **Independent Variable**

Female leader participation (FEM) is the independent variable of the paper. According to previous literature, the following two methods are generally adopted for measurement. The first is to construct dummy variables. When there are female leaders in the management ranks, it is set to 1; otherwise, it is set to 0. The second approach is to measure the percentage of female leader participation.94.2% of the sample firms have two or more female leaders, so this paper preliminarily selects the second way to measure. The definition of management ranks includes the board of directors, the board of supervisors, and senior managers of listed companies.

# **Mediating Variable**

Corporate social responsibility(CSR) is the mediating variable of this paper. The paper uses the results of RKS social responsibility report rating system on CSR of listed firms as the measurement index. The higher the score is, the higher the CSR level will be.

# **Moderating Variable**

Business ownership (HLD) is the moderating variable of the paper. This variable measures whether the sample is a state-owned firm or not. The judgment standard is carried out according to the nature of the actual controller in the GTA database. If the sample is a state-owned firm, it is set to 1; otherwise, it is set to 0.

# **Control Variable**

Based on the research of Zhai, H.Y. (2015) and Liu, Y.Y., et al. (2019), the paper sets company size(SIZE), risk-taking level(LEV), equity concentration (SHRZ) and separation of power (DUAL) as control variables. Finally, such dummy variables as the industry (ind) and year (year) are added to the control catalog. See Table 1 for a detailed definition and measurement method of specific variables.

	Variable name	Measure
Dependent	Corporate financial	FP <sub>i,t</sub> =EBIT <sub>i,t</sub> /Assrt <sub>i,t</sub>
variable	performance (FP)	
Independent	Female leader	Number of female leaders as a percentage
variable	participation (FEM)	of total management
Moderator	Business ownership (HLD)	If it is a state-owned enterprise, the value is
	-	1, otherwise it is 0
Intermediary	Social responsibility (CSR)	Run Ling Global (RKS) Social
variable		Responsibility Report Rating System
		scores
Control variable	Company Size (SIZE)	ln (Total assets at the end of the period)
	Risk-taking level (LEV)	Total assets / total liabilities
	Equity concentration (SHRZ)	Shareholding ratio of the largest
		shareholder
	Separation of power (DUAL)	The difference between the actual
		controller's control of the listed company

#### Table 1 Variable Definition

	and ownership
Industry (ind)	"Guidelines for Industry Classification of
	Listed Companies" issued by the CSRC
Year (year)	The current year

# 3.3 Statistics Used for Data Analysis

To study the relationship between female leader participation and corporate financial performance, Model 1 is established:

 $Model \ 1: FP_{i, t+1} = \alpha_0 + \alpha_1 FEM_{i, t} + \alpha_2 LEV_{i, t} + \alpha_3 SHRZ_{i, t} + \alpha_4 DUAL_{i, t} + \alpha_5 SIZE_{i, t} + \sum ind + \sum yr + \gamma DUAL_{i, t} + \alpha_5 SIZE_{i, t} + \sum ind + \sum yr + \gamma DUAL_{i, t} + \alpha_5 SIZE_{i, t} + \sum ind + \sum yr + \gamma DUAL_{i, t} + \alpha_5 SIZE_{i, t} + \sum ind + \sum yr + \gamma DUAL_{i, t} + \alpha_5 SIZE_{i, t} + \sum ind + \sum yr + \gamma DUAL_{i, t} + \alpha_5 SIZE_{i, t} + \sum ind + \sum yr + \gamma DUAL_{i, t} + \alpha_5 SIZE_{i, t} + \sum ind + \sum yr + \gamma DUAL_{i, t} + \alpha_5 SIZE_{i, t} + \sum ind + \sum yr + \gamma DUAL_{i, t} + \sum ind + \sum yr + \gamma DUAL_{i, t} + \sum ind + \sum yr + \gamma DUAL_{i, t} + \sum ind + \sum yr + \gamma DUAL_{i, t} + \sum ind + \sum yr + \gamma DUAL_{i, t} + \sum ind + \sum yr + \gamma DUAL_{i, t} + \sum ind + \sum yr + \gamma DUAL_{i, t} + \sum ind + \sum yr + \gamma DUAL_{i, t} + \sum ind + \sum yr + \gamma DUAL_{i, t} + \sum ind + \sum yr + \gamma DUAL_{i, t} + \sum ind + \sum yr + \gamma DUAL_{i, t} + \sum ind + \sum yr + \gamma DUAL_{i, t} + \sum ind + \sum yr + \gamma DUAL_{i, t} + \sum ind + \sum yr + \gamma DUAL_{i, t} + \sum ind + \sum yr + \gamma DUAL_{i, t} + \sum ind + \sum yr + \gamma DUAL_{i, t} + \sum ind + \sum yr + \gamma DUAL_{i, t} + \sum ind + \sum yr + \gamma DUAL_{i, t} + \sum ind + \sum yr + \sum ind + \sum in$ 

To study the difference of the impact of female leader participation on corporate financial performance with different business ownership, Model 2 is established:

Aiming for the impact of female leader participation on corporate social responsibility, this paper establishes Model 3:

 $Model \ 3: CSR_{i, t+1} = \alpha_0 + \alpha_1 FEM_{i, t} + \alpha_2 LEV_{i, t} + \alpha_3 SHRZ_{i, t} + \alpha_4 DUAL_{i, t} + \alpha_5 SIZE_{i, t} + \sum ind + \sum yr + \Phi$ 

To test the relationship between corporate social responsibility in the current period and its financial performance during the delayed period, the paper establishes Model 4:

 $Model 4: FP_{i, t+1} = \alpha_0 + \alpha_1 CSR_{i, t} + + \alpha_2 LEV_{i, t} + \alpha_3 SHRZ_{i, t} + \alpha_4 DUAL_{i, t} + \alpha_5 SIZE_{i, t} + \sum ind + \sum yr + T$ 

The subscript *i* indicates firm, *t* indicates the year, and t+1 represents financial value and evaluating score of social responsibility during the lagging period. The paper uses  $\sum$  ind to measure industry fixed effect and  $\sum$ yr to measure time fixed effect. $\gamma$ ,  $\lambda$ ,  $\Phi$  and *T* are random disturbance index.

#### **4** Data Analysis and Findings

#### 4.1 Descriptive statistics

Table 2 Descriptive Statistics of the Whole Sample

	Min	Mean	P50	Max	SD
FP	-0.15	0.06	0.05	0.24	0.05
FEM	0.00	0.17	0.14	0.60	0.13
HLD	0.00	0.67	1.00	1.00	0.47
CSR	0.00	39.60	37.04	81.27	15.67
LEV	1.06	2.50	1.82	13.73	2.00
DUAL	0.00	5.75	0.00	34.24	8.55
SHRZ	7.84	37.33	36.43	74.87	16.06
SIZE	20.42	23.55	23.30	29.54	1.83

Table 2 indicates the descriptive statistical results of each variable. It can be found that, for the dependent variable (FP), the average value is 0.06 and the standard deviation is 0.05, indicating that there is little difference in financial performance among sample firms. The minimum value and average value of the independent variable (FEM) is 0.00 and 0.17 respectively, and the standard deviation is 0.13, indicating that there are no female leaders in management ranks of some sample firms, while in those sample firms with female leaders, the number of them accounts for a relatively low proportion, not exceeding 13% within half of the sample firms. For the moderating variable business ownership(HLD), the average value is 0.67 and the median value is 1.00, indicating that more than 50% of the sample firms are state-owned firms. The minimum value and the average value for the intermediary variable (CSR) are 0.00 and 39.60 respectively, indicating that there is a big difference in CSR performance among the sample firms. Within the control variables, the minimum value and the maximum value of company size (SIZE) are 20.42 and 29.54 respectively, and the standard deviation is 1.83, indicating that the SIZE difference among firms is small. The minimum value, the median, and the average risk-taking level (LEV) are 1.06, 1.82, and 2.50 respectively. The minimum value of separation of power (DUAL) is 0.00, the maximum value is 34.24, and the average value is 5.75, indicating that there is a large gap in the separation of power among sample firms.

# 4.2 Univariate analysis

According to the proportion of female leaders in management ranks, the sample firms are divided into three groups. Sample firms in the first 33% are selected as the high-proportion group, and sample firms in the last 33% are selected as the low-proportion group. Then, the difference between FP and CSR is tested in these two groups. See Table 3 for detailed results:

	FEM	Mean between groups	Mean difference
FP	high	0.060	0.006***
	low	0.054	(5.21)
CSR	high	45.404	9.204***
	low	36.200	(-15.27)

 Table 3 Mean t-Test of Independent Samples

Table 3 suggests that the value of FP and CSR in firms with a higher proportion of female leaders is greater than those with a lower proportion (0.060>0.054, 45.404>36.200), and the mean difference between the two comparative groups is statistically significant, indicating that the proportion of female leaders has a positive impact on corporate financial performance and social responsibility. Hypothesis 1 and hypothesis 3 have been preliminarily verified.

#### 4.3 Correlation analysis

To avoid the impact of multicollinearity between independent variables on the empirical results, the paper adopts the variance inflation factor test method to ensure the accuracy of the conclusion. See table 3 for detailed results.

Table 4 Variance Inflation Factor Test

Variable	VIF	1/VIF
FEM	1.00	0.99
HLD	1.21	0.83
CSR	1.44	0.69
SHRZ	1.16	0.86
DUAL	1.07	0.93
SIZE	1.79	0.56
LEV	1.23	0.82
Mear	1.27	

According to the result of Cai, Q.F., and Jiang, Y.Z.(2013), if the largest variance inflation factor vif $\leq$ 10 among all variables, the existence of multicollinearity will not affect the results. Table 3 indicates that the variance inflation factor in the variable is not more than 10. Meanwhile, Table 5 reports that the correlation coefficients among variables are not more than 0.8, hence meaning that no obvious multicollinearity problem in the Model.

Table 5 Correlation Coefficients among Main Variables

	FP	FEM	HLD	CSR	LEV	DUAL	SHRZ	SIZE
FP	1.000							
FEM	0.144***	1.000						
HLD	-0.078***	-0.015	1.000					
CSR	-0.021	0.204**	0.156***	1.000				
LEV	0.265***	0.005	-0.111****	-0.144***	1.000			
DUAL	0.090***	-0.012**	-0.175***	-0.010	0.020	1.000		
SHRZ	0.072***	-0.006	0.313***	0.118***	0.025	0.108***	1.000	
SIZE	-0.124***	0.023*	0.185***	0.552***	-0.411***	-0.087***	0.160***	1.000

Note: \*\*\*, \*\*, and \* represent the significance levels of 1%, 5%, and 10%, respectively.

Table 5 reports Pearson correlation coefficient among main variables, showing that the correlation coefficient between the portion of female leader participation (FEM) and corporate financial performance (FP) is 0.144, and positively correlated at 1% level, which indicating female leader participation can, in some extent, improve corporate financial performance, hence preliminarily supporting for hypothesis 1. The correlation coefficient between female leader participation(FEM) and corporate social responsibility(CSR) is 0.204, with a positive correlation at the level of 5%, indicating that female leader participation can promote corporate social responsibility, hence preliminarily verifying hypothesis 3. Besides, CSR is significantly positively correlated with business ownership (HLD) at the 1% level, indicating that China's state-owned firms assume more social responsibilities.

# 4.4 Regression analysis

# Table 6 Regression analysis results of Model 1 to Model 4

	Model 1		Model 2		Model 3		Model 4	
	Financi performance	al (FP)	Financial performance (FP)		Social responsibility (CSR )		Financial performance (FP)	
	coefficient	Р	coefficient	Р	coefficient	Р	coefficient	Р
FEM	0.420*** (2.93)	0.003	0.303*** (4.07)	0.001	0.834*** (3.23)	0.001		
CSR							0.231 <sup>*</sup> (1.55)	0.122
FEM*HLD			0.365 <sup>***</sup> (3.13)	0.002				
SHRZ	0.007 (3.07)	0.002	0.011 <sup>***</sup> (3.67)	0.001	0.007 (0.51)	0.613	0.007 <sup>***</sup> (3.06)	0.002
LEV	0.017*** (10.30)	0.001	0.007*** (10.23)	0.001	0.786*** (7.31)	0.001	0.006 <sup>***</sup> (10.04)	0.001
DUAL	0.011 <sup>***</sup> (-4.61)	0.001	0.004*** (4.14)	0.001	0.069*** (2.71)	0.007	0.005 <sup>***</sup> (4.51)	0.001
SIZE	0.021 (0.20)	0.841	0.030 (0.66)	0.512	5.156 (37.84)	0.001	-0.004 (2.22)	0.521
_cons	0.022 <sup>*</sup> (1.57)	0.116	0.015 <sup>*</sup> (1.06)	0.288	-84.297*** (- 26.15)	0.001	0.035 (2.22)	0.027
YEAR	Contro	ol	Contro	ol	Control		Control	
IND	Contro	ol	Contro	ol	Control		Control	
Р	0.001		0.001		0.002		0.001	
Adj-R <sup>2</sup>	0.378		0.281		0.305		0.277	
F	35.86		32.10		322.66		35.55	
Ν	3537	,	3537	,	3551		353	37

Table 6 lists the regression results of Model 1 to Model 3, and the analysis is as follows:

First, based on the regression results of Model 1, the regression coefficient between female leader participation(FEM) and corporate financial performance (FP) for one-stage lagging is 0.420,

which is significant at 1% level, indicating that female leaders in management ranks could promote corporate financial performance, hence verifying Hypothesis 1. Among the control variables, separation of power (DUAL) and risk-taking level(LEV) are positively correlated with corporate financial performance (FP) at the level of 1% ( $\beta$ =0.011, $\beta$ =0.017), indicating that the improvement of separation power and risk-taking level could also promote corporate financial performance.

Second, according to the results of regression in Model 2, with extra interactive indexes added in business ownership(HLD) and female leader participation(FEM), the corporate financial performance (FP) coefficient is still significantly positive at the level of  $1\%(\beta=0.365)$ . Compared to non-state-owned firms, state-owned firms have a positive effect on regulating female leader participation and corporate financial performance. In other words, in state-owned firms, financial performance could get a higher degree of ascension for female leader participation, hence verifying Hypothesis 2.

Third, according to the regression results in Model 3, the regression coefficient of FEM and CSR is 0.834, which is significant at the level of 1%, indicating that female leader participation can promote corporate social responsibility, hence verifying Hypothesis 3. Among the control variables, DUAL and LEV are positively correlated with CSR at the level of  $1\%(\beta=0.786 \text{ and }\beta=0.069)$ , indicating that firms with high DUAL and LEV are more willing to undertake social responsibilities. Fourth, based on regression results in Model 4, the regression coefficient of CSR and FP is 0.231, and they are positively correlated at a 10% level, indicating that the improvement of CSR level can enhance FP to a certain extent, hence verifying Hypothesis 4.

#### 4.5 Summary of the Results

The previous regression analysis does not take into account the sample selection bias, considering that the recruitment of female leaders by Chinese listed firms may have the endogenous problem of self-selection bias, that is, in the actual situation, the recruitment of female leaders by listed firms is an institutional arrangement, and female leader participation is an endogenous variable. To control the distortion of regression results caused by self-selection bias, this paper adopts the Heckman's two-stage model to further analyze Hypothesis 1. In the preliminary stage, the Probit model is used to establish the Heckman's selection model (Model 5) to analyze the factors affecting the recruitment of female leaders by Chinese listed firms. The factors affecting whether the listed firms employ female leaders (Female) are taken as the dependent variable. If the listed firms employ female leaders, it is set to 1, otherwise, it is set to 0. The independent variables in the model include risk-taking level (LEV), company size(SIZE), separation of power(DUAL) and equity concentration(SHRZ), to estimate the possibility of employing female leaders in listed firms, and calculate Mills inverse ratio (IMR) based on the regression results. In the second stage, IMR is added to Model 1 as a control variable to control the possible sample selection bias. If the IMR coefficient is significant, it indicates that the sample has selectivity bias, which can be effectively corrected by Heckman's two-stage regression and can effectively correct the self-selection bias in female leader recruitment, and then analyze the impact of female leaders on corporate financial performance. Model 5: Female<sub>i</sub>,  $t+1=\alpha_0+\alpha_1 LEV_i$ ,  $t+\alpha_2 SHRZ_i$ ,  $t+\alpha_3 DUAL_i$ ,  $t+\alpha_4 SIZE_i$ ,  $t+\mu$ 

Table 7 Heckman's Two-Stage Regression Results

	Model 1				
	Financial performa	nce (FP)			
	coefficient	Р			
FEM	0.478*** (3.65)	0.001			
SHRZ	0.005 (1.18)	0.237			
LEV	0.003 <sup>***</sup> (2.93)	0.003			
DUAL	0.001*** (2.74)	0.006			
SIZE	-0.004 (-1.78)	0.076			
IMR	0.019 (0.08)	0.938			
_cons	0.121** (2.28)	0.023			
YEAR	Control				
IND	Control				
Р	0.001				
N	3551				

Table 7 reports the results of Heckman's two-stage regression. The FEM coefficient is 0.478 and is positively correlated at the level of 1%. Compared to Table 7, the FEM coefficient increases slightly (0.478>0.420) while the significance remains unchanged, meaning that the results of Heckman's two-stage regression still support Hypothesis 1.

# 4.6 Mediation Effect Test

To verify Hypothesis 5, this paper constructs Model 6 to test the mediating effect of CSR according to the sequential test method proposed by Wen, Z.L., et al. (2004).

 $Model \ 6: \ FP_{i, \ t+1} = \alpha_0 + \alpha_1 CSR_{i, \ t} + \alpha_2 \ FEM_{i, \ t} + \alpha_2 LEV_{i, \ t} + \alpha_3 SHRZ_{i, \ t} + \alpha_4 DUAL_{i, \ t} + \alpha_5 SIZE_{i, \ t} + \sum ind + \sum yr + \gamma DUAL_{i, \ t} + \alpha_5 SIZE_{i, \ t} + \sum ind + \sum yr + \gamma DUAL_{i, \ t} + \alpha_5 SIZE_{i, \ t} + \sum ind + \sum yr + \gamma DUAL_{i, \ t} + \alpha_5 SIZE_{i, \ t} + \sum ind + \sum yr + \gamma DUAL_{i, \ t} + \alpha_5 SIZE_{i, \ t} + \sum ind + \sum yr + \gamma DUAL_{i, \ t} + \alpha_5 SIZE_{i, \ t} + \alpha_5 S$ 

# Table 8 Intermediary Effect Test of Model 6

	Model 6				
	Financial perform	ance (FP)			
	coefficient	Р			
CSR	0.128* (1.53)	0.127			
FEM	0.449*** (2.92)	0.004			
SHRZ	0.003*** (3.06)	0.002			
LEV	0.007*** (10.06)	0.001			
DUAL	0.003*** (4.55)	0.002			
SIZE	-0.007 (-0.62)	0.539			
_cons	0.031** (1.97)	0.049			
YEAR	Contro	bl			
IND	Contro	bl			
Р	0.002				
Adj-R <sup>2</sup>	0.479	)			
Ν	3537				

It can be seen from previous results that FEM, CSR, and FP are significantly correlated at 1% and 10% levels. Table 7 reports that " $\alpha_1$ " is significant at the level of 10%, which can preliminarily prove that CSR has a partial mediating effect between FEM and FP. Moreover, " $\alpha_2$ " is significant at the level of 1%. Thus, it can be proved that CSR has an intermediary effect between FEM and FP, hence proving the accuracy of Hypothesis 5.

# 4.7 Robustness test

To improve the reliability of the research conclusion, this paper adopts the following two methods for robustness test:

First, considering the impact of the measurement of variables on the reliability of results, this paper changes the original measurement method of corporate financial performance (FP) according to the following model referring to the practice of Yin, K.G. (2014). After re-analysis, the results of regression, moderating, and mediating effect test is stable, indicating that the conclusion of this paper is reliable.

CFP=(Revenue from main operations-Cost of main operations)/ total assets

Second, the paper further uses propensity score matching (PSM) to test the robustness of the research conclusion. The specific operation steps are as follows:

First, for China's listed firms, the CEO plays a decisive role in the firm operation, and the characteristics of the CEO will affect the overall characteristics of the management. Therefore, to further study the impact of female leaders on corporate financial performance, this paper eliminates the CEO position from the management ranks and constructs dummy variables (FECEO) based on whether the CEO is female. If the CEO is female, it's set to 1; otherwise, it's set to 0.Subsequently, the group with FECEO as 1 is set as the experimental group, and the group with FECEO as 0 is the control group. Eventually, the matching variables with propensity scores are SIZE, LEV, DUAL, and SHRZ.

variable		average	e value	Standardized	t-test
		test group	control group	deviation (%)	
LEV	U	2.481	2.533	-2.7	-0.32
	М	2.481	2.782	-15.5	-1.27
SIZE	U	23.266	23.468	-10.2	-1.42
	М	23.266	23.231	-0.6	0.20
DUAL	U	4.918	5.788	-16	-1.24
	М	4.918	4.967	9.8	-0.05
SHRZ	U	35.585	37.975	-12.2	-1.84
	М	35.585	34.125	2.1	0.90

 Table 9 Sample Matching Effect Test

*Note: U means before matching, M means after matching* 

Second, the sample matching effect is tested. Table 9 reports the result of the standardized deviation, that is, before matching, the variables of the experimental group and the control group has a large deviation, except for LEV. After matching, the absolute value of the standardization deviation of other variables except LEV can be controlled within 10%. Besides, from the results of the *t*-test, the variables after matching are not significantly different, and the null hypothesis is not rejected, that is, there is no systematic difference between the experimental group and the control group. In summary, the data of the experimental group and the control group are balanced after matching, which is suitable for further estimation.

Finally, the nearest neighbor matching method is used to estimate the average effect (ATT), and the ATT value is 0.121, which is significant at a 5% level. Therefore, it is concluded that under the same operating environment, financial performance with the female CEO is 12.1% higher than that with the male CEO. Therefore, consistent with the previous conclusions, it further proves that the female leader participation promotes corporate financial performance.

#### 5. Conclusion, Discussion, and Recommendation

# **5.1 Discussion**

To study the relationship between female leader participation and corporate financial performance in China's listed firms and explore what kind of effect business ownership and social responsibility assume between those two variables, the paper takes China's 2011-2018 A-share non-financial listed firms as the sample, proposes five hypotheses based on stakeholder theory, a theory of social role and signaling theory, takes Heckman's two-phase model and propensity score matching method to verify the hypotheses and finds that the proposed hypotheses are following previous research conclusions.

The paper concludes that female leader participation can improve corporate financial performance and social responsibility. Furthermore, after the second classification of business ownership of the sample firms, it is found that the improvement of financial performance is more obvious in state-owned firms. Finally, the paper reveals that social responsibility has a mediating effect between female leader participation and corporate financial performance. According to the conclusion of the paper, it is believed that female leader participation can effectively promote corporate financial performance, which is more obvious in state-owned enterprises in China, and this mechanism is operated through corporate social responsibility.

Based on existing references, the conclusions of this paper can provide more references for China's listed firms to better improve management governance levels and enhance their awareness of the importance of female leaders. For firms that have already employed female leaders in management ranks, they can assign work related to social responsibility to female leaders, to better explore the advantages of them. This paper does not make a more detailed distinction between the features of female leaders. In future research, specific features such as age and educational background should be measured, to find out the effects of different features of female leaders on social responsibility and financial performance in more detail.

#### **5.2** Conclusion

According to the theory of social role, stakeholder, and other theoretical foundations, this paper takes China's A-share non-financial listed firms from 2011 to 2018 as the sample to study the impact of female leader participation on corporate financial performance. Furthermore, the paper studies the regulating effect of business ownership and the mediating effect of corporate social responsibility. The detailed conclusions are as follows: after the validation of the Heckman's two-stage model and the method of propensity score matching, the paper finds that female leader participation can improve corporate financial performance and social responsibility level. Furthermore, after the second classification of the business owners of sample firms, it turns out that the improvement effect of financial performance is more obvious in state-owned firms. Finally, the paper reports that social responsibility has a mediating effect between female leader participation and corporate financial performance.

#### **5.3 Recommendation**

First, within-sample firms, the proportion of female leader participation is terrifically low. As female leaders have better performance in fulfilling social responsibility. Consequently, firms' social responsibility activities can bring good financial performance. Therefore, firms can further optimize the composition of management ranks, choose managers according to their job characteristics, and

23

give more space to the recruitment and work for female leaders to help them make full use of their advantages in their positions.

Second, at the present stage of China's market economy, Chinese private firms should be fully aware of the importance of the selection and appointment of female leaders to corporate financial performance and social responsibility. How to create a better working environment to attract the participation of female leaders has become a problem that Chinese private firms need to consider.

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