Impact of Executive Gender on High-quality Development of Non-family Enterprises--Based on the Empirical Test of Listed Enterprises in China

Manxue Chen[1], Yanting Ma[2], Tianze Liu[3*]

987167701@qq.com[1], 3548973721@qq.com[2], * Corresponding author's e-mail: 407715007@qq.com[3]

School of Economics and Management Beihua University, Jilin, Jilin, P.R.China[1]
School of Economics and Management Beihua University, Jilin, Jilin, P.R.China[2]
School of Mathematics and Statistics Beihua University, Jilin, Jilin, P.R.China[3]

Abstract: At present, more and more women are holding key positions in enterprises and becoming an indispensable force for the development of enterprises. Based on the data of non-family enterprises listed on China's A-share market from 2015 to 2021, this paper explored the impact of executive gender on the high-quality development of enterprises. According to the fundamental regression findings: Female CEOs can promote high-quality development of non-family enterprises. Analysis based on the gender structure of the management shows that: The female-male combination of CEO and chairman has the most significant positive effect on the high-quality development of enterprises, and the positive effect of female CEOs on the high-quality development of enterprises is mainly reflected in enterprises with a high degree of gender diversity in the Board. After dividing the enterprise lifecycle, it is found that the positive impact of female CEOs on the high-quality development of enterprises is most significant in the growth and maturity stages. The heterogeneity analysis of financial flexibility shows that the impact of female CEOs on the high-quality development of enterprises is significant in enterprises with high financial flexibility.

Keywords: Executive Gender; High-quality Development of Non-family Enterprises; Executive Gender Structure; China.

1 Introduction

Currently, the uncertain factors faced by the enterprise production and operation activities have increased significantly. It is particularly necessary to promote high-quality economic development in China. Manufacturing industry is one of the key industries in China's real economy. The high-quality development of manufacturing enterprises is an important part of the high-quality development of China's economy. In recent years, the female labor participation rate is gradually increasing(Chen et al., 2021) [1], and women's status in the workplace has gradually improved, playing an irreplaceable role in enterprises. However, most scholars have studied the impact of executive gender on a single aspect of corporate performance, such as financial performance, technological innovation, green environmental protection, and shared development (Chen et al. 2022; Zhang et al. 2023; Lim and Chung, 2021) [2-4]. Few scholars have explored the impact of executive gender on the high-quality development of enterprises from a holistic and systematic perspective, and most scholars have

focused on the impact of executive gender factors in individual positions on business decision-making, lacking attention to the complementary or mutually exclusive effects of gender structures in management.

Non-family enterprises occupy an important position in Chinese enterprises, and they are different from the governance model of family enterprises. Then, what is the impact of executive gender on the high-quality development of non-family enterprises in China's manufacturing industry? What kind of executive gender structure can promote the high-quality development of enterprises? Is there a difference in the impact of executive gender on the high-quality development of enterprises across different lifecycles and levels of financial flexibility? This article takes non-family enterprises listed on China's A-share market as research samples to empirically test the above issues, and to provide some reference for listed companies to improve their decision-making quality and governance level.

2 Theoretical Analysis and Research Hypothesis

2.1 Impact of CEO gender on high-quality development of enterprises

As a key figure in the strategy formulation and execution of the company, CEO has a profound impact on the enterprise development. CEOs in non-family enterprises are selected from a large talent pool and have a wealth of management knowledge and experience. Compared to men, women are more compassionate and tolerant, adept at expressing emotional appeals, and able to maintain good relationships with competitors and customers (Chen et al., 2016) [5], which helps improve organizational collaboration efficiency. Gender discrimination is widespread in the workplace (Chen et al., 2023) [6]. Female CEOs in the non-family enterprises need to break through the traditional gender impression and develop their keen decision-making and judgment to make a place in the management. The prevailing social stereotype also increases the demission cost of female CEOs. If they leave voluntarily, their reputation will be damaged As a result, once women reach the CEO ranks, they tend to stay longer than men (Pan and Liu, 2021) [7]. This also provides enterprises with high-value human capital, which is conducive to promoting the improvement of enterprise innovation performance and bringing about the growth of enterprise value. In addition, compared to men, female executives have a stronger moral responsibility orientation, and pay more attention to social performance such as employee development and stakeholder satisfaction. Based on this, the hypothesis H1 is proposed:

H1: Female CEOs promote high-quality development of non-family enterprises compared to male CEOs.

2.2 Impact of gender combination of chairman and CEO on high-quality development of enterprises

Gender-based division of labor has led to differences in gender-role expectations. Men are considered more aggressive, while women are more humanistic and good at creating a harmonious working atmosphere. Based on the information decision theory and resource base theory and under the opposite-sex combination of chairman and CEO, enterprises have more complementary methods and ideas to respond to the changes in the external environment, and

the diversified expertise of the management helps to improve the quality of decision-making. Based on the gender facilitation theory, female executives help to stimulate the creativity of male executives and improve the job satisfaction of both sides (Kerr and Sullaway, 1983) [8], thus improving the high-quality development level of enterprises. Therefore, this paper matches the combination of CEO and chairman as follows:

CEO-Board 1: Both CEO and the chairman are male, namely MM;

CEO-Board 2: CEO is male and the chairman is female, namely MF;

CEO-Board 3: CEO is female and the chairman is male, namely FM;

CEO-Board 4: Both CEO and the chairman are female, namely FF.

The hypothesis H2 is proposed:

H2: The gender combination of female CEO and male chairman is most beneficial for the high-quality development of enterprises.

2.3 The role of gender diversity in the Board

On the one hand, the promotion of gender diversity of the Board can give full play to the advantages of both men and women, bring members of the Board with diversified experience, technology and ability, and better play their supervisory function, and promote the management's responsibility for the performance. On the other hand, men still dominate the Board of enterprises at present, and the growing female members in the Board can enhance the "female discourse power" in the management of enterprises. To build same-sex social networks, female Board members may give more support to female CEOs(Pan and Liu, 2021) [7]. Based on this, the hypothesis H3 is proposed:

H3: The promotion effect of female CEOs on the high-quality development of enterprises is more significant in enterprises with higher gender diversification of the Board.

2.4 Heterogeneity in the lifecycle

In the growth period, enterprises face rising business performance and business growth, which brings more investment opportunities. Male CEOs are more likely to develop overconfidence and make inefficient investments. However, companies in the growth stages have not yet formed a stable cash flow. Female CEOs tend to be cautious about high-risk decisions, and can alleviate inefficient investments. In the mature stage, the corporate governance mechanism is gradually improved, and the problem of inefficient investment has been standardized. At this point, companies need to work hard to develop products and services to maintain a competitive advantage. Female CEOs are better at strengthening team communication and promoting team members to collaborate on product development, thereby consolidating their market position. In the recession period, the enterprises are faced with weak internal governance mechanism, obvious bureaucratic style and unclear development prospects. To reverse the corporate crisis, both male and female CEOs need to make careful decisions to lead companies into a new lifecycle. Therefore, the effect of female CEOs on the high-quality development of enterprises in the recession period is not significant. Based on this, the hypothesis H4 is proposed:

H4: The positive effect of female CEOs on the high-quality development of enterprises is more significant in the growth period and the maturity period, but not in the recession period.

2.5 Heterogeneity of financial flexibility

Financial flexibility reflects the ability of enterprises to mobilize financial resources when dealing with uncertain situations. Higher financial flexibility improves the expectations of future operations, which in turn increases the investment willingness of female executives. Therefore, the reasonable reserve of financial flexibility helps to enhance the overall value of enterprises, encourage the performance of corporate social responsibility, and promote the high-quality development of enterprises. A low financial flexibility may lead to problems such as rising financing costs, and the positive role of women on the high-quality development of enterprises is limited. Based on this, the hypothesis H5 is proposed:

H5: The positive effect of female CEOs on the high-quality development of enterprises is more significant in enterprises with high financial flexibility.

3 Research design

3.1 Sample selection and data source

This paper took non-family enterprises listed on the A-share market in China's manufacturing industry from 2015 to 2021 as the research object, selected samples from the China Stock Market & Accounting Research Database (CSMAR), excluded companies with ST and *ST during the sample period and supplemented the missing values. Finally, this paper obtained 2,026 annual sample observations from 502 companies. All the data were obtained from the Chinese Research Data Services (CNRDS), CSMAR, and the Digital Inclusive Finance Index published by Peking University's Digital Finance Research Centre.

3.2 Variable definition

3.2.1 Explained variables

Table 1 High-quality development measurement index system.

Overall indicator	Level I indicator	Level II indicator	Measurement method	Indicator Property
High-quality development	Economy Benefit	Total factor productivity	Calculate the total factor productivity using LP method	Positive
		Sustainable growth rate	Increased retained earnings /Initial shareholders ' equity	Positive
		Tobin's Q	Market value / total assets	Positive
		Return on equity	Net profit/average shareholders' equity	Positive
		Economic value added	EVA/ Number of shares	Positive
	Technology Innovation	R&D investment	R&D investment / operating revenue	Positive

Overall indicator	Level I indicator	Level II indicator	Measurement method	Indicator Property
High-quality development	Technology Innovation	Intellectual property creation ability	Number of invention patent applications / number of patent applications	Positive
			LN (1+ number of invention patent applications in the current year)/LN (1+ R&D investment in the current year)	Positive
		Intellectual property application ability	Number of invention patents obtained / number of patents obtained	Positive
			LN (1+number of invention patents obtained in the current year)/LN (1+ R&D investment in the current year)	Positive
	Green Environmental protection	Degree of environmental disclosure	Calculate the total score based on the disclosed data of enterprise exhaust emission reduction and treatment, wastewater emission reduction and treatment, dust and smoke treatment, solid waste utilization and disposal, noise, light pollution and wastewater treatment, and clean production implementation, and divide the highest score. The enterprise qualitative disclosure score is 1 and the quantitative disclosure score is 2, otherwise 0.	Positive
	Sharing Development	Employees' rights and interests	(Current employee compensation - base period employee compensation)/base period employee compensation	Positive
		Tax contribution	Paid taxes/operating income	Positive
		Social donation	Charitable donations / total assets	Positive

High-quality development (Quality): Referring to the research of scholars such as Tian and Ding (2023) [9], this paper constructs measurement indicators for high-quality development of enterprises from four dimensions,The specific methods are shown in Table 1.

3.2.2 Explanatory variables

In this paper, dummy variables are used to measure CEO gender (CEO). If the CEO is female in the current year, the value is 1; otherwise, the value is 0. On this basis, the research is divided into four groups based on the different gender combinations of CEO and chairman. When both positions are held by men, it is defined as a male-male combination (MM). If the CEO is male and the chairman is female, it is defined as a male-female combination (MF); If the CEO is female and the chairman is male, it is a female-male combination (FM); If both positions are held by women, it is defined as a female - female combination (FF). 0-1 variables are used to measure the gender combination of CEO and the chairman.

3.2.3 Control variables

Drawing on previous studies, this paper selects the following control variables: Turnover rate of total assets of enterprises (Tat), management shareholding (Share), board size (Bosize), regional digital inclusive finance index (Digi), institutional investor shareholding (INST), property rights nature (State), size of the Board of Supervisors (Spu), and company establishment year (Age), The specific variable definitions are shown in Table 2.

Table 2 Main variables and definitions.

Variable type	Variable name	symbol	Variable meaning
Explained variable	High-quality development	Quality	Measured by entropy method
	CEO gender	CEO	Female CEO=1, Male CEO=0
	Male-male combination	MM	1 if the CEO and the chairman are both male, and 0 otherwise
Explanatory variables	Male-female combination	MF	1 if the CEO is male and the chairman is female, and 0 otherwise
	Female-male combination	FM	1 if the CEO is female and the chairman is male, and 0 otherwise
	Female-female combination	FF	1 if the CEO and the chairman are both female, and 0 otherwise
Control variables	Management shareholding	Share	The ratio of managerial ownership
	Board size	Bosize	Total number of directors in the board
	Operation ability	Tat	Turnover rate of total assets of enterprises
	Regional digital inclusive financial index	Digi	Peking University Digital Inclusive Finance Index
	Institutional investor shareholding	INST	Number of institutional investors shareholding / circulating stock capital
Control variables	The nature of property right	State	1 if the enterprise is a state-owned enterprise, and 0 otherwise.
	Size of supervisory board	Spu	Total number of board of supervisors
	Age of the enterprise	Age	LN (1 + enterprise age)
	Year fixed effect	Year	Year of the sample

3.3 Model design

Based on the study hypothesis, we constructed Model (1) and (2):

$$Quality_{it} = \beta_0 + \beta_1 CEO_{it} + \gamma\sum Controls_{it} + \sum Year + \varepsilon_{it} \qquad (1)$$

$$Quality_{it} = \beta_0 + \beta_1 CEO - Board_{it} + \gamma\sum Controls_{it} + \sum Year + \varepsilon_{it} \qquad (2)$$

Among them, β_0 is a constant term, and β_1 and γ are regression coefficients, CEOit represents the gender of the CEO of the enterprise. CEO-Boardit represents the executive gender combination of the enterprise, i.e. MM, MF, FM and FF. Year is the year fixed effect and εit is the residual term

4 Empirical Analysis

4.1 Descriptive statistics

Table 3 Descriptive statistics.

Variable	N	Mean	P50	S.D.	Min	Max
Quality	2026	0.160	0.153	0.061	0.022	0.517
CEO	2026	0.045	0	0.207	0	1
MM	2026	0.933	1	0.249	0	1
MF	2026	0.022	0	0.146	0	1
FM	2026	0.040	0	0.196	0	1
FF	2026	0.005	0	0.070	0	1
Share	2026	0.016	0	0.051	0	0.498
Bosize	2026	9.031	9	1.627	5	17
Tat	2026	0.671	0.589	0.393	0.012	3.282
Digi	2026	5.747	5.777	0.208	5.264	6.129
INST	2026	0.550	0.551	0.180	0.026	0.959
State	2026	0.884	1	0.320	0	1
Spu	2026	3.910	3	1.270	1	11
Age	2026	3.064	3.091	0.249	1.609	4.007

According to the descriptive statistical results of Table 3 for enterprises, the minimum value of high-quality development (Quality) is 0.022, the maximum value is 0.517, the mean is 0.160, and the median is 0.153, indicating that the development quality of most enterprises needs to be improved. At the level of independent variables, the mean of female CEO position in a company is 0.045, with a median of 0, indicating that women have difficulty in promotion and are at a disadvantage in management positions.

4.2 Correlation analysis

Table 4 Correlation analysis.

Explanatory variables	Quality	Control variables	Quality	Control variables	Quality
CEO	0.033	Share	-0.055**	State	-0.030
MM	-0.008	Bosize	0.090***	Spu	0.087***
MF	-0.034	Tat	0.017	Age	-0.002
FM	0.048**	Digi	0.004		
FF	-0.035	INST	0.195***		

Note: ***, ** and * represents a significance level of 1%, 5% and 10%, respectively.

The correlation analysis among variables is shown in Table 4. The correlation coefficient between CEO gender and high-quality development of enterprises is 0.033. From the perspective of executive gender combination, FM is positively correlated with high-quality development of enterprises.

4.3 Multivariate regression analysis

4.3.1 The impact of executive gender on high-quality development of enterprises

The regression results of the influence of executive gender and gender structure on the high-quality development of enterprises are shown in Table 5. Column (1) in Table 5 reports the regression results for the effect of CEO sex on the high-quality development of non-family enterprises. As shown in the table, the regression coefficient of CEO gender (CEO) on the high-quality development of enterprises is 0.015, which is significant at the 5% level. Hypothesis H1 is established. In Table 5, columns (2) to (5) report the regression results based on the gender combination of CEO and chairman. As shown in the table, the regression coefficient of FM on high-quality development of enterprises is significantly positive at the 1% level, while the regression coefficients of MM and MF are not significant, while FF significantly inhibits high-quality development of enterprises at the 5% level. The positive impact of women serving as CEOs on the high-quality development of enterprises only exists when men serve as chairman. When both positions are held by women, there is a significant negative impact on the high-quality development level of the enterprise. Hypothesis H2 is established. FM can not only play the opposite-sex attraction effect, but also provide a wider vision and more abundant resources. Due to the insufficient recognition of female executives and the single nature of decision-making perspective, FF shows a significant inhibitory effect on the high-quality development of enterprises.

Table 5 The impact of executive gender on the high-quality development of enterprises.

Variables	(1)	(2)	(3)	(4)	(5)	(6)	(7)
CEO	0.015^{**} (0.007)					0.020^{***} (0.008)	-0.000 (0.010)
MM		-0.007 (0.005)					
MF			-0.008 (0.009)				
FM				0.020^{***} (0.007)			
FF					-0.028^{**} (0.012)		
Controls	YES	YES	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES	YES	YES
Constant	-0.077 (0.086)	-0.074 (0.086)	-0.082 (0.086)	-0.079 (0.086)	-0.088 (0.086)	-0.126 (0.118)	0.021 (0.124)
Observations	2026	2026	2026	2026	2026	1203	823
R-squared	0.062	0.060	0.060	0.063	0.060	0.074	0.061
r2_a	0.0546	0.0531	0.0526	0.0563	0.0533	0.0623	0.0434

Note: Standard error is given in parentheses. ***, ** and * represents a significance level of 1%, 5% and 10%, respectively.

According to column (6) in Table 5, it can be seen that increasing gender diversity helps to shape a more harmonious atmosphere. Female directors can provide more comprehensive support for leveraging the positive role of female CEOs in the high-quality development of enterprises. According to column (7), it can be seen that in companies with lower levels of gender diversity in the Board, the regression coefficient of CEOs is not significant, and hypothesis H3 is established.

4.3.2. Heterogeneity test of lifecycle

Referring to the research of scholars such as Li and Li (2019) [10], this paper divides the life cycle of the enterprise. The regression results are shown in Table 6. The impact of female CEOs on the high-quality development of enterprises is significantly positive in the growth period and the maturity period, but is not significant in the recession period. In the growth and maturity stages of enterprises, the outstanding management and communication abilities of female CEOs promote the enterprise development level. Hypothesis H4 is established.

Table 6 Heterogeneity analysis of enterprise lifecycle.

Variables	Growth	Maturity	Decline
CEO	0.021**	0.019*	0.001
	(0.010)	(0.011)	(0.013)
Controls	YES	YES	YES
Year	YES	YES	YES
Constant	0.050	-0.218*	-0.053
	(0.149)	(0.126)	(0.190)
Observations	760	854	412
R-squared	0.100	0.072	0.074
r2_a	0.0823	0.0550	0.0392

Note: Standard error is given in parentheses. ***, ** and *represents a significance level of 1%, 5% and 10%, respectively.

4.3.3 Heterogeneity analysis of enterprise financial flexibility

Table 7 Heterogeneity analysis of enterprise financial flexibility.

Variables	High financial flexibility	Low financial flexibility
CEO	0.023**	0.007
	(0.009)	(0.009)
Controls	YES	YES
Year	YES	YES
Constant	0.137	-0.310***
	(0.119)	(0.119)
Observations	1013	1013
R-squared	0.054	0.097
r2_a	0.0401	0.0835

Note: Standard error is given in parentheses. ***, ** and * represents a significance level of 1%, 5% and 10%, respectively.

The regression results are shown in Table 7. It can be seen that the impact of female CEOs on the high-quality development of enterprises is only significantly positive in enterprises with high levels of financial flexibility. The improvement of financial flexibility reduces the threat of external environmental changes to enterprise operations. Hypothesis H5 is established.

4.3.4 Robustness test

Table 8 Robustness test results.

Variables	(1)	(2)	(3)	(4)	(5)
CEO	0.017** (0.008)				
MM		-0.006 (0.006)			
MF			-0.015 (0.010)		
FM				0.026*** (0.008)	
FF					-0.049*** (0.009)
Controls	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES
Constant	0.047 (0.105)	0.047 (0.106)	0.045 (0.106)	0.047 (0.105)	0.034 (0.106)
Observations	1360	1360	1360	1360	1360
R-squared	0.055	0.053	0.053	0.058	0.055
r2_a	0.0456	0.0430	0.0436	0.0486	0.0452

Note: Standard error is given in parentheses. ***, ** and * represents a significance level of 1%, 5% and 10%, respectively.

This paper analyzes the lag effect of executive gender on the high-quality development of enterprises. The regression results are shown in Table 8. The regression coefficient of CEO gender is 0.017, significant at the 5% level, so hypothesis H1 is robust; The regression coefficient of MM and MF is not significant; The regression coefficient of FM is significantly positive at the 1% level, while the regression coefficient of FF is significantly negative at the 1% level, so hypothesis H2 is robust.

5 Conclusions

This paper takes non-family enterprises listed on China's A-share market from 2015 to 2021 as research samples. The research results suggest that: female CEOs can significantly promote the high-quality development of non-family enterprises. The gender combination of female CEO and male chairman is the most beneficial. Moreover, female CEOs have a positive impact on the high-quality development of enterprises only in enterprises with higher gender diversification of the Board. The heterogeneity analysis based on lifecycle shows that this positive impact is mainly reflected in the growth period and maturity period. The analysis of financial flexibility heterogeneity indicates that the positive impact of female CEOs on the

high-quality development of enterprises only exists in enterprises with higher financial flexibility.

Based on this, the following suggestions are made: In non-family enterprises, women who hold senior positions have rich management knowledge and experience. First, enterprises should pay attention to female executives, improve the talent recruitment mechanism, and remove the invisible restrictions of women in job promotion. Second, enterprises should rationally match the gender structure of CEO and chairman. At the same time, enterprises should enhance the gender diversity of the Board. Finally, enterprises should choose the gender of CEO according to the stage of the lifecycle, and maintain appropriate financial flexibility.

References

[1] Chen M, Qin L, Zhao C. What Are Reasons of the Significant Change in the Chinese Female Labour Force Participation Rate? Analysis on Influencing Factors Based on the Macroscopic Trend Transformations in Business & Economics, Vol. 20, pp. 405-428 (2021).

[2] Chen M, Zhao C, Liu T, et al. DOES THE EXECUTIVE GENDER INFLUENCE THE ENTERPRISE INNOVATION EFFICIENCY? EVIDENCE FROM CHINA'S LISTED COMPANIES. Transformations in Business & Economics, Vol. 21, pp.73-93 (2022).

[3] Zhang Y, Guo Y, Nurdazym A. How do female CEOs affect corporate environmental policies? Corporate Social Responsibility and Environmental Management, 2023, Vol. 30 , pp. 459-472.

[4] Lim M H, Chung J Y. The effects of female chief executive officers on corporate social responsibility. Managerial and Decision Economics, Vol. 42, pp. 1235-1247 (2021).

[5] Chen C, Velasquez Tuliao K, Cullen J B, et al. Does gender influence managers' ethics? A cross-cultural analysis. Business Ethics: A European Review, Vol 25, pp. 345-362(2016).

[6] Chen, M, Ma, Y, Liu T , et al.. How employment diversification affects labour competitiveness: A gender perspective. Journal of Competitiveness, Vol 15, pp. 54-71 (2023).

[7] Pan Z, Liu L. The Impact of CEO Gender on CEO Turnover: Promoting or Inhibiting?. Journal of Zhongnan University of Economics and Law, No 6,:pp. 38-50+159 (2021). [in Chinese].

[8] Kerr N L, Sullaway M E. Group sex composition and member task motivation. Sex Roles, Vol 9, pp. 403-417(1983).

[9] Tian D, Ding B. Measurement and mechanism of enterprises high-quality development from resilience perspective. China Soft Science, No.9, pp. 154-170 (2023). [in Chinese].

[10] Li, X, Li, W. Research on Innovation Strategy of Female Executive Based on Family Attributes and Gender Attributes Chinese Journal of Management, Vol 16, pp.1624-1631 (2019). [in Chinese].