

Equity Structure, Green Innovation and Corporate Finance Constraints

Guiping Luan

Nanjing Normal University, University of Business studies, Nanjing, China

ABSTRACT

Based on the goal of “dual carbon”, we select the data of Chinese A-share listed companies from 2007 to 2019, and empirically test the effects of equity structure, green innovation and their interaction terms on corporate financing constraints, and find that: (1) the improvement of equity checks and balances and green innovation can alleviate the financing constraints faced by enterprises, especially in SOEs. financing constraints, which is particularly significant in SOEs. (2) An increase in equity concentration and management shareholding can effectively alleviate the financing constraints of enterprises, and this effect is more significant in non-SOEs. (3) Considering the interaction effect of management shareholding and green innovation, the increase of management shareholding can weaken the mitigation of financing constraints by green innovation, and this effect is more significant in non-SOEs. This paper provides new empirical evidence for corporate financing constraints from the perspectives of equity structure and green innovation, which is conducive to optimizing the equity structure and improving the vitality of corporate green innovation development.

KEYWORDS

Equity structure; Green innovation; Financing constraints

1. INTRODUCTION

The 2021 Government Work Report explicitly promotes “dual-carbon” work, placing the goal of green development at an unprecedented level of importance. As the resource-based economy cannot cope with the double test of “resources” and “environment”, green innovation has been widely noticed for its benefits to green growth and regional green transformation (Wang Hailong et al., 2016).

Currently, most domestic studies on green innovation are centered on the environmental regulation theory based on the Porter's hypothesis (Yu Yize et al. 2022; Tao Feng et al. 2021; Lv C et al. 2021), which focuses on the supervision of environmental law enforcement (Yu Lianchao et al. 2019), government subsidies (Li Xin'an 2021), green economic growth (Fan Dan et al. 2020), regional environmental quality (Wang Yubao, 2021), and other areas external to the firms are examined, and few studies have been conducted from within the firms. China's economy is in urgent need of development and transformation, and financing constraints are one of the main obstacles that have long plagued the transformation and upgrading of Chinese enterprises (Li Zengquan et al., 2008; Chen Xudong et al., 2020), and the green innovation activities of enterprises are subject to even more serious financing constraints due to the characteristics of large investment amount, high risk, long payback period, and asymmetric information (Lu Xin et al., 2013; Yang Guozhong et al., 2019; Ye Cuihong et al. , 2021), restricting the enthusiasm of enterprises to engage in green innovation (Chen Zhihong et al., 2020). The first and foremost task to stimulate corporate green innovation is to alleviate the financing constraints faced by corporate innovation.

Since Fazzari et al. (1988) first proposed that corporate financing constraints are closely related to their internal cash flows, successive scholars have found that corporate governance structure (Harford, et al., 2007) and equity structure (Yuan Fenqiang et al., 2018) affect the level of cash holdings of firms, which in turn affects financing activities. In addition, firms' green innovation and financing constraints affect each other, which is a two-way process of dynamic adjustment (Huang Rong et al., 2020). Benefiting from the environmental performance and social reputation gained from corporate participation in green governance (Lai, Wenjing et al., 2015), enterprises highlight their corporate competitive advantages (Weng et al., 2015), attract high-quality investors (Aldieri et al., 2019), and reduce the cost of financing mainly in terms of the cost of equity and debt (Ghoul et al., 2011), thereby alleviating the financing constraints.

China's current financial market system design is not sound, the system is not yet perfect, the existing financing constraints research perspective is too single, the enterprise's equity structure, green innovation can further alleviate the problem of enterprise financing constraints? And whether the equity structure will affect the enterprise green innovation behavior and thus have an impact on the financing constraints? Sorting out these issues is of great practical significance to enterprise financing, and accumulates experience for enterprises to optimize their equity structure and actively participate in green innovation.

2. THEORETICAL ANALYSIS AND RESEARCH HYPOTHESES

2.1. Equity Structure and Corporate Financing Constraints

A good equity structure is a prerequisite for optimizing corporate governance (Ma Lianfu et al., 2020) and has an impact on how firms choose their development strategies (Sun et al., 2012). Optimization of equity structure can also help firms attract highly responsible consumers and enhance their competitiveness, further reduce the cost of capital, and improve the social prestige and business performance of firms (Wang, Hongling et al., 2010), thus alleviating financing constraints. By combing through the past literature, this paper will analyze the specific impact of equity structure on financing constraints from the following three dimensions.

1) Equity concentration and corporate financing constraints

Accompanied by the gradually growing scale of operation and specialized team management of modern companies, ownership and operation gradually tend to separate, and gradually triggered the formation of a variety of economic entrustment behavior or business agent relationship between the two. Operators and owners seek different interests, the effective separation of the two powers can fully release the development of the company's power, if the enterprise shareholding is over-dispersed, the majority of minority shareholders lack the incentive to monitor the interests of the operator, resulting in a larger agency costs. The increase of equity concentration will motivate the majority shareholders to protect their own interests, and in the confrontation process, the majority shareholders are in a more favorable position compared to minority shareholders. Based on agency theory, equity concentration makes corporate dividend policy stable (Lent et al., 2013), reduces the negative effect of financing constraints on dividend stability (Zhai et al., 2019), and releases favorable signals to corporate investors, thus attracting more quality investors. Zhou Jian et al. (2016) found that the consistency between the interests of large shareholders and the enterprise far exceeds their appropriation of the interests of the enterprise, and the increase of equity concentration will create value for the enterprise. And most scholars in China get through empirical analysis that the increase of the shareholding ratio of the first largest shareholder of listed companies will have a positive effect on corporate performance (Sun et al., 2012), and enhance corporate profitability and governance capacity. As a result, this paper proposes the following research hypotheses:

H1: The increase of equity concentration will alleviate the severe financing constraint pressure faced by enterprises.

2) Equity checks and balances and corporate financing constraints

The degree of equity checks and balances generally refers to the mutual constraints on the various interests of the company's shareholders due to different numbers of shareholdings. First of all, equity checks and balances prevent the first largest shareholder from exercising arbitrary power due to internal checks and balances. The existence of several major shareholders, when there is a dispute over their interests, out of the consideration of maintaining their own interests, other major shareholders will play with the first major shareholders and operators, to avoid the major shareholders maliciously encroach on the collective interests of the enterprise's irregularities, the protection of the company's scarce resources, the shareholders of the decision-making process can be more transparent, standardized and scientific, so as to improve their own overall development of the strength of the company's performance and long-term enhancement of performance, so that the company's decision-making process can be more transparent and standardized. Long-term improvement of performance, so that enterprises in the entire capital market level based on the various types of financing activities more convenient and long-term sustainability, that is, to enhance equity concentration can alleviate the financing constraints faced by enterprises (Yu Wenling et al., 2020). Second, the enhancement of equity checks and balances can significantly improve the internal governance efficiency of listed companies (Qin Xingjun et al., 2018), a certain number of shareholders compared to only one major shareholder has a better supervisory effect on the enterprise operators, and positively affects the operators to create value for the enterprise (Chen Deping et al., 2011), the higher degree of checks and balances of the equity of the listed enterprises compared to other listed enterprises with lower degree of checks and balances of the equity of the listed enterprises have a greater access to more resources than other listed enterprises. The listed firms with higher equity checks and balances have more stable and reliable capital as support than other listed firms with lower equity checks and balances. Therefore, this paper proposes the following research hypotheses:

H2: The improvement of equity balance will alleviate the severe financing constraints faced by enterprises.

3) Management shareholding ratio and corporate financing constraints

Management shareholding ratio is an external manifestation of the equity incentive system, the motivation of enterprises to actively undertake social responsibility is due to the pursuit of more reputation of the managerial layer (Sun Yanmei et al., 2019), better social reputation can undoubtedly help enterprises to quickly improve the brand effect, and occupy a place in the highly competitive market. In enterprises with relatively low management shareholding, fierce competition in the industry significantly reduces the level of corporate cash holdings (Zhang Shengqiang et al., 2022), and management shareholding can moderately regulate financing constraints with excessive irrational investment and lack of investment incentives of enterprises (Yu Xiaohong et al., 2020). The increase of management's power makes the cash holding level of listed companies increase effectively (Yang Xingquan et al., 2014), and the direct increase of cash holding level can not only alleviate the external financing constraints faced by the company, but also further satisfy the capital demand of its growth investment and help to improve the overall level of the company's operation and financial flexibility (Denis et al., 2011), and the sustained high level of cash holding can be in the company's Continuous high cash holdings can support the company's high performance growth in the long term without taking measures to reduce the quality of its own operating performance, which is the optimal incentive for high-growth companies. In addition, the gradual implementation of the executive incentive policy also helps to significantly improve the level of high-level governance within the company (Qin Xingjun et al., 2018), the further increase in the proportion of shares held by the company's management and employees can allow the enterprise to reduce the cash-cash flow sensitivity within a certain range (Cheng Ke et al., 2017), and the high level of holding the company's cash reserves can greatly reduce the possibility of the company's facing a large amount of financial difficulties in the short-term expenditures. occurrence possibility, thus, this paper proposes the following research hypothesis:

H3: The increase of management shareholding ratio will alleviate the severe financing constraint pressure faced by the company.

2.2. Green Innovation and Enterprise Financing Constraints

China is now trying hard to promote the enterprises as the main body of the market to devote themselves to green innovation, however, the high consumption of green innovation will make the cost of exogenous financing of enterprises affected (Xu Lin et al., 2021), and the financing constraints have become an important factor affecting green innovation (Ye Cuihong et al., 2021). First, according to the stakeholder theory, if corporate innovation and development satisfy the requirements of internal and external stakeholders of the company, they will invest their efforts to increase the value of the enterprise. Second, green innovation follows the trend of the times and can obtain more policy support (Qin Shusheng et al., 2013), improve the social status of enterprises and attract more talents to join. The implementation of green innovation by enterprises can obtain more resource support to further improve their financial performance as well as expand their market share (Xie X M et al., 2019), and achieve high-quality development of the economy. Third, green innovation can enhance the mitigating effect of carbon accounting disclosure quality on financing constraints, (Ge Jing et al., 2019), further alleviating the huge financing pressure to be faced by the transformation of heavily polluting enterprises. In short, green innovation can effectively integrate all kinds of resources within the company, help enterprises improve their financial performance, establish a positive image, and thus improve the level of holding funds. As a result, this paper proposes the following research hypotheses:

H4: The improvement of green innovation level will significantly alleviate the severe financing constraint pressure faced by enterprises.

2.3. Equity Structure, Green Innovation and Corporate Financing Constraints

Shareholding structure affects the efficiency of corporate governance so that it shows different green innovation enthusiasm. Recent studies show that equity concentration and technological innovation efficiency are not simply linear (Gu Lulu et al., 2015), but have a significant inverted U-shaped relationship (Zhang Rui et al., 2022; Wang Jinzhao et al., 2020), and large shareholders will seize the interests of small shareholders through tunneling rather than obtaining long-term gains through innovation (Zhong Teng et al., 2020), and Yu Bin et al. (2020) found that equity concentration and technological innovation show a significant “N” relationship, and the relationship between equity concentration and technological innovation is significantly different from that between green innovation and corporate governance. Yu et al. (2020) found that the relationship between equity concentration and technological innovation is significantly “N” shaped. Therefore, it is difficult to further explore whether equity concentration has an impact on the promotion of green innovation and financing constraints. The conclusions of academic studies on the impact of equity checks and balances on corporate green innovation are also quite different. A part of scholars found that higher equity checks and balances would promote further improvement in corporate innovation performance (Li Xiaoqing et al., 2020), and Yang Liuqing et al. (2018) corporate R&D investment also rises accordingly with the increase in corporate equity checks and balances. On the other hand, another part of scholars believe that the rise of equity checks and balances does not have a positive impact on the efficiency of corporate technological innovation (Guo Yujing et al., 2020), and Yu Bin et al. (2020) even suggest that the relationship between equity checks and balances and the degree of innovation depends on the degree of equity concentration to a certain extent. Existing research frameworks make it difficult to clarify whether the degree of equity checks and balances will have an impact on the promotion of green innovation and financing constraints.

As for the actual shareholding ratio of enterprise management, based on the moral hazard effect, as a rational person in the enterprise, he or she will more actively pursue the maximization of the value of

the interests of the enterprise itself and the management team, and exacerbate the problem of insider control for the purpose of pursuing the rate of return on profits, thus avoiding the technological innovation that is very slow to bear fruit and extremely risky, compressing the large amount of investment in green innovation (Yang Huihui et al., 2018), and making the limited funds flow into high-return industries. funds to flow into high-return industries. Moreover, the more short-sighted management is, the more it will exacerbate the inhibitory effect of accounting robustness on green innovation (Zhong Yuxiang et al., 202). Zhou Jianyang et al. (2022) conducted a study from the perspective of different patent types and found that an increase in management shareholding significantly reduces the performance impact of innovation inputs on innovation outputs, and that management ability is negatively correlated with the firm's degree of innovation (Huang Xinjian et al., 2020), and an increase in management shareholding strengthens this negative relationship (Zhou Frequency et al., 2020). As a result, the following hypothesis is proposed:

H5: Controlling for other factors remaining unchanged, the increase in management shareholding ratio will reduce the mitigation effect of green innovation on financing constraints.

3. RESEARCH DESIGN

3.1. Sample Selection and Data Sources

This paper will select China's companies listed in Shanghai and Shenzhen A-shares during the period of 2007-2019 as the research object, and seeks to re-screen and organize the sample data through the preliminary data analysis: (1) excluding individual companies that are ST, *ST, and PT within a specific time frame of the study; (2) for the missing core values appearing in a small number of samples, linear interpolation is used for effective supplementation to eliminate a few of them samples whose core variables are seriously missing and cannot be supplemented. (3) This paper only considers the exclusion of some listed companies in the financial industry and the insurance industry. The data on enterprise equity structure and basic economic and financial indicators of listed companies to be used in the process of empirical analysis come from CSMAR database, and the number of green patent applications is matched manually by using the National Intellectual Property Rights Patent Database and the Green List of International Patent Classification Library from WIPO. Subsequently, continuous variables were indented at 1% and 99% respectively, and STATA version 15.0 was used for direct data processing.

Table 1. Definition of variables

Variable category	variable name		variable symbol	explicit explanation
explanatory variable	Financing constraints		SA	$SA = -0.737 * Size + 0.043 * Size^2 - 0.040 * Age$
explanatory variant	shareholding structure	shareholding concentration	LHR	Shareholding of the largest shareholder
		Shareholding checks and balances	SB	Proportion of shares held by the 2nd-5th largest shareholders
		Management shareholding	ML	Ratio of number of shares held by directors and supervisors to total number of shares
	Green Innovation		GI	Total number of patent applications for green technology inventions vs. total number of patent applications for green utility models
control variable	Net profit margin on total assets		ROA	Net profit/total assets
	gearing		ALR	Total liabilities/total assets
	Book-to-market ratio		BTMR	Shareholders' equity/company market capitalization
	current ratio		CR	Current assets/current liabilities
	Revenue growth rate		ORG	Single-quarter indicator that refers to the growth of the company. (Operating income for the current year, current single quarter amount - operating income last single quarter amount) / operating income last single quarter amount
	Cash flow volatility		CFV	(Cash flow/total assets) Three-year volatility; where: three-year volatility is calculated: standard deviation from year t-2 to year t.

3.2. Benchmark Modeling

A fixed effects panel model is selected using the results of the Hausman test to control for firm fixed effects. The time trend may cause “pseudo-regression problem”, so we further control the fixed effect of year.

1) the impact of equity structure on financing constraints

This paper tries to explore the effect of equity structure on corporate financing constraints from the perspective of equity institutions, the three measures of equity structure as explanatory variables introduced into the model, the specific structure is as follows:

$$SA_{i,t} = \beta_0 + \beta_1 LHR_{i,t} + \beta_2 ROA_{i,t} + \beta_3 ALR_{i,t} + \beta_4 BTMR_{i,t} + \beta_5 CR_{i,t} + \beta_6 WCT_{i,t} + \beta_7 ORG_{i,t} + \beta_8 CFV_{i,t} + Year_t + Code_i + \varepsilon_{i,t} \quad (1)$$

$$SA_{i,t} = \beta_0 + \beta_1 SB_{i,t} + \beta_2 ROA_{i,t} + \beta_3 ALR_{i,t} + \beta_4 BTMR_{i,t} + \beta_5 CR_{i,t} + \beta_6 WCT_{i,t} + \beta_7 ORG_{i,t} + \beta_8 CFV_{i,t} + Year_t + Code_i + \varepsilon_{i,t} \quad (2)$$

$$SA_{i,t} = \beta_0 + \beta_1 ML_{i,t} + \beta_2 ROA_{i,t} + \beta_3 ALR_{i,t} + \beta_4 BTMR_{i,t} + \beta_5 CR_{i,t} + \beta_6 WCT_{i,t} + \beta_7 ORG_{i,t} + \beta_8 CFV_{i,t} + Year_t + Code_i + \varepsilon_{i,t} \quad (3)$$

2) Impact of green innovation on financing constraints

$$SA_{i,t} = \beta_0 + \beta_1 GI_{i,t} + \beta_2 ROA_{i,t} + \beta_3 ALR_{i,t} + \beta_4 BTMR_{i,t} + \beta_5 CR_{i,t} + \beta_6 WCT_{i,t} + \beta_7 ORG_{i,t} + \beta_8 CFV_{i,t} + Year_t + Code_i + \varepsilon_{i,t} \quad (4)$$

3) Management shareholding, green innovation and corporate financing constraints

To test hypothesis 5, which is to test whether management shareholding weakens the mitigating effect of green innovation on financing constraints.

$$SA_{i,t} = \beta_0 + \beta_1 ML_{i,t} + \beta_2 GI_{i,t} + \beta_3 ML_{i,t} * GI_{i,t} + \beta_4 ROA_{i,t} + \beta_5 ALR_{i,t} + \beta_6 BTMR_{i,t} + \beta_7 CR_{i,t} + \beta_8 WCT_{i,t} + \beta_9 ORG_{i,t} + \beta_{10} CFV_{i,t} + Year_t + Code_i + \varepsilon_{i,t} \quad (5)$$

4. EMPIRICAL RESULTS AND ANALYSIS

4.1. Descriptive Statistics

Table 2 presents the results of the descriptive statistical measurements of the variables covered in the paper. The mean value of financing constraint (SA) is -3.712, and the value range of the absolute value is (3.016, 4.318), which indicates that all the selected sample firms may be facing different degrees of financing constraints at present. Regarding the equity structure, the standard deviation of equity concentration is 14.93, indicating that the number of shares held by the first largest shareholder of listed companies varies greatly. The sample mean of green innovation (GI) is 1.066, and the sample standard deviation is 3.996, which means that the overall performance of A-share listed companies

in Shanghai and Shenzhen in terms of green innovation initiative is strong, but the level of green innovation varies greatly among different companies.

Table 2. Results of descriptive statistics

variant	sample size	average value	statistics	minimum value	maximum values
SA	24,281	-3.712	0.255	-4.318	-3.016
LHR	24,280	35.16	14.93	8.94	75.05
SB	24,280	0.697	0.604	0.0234	2.799
ML	24,280	12.2	19.49	0	69.68
GI	24,281	1.066	3.996	0	30
ROA	24,281	0.0425	0.0525	-0.19	0.199
ALR	24,281	0.415	0.203	0.0415	0.849
BTMR	24,281	0.324	0.164	0	0.772
CR	24,281	2.594	3.096	0.1	20.69
ORG	24,281	0.363	0.976	-0.696	6.786
CFV	24,281	0.0407	0.0401	0	0.215

4.2. Correlation Analysis

Table 3. Results of correlation analysis

	SA	LHR	SB	ML	GI	ROA	ALR	BTMR	CR	ORG	CFV
SA	1										
LHR	0.194***	1									
SB	0.017***	-0.669***	1								
ML	0.224***	-0.105***	0.274***	1							
GI	0.079***	0.039***	-0.008	-0.011*	1						
ROA	0.120***	0.132***	0.019***	0.136***	0.033***	1					
ALR	-0.143***	0.043***	-0.134***	-0.324***	0.081***	-0.350***	1				
BTMR	0.017***	0.036***	0.061***	0.154***	-0.005	0.028***	-0.448***	1			
CR	0.178***	-0.019***	0.116***	0.303***	-0.050***	0.206***	-0.619***	0.275***	1		
ORG	-0.030***	-0.013**	-0.001	-0.019***	-0.007	-0.016**	0.070***	-0.067***	-0.004	1	
CFV	-0.098***	-0.035***	-0.068***	-0.151***	-0.046***	-0.087***	0.192***	-0.179***	-0.132***	0.111***	1

Table 3 shows the correlation tests performed on the data of the main statistical variables and the measurements of their statistics. The correlation coefficients between the variables are also less than 0.7 and the data vif values are much smaller than 10, indicating that the problem of concurrent multicollinearity does not exist in the data selected for this paper. The coefficients of the metrics of equity structure as well as the green innovation and SA index are significantly positive, which initially proves the first four hypotheses, that is, it can Huang sister enterprises face financing constraints.

4.3. Equity Structure and Corporate Financing Constraints

According to the results of the fixed-effects model, the coefficient value of equity concentration (LHR) is 0.001, and the effect is significant at the 1% level, indicating that the relative increase of equity

concentration can significantly reduce the degree of corporate constraints, in line with the hypothesis H1. along with the gradual increase in the concentration of the company's equity, the majority of shareholders of the “sense of ownership” continues to increase, which represents the internal supervision of the management of the enterprise and the governance of the company. With the gradual increase of the company's equity concentration, the majority shareholders' sense of “ownership” is increasing, which means that their enthusiasm for the internal supervision and governance control of the enterprise management is further improved, which makes the decision-making process of entrusted investment more professional, reduces the cost of entrusted agency, and has a mitigating effect on the financing constraint. In addition, in general, in enterprises with high equity concentration, the major shareholders also pay more attention to improving the overall performance of the company's operations, and under their governance, the company tends to achieve better financial performance, increase internal cash flow, and also alleviate their own financing constraints.

The coefficient of the degree of equity checks and balances (SB) is 0.013 and significant at the 1% level, indicating that the improvement of the degree of equity checks and balances can significantly reduce the degree of corporate financing constraints, which is consistent with the hypothesis H2. The timely and stable payment of dividends is usually an important window of a company's positive release of signals to the majority of investors, and the sharp fluctuations of the level of dividends in the short term are most likely to cause investors to hold stocks in the panic, and the degree of equity checks and balances can often be more effective in reducing the risk of stockholder panic. checks and balances tend to be more effective in weakening the negative impact that the financing constraints faced by firms play on the smoothness aspect of corporate dividends (Zhai, Huaming et al., 2019). In addition, equity dispersion also contributes to the unique mechanism advantage of the combination of production and financing to ensure a steady improvement in investment efficiency (Han Dan et al., 2016), to improve the revenue of enterprises, and to alleviate the development transition problem of financing difficulties.

The coefficient value of management shareholding (ML) is 0.002 and significant at the 1% level, indicating that the increase in management shareholding can significantly reduce the degree of financing constraints faced by Chinese enterprises, which is consistent with hypothesis H3. The increase in management shareholding makes it possible to improve the efficiency of corporate governance, to vigorously pursue the enhancement of social reputation, to ensure the stable operation of the company, to improve financial performance, to improve the level of cash holdings, and to alleviate the financing constraint problem.

4.4. Green Innovation and Corporate Financing Constraints

The coefficient value of green innovation (GI) is 0.002, and the effect is significant at the 1% level, indicating that the enterprise's green independent innovation activities have a significant positive effect on the SA coefficient. The SA indexes of enterprises used in the paper are all negative, and the increase in the level of green innovation activities means that the absolute value of the SA coefficient of enterprises decreases, which significantly reduces the extent to which the innovation activities of enterprises are constrained by the market financing mechanism, in line with the research hypothesis of this paper, H4. This is probably due to the fact that: (1) China has made the green science and technology development project the focus of the country's development in recent years, and the green innovations will inevitably be subjected to strong support from the national policy departments. Green innovation is bound to receive strong and continuous support from the national policy departments. Especially for enterprises that have achieved more fruitful green innovation transformation results, they can enjoy more financial financing subsidies provided by the local government to alleviate the project financing problems they face. (2) The domestic carbon trading and emissions trading mechanisms are becoming more and more perfect, and green credit and other green incentives have greatly improved the investment and financing environment for green innovation. (3) The green innovation achievements of enterprises help them maintain competitive advantages in market

competition and improve market access barriers. And it helps enterprises to attract more high-quality investors, so as to get rid of the shackles of financing constraints.

Table 4. Fixed effects model

variant	mould(1)	mould(2)	mould(3)	mould(4)
LHR	0.001***			
	-5.28			
SB		0.013**		
		-2.57		
ML			0.002***	
			-11.86	
GI				0.001***
				-2.83
ROA	0.056***	0.076***	0.046***	0.076***
	-3.06	-4.17	-2.64	-4.17
ALR	0.035***	0.041***	0.039***	0.039***
	-3.01	-3.56	-3.42	-3.42
BTMR	-0.008	-0.007	-0.011	-0.006
	(-1.12)	(-0.98)	(-1.63)	(-0.80)
CR	0.004***	0.004***	0.004***	0.004***
	-9.66	-10	-9.16	-10.01
ORG	-0.004***	-0.004***	-0.003***	-0.004***
	(-3.69)	(-3.51)	(-3.22)	(-3.48)
CFV	-0.230***	-0.238***	-0.208***	-0.240***
	(-9.14)	(-9.57)	(-8.36)	(-9.53)
Constant	-3.494***	-3.466***	-3.474***	-3.457***
	(-318.92)	(-360.39)	(-407.60)	(-425.42)

4.5. Management Shareholding, Green Innovation and Corporate Finance Constraints

From the empirical results in Table 1, we can find that the coefficients of management shareholding and green innovation are significant at the 1% level, both are 0.002, while the interaction term of the two is significantly negative at the 1% level, i.e., it indicates that the increase of management shareholding will weaken the mitigating effect of green innovation on financing constraints, which is in line with Hypothesis H5. The moral hazard effect makes the management, which seeks to maximize its own interests, pursue high returns and invest insufficiently in green innovation R&D, making it difficult to obtain higher innovation output, thus negatively affecting the mitigating effect of green innovation on financing constraints.

Table 5. Fixed effects model

variable	SA
ML	0.002***
	-12.03
GI	0.002***
	-4
ML × GI	-0.00006***
	(-3.60)
ROA	0.045**
	-2.58
ALR	0.038***
	-3.33
BTMR	-0.012*
	(-1.72)
CR	0.004***
	-9.11
ORG	-0.003***
	(-3.21)
CFV	-0.207***
	(-8.31)
Constant	-3.473***
	(-408.48)

5. CONCLUSION AND RECOMMENDATION

This paper selects China's state A-share listed companies from 2007 to 2019 as the sample for examination, and systematically empirically researches and discusses the effects of China's corporate equity structure, green innovation and their interaction terms on China's corporate financing problems. Based on the empirical results, the main conclusions are: (1) The improvement of equity checks and balances and green innovation can alleviate the financing constraints faced by enterprises, and the alleviation effect is particularly significant in state-owned enterprises. (2) The increase of enterprise equity concentration and management shareholding ratio can effectively alleviate the financing constraints faced by enterprises, and the alleviation effect is particularly significant in non-state-owned enterprises. (3) There is an interaction effect between management shareholding and green innovation on the mitigation of financing constraints, and the increase of management shareholding will significantly weaken the mitigation of green innovation on financing constraints, with a significant effect in non-state-owned enterprises.

Based on the conclusions drawn above, this paper will put forward the following suggestions for the three main bodies: micro enterprise level, financial institutions, and government departments:

First, enterprise level: optimize the equity structure and devote to green innovation. Combined with the above conclusions, under the framework of China's current level of corporate governance, for state-owned enterprises, improve the equity checks and balances of the board of directors, moderately reduce the proportion of shares held by the first major shareholder of the enterprise, and for other

enterprises, moderately increase the proportion of shares held by the first major shareholder of the board of directors and the proportion of shares held by employees of high management level, and set up an effective internal supervision mechanism to alleviate the constraints of financing. Actively respond to the national policy call, grasp the policy dividend, make full use of the national special funds, green industrial parks and a series of preferential policies to cultivate the development of green innovation, and improve the output of green innovation, in order to alleviate the financing constraints faced by their own problems.

Secondly, financial institutions: develop green finance and guarantee direct financing for enterprises. The international financing model of green industry mainly relies on new channels of market financing such as overseas venture fund investment, bond market, GEM stock market issuance and so on (Xu Lin et al., 2021). Financial institutions should fully summarize and learn from the advanced financing experience of international counterparts, broaden the innovative loan financing service channels for all kinds of enterprises, vigorously promote the development of green securities funds, help enterprises obtain social capital support, especially financing to non-state-owned enterprises tilted appropriately to help enterprises cross the threshold of financing constraints. It should also focus on combining the local government and relevant departmental policies, to carry out all kinds of green transformation innovative financial service activities, to form a long-term interest-driven innovation mechanism, better and effective service of China's real economy green development transformation across the upgrade.

Finally, government departments: supervise corporate governance and relax financial control. Long-term supervision of the governance of listed companies, adjusting the state's control of enterprises, introducing appropriate competition mechanisms, and improving the efficiency of corporate governance. Government departments should fully utilize their own macro-control capabilities, accelerate the construction of China's financial market system, adhere to the long-term financial support for enterprises' green innovation activities, and actively guide the “two high and one leftover” industries to devote themselves to green development. It should also accelerate the study on the construction of a national carbon credit trading demonstration market, and utilize market mechanisms to encourage Chinese enterprises to continue to innovate in green development.

REFERENCES

- [1] Jarrad Harford, Sattar A. Mansi, William F. Maxwell. Corporate governance and firm cash holdings in the US[J]. *Journal of Financial Economics*, 2007, 87(3).
- [2] Aydin Ozkan, Neslihan Ozkan. Corporate cash holdings: An empirical investigation of UK companies[J]. *Journal of Banking and Finance*, 2003, 28(9).
- [3] Sadok El Ghouli, Omrane Guedhami, Chuck C.Y. Kwok, Dev R. Mishra. Does corporate social responsibility affect the cost of capital?[J]. *Journal of Banking and Finance*, 2011, 35(9).
- [4] Maria C. Cuerva, Ángela Triguero-Cano, David Córcoles. Drivers of green and non-green innovation: empirical evidence in Low-Tech SMEs[J]. *Journal of Cleaner Production*, 2014, 68.
- [5] Lv Chengchao, Shao Changhua, Lee Chien-Chiang. Green technology innovation and financial development: Do environmental regulation and innovation output matter?[J]. *Energy Economics*, 2021, 98.
- [6] Allen Goss, Gordon S. Roberts. The impact of corporate social responsibility on the cost of bank loans[J]. *Journal of Banking and Finance*, 2010, 35(7).
- [7] Lv Chengchao, Shao Changhua, Lee Chien-Chiang. Green technology innovation and financial development: Do environmental regulation and innovation output matter?[J]. *Energy Economics*, 2021, 98(98).
- [8] Sadok El Ghouli, Omrane Guedhami, Chuck C.Y. Kwok, Dev R. Mishra. Does corporate social responsibility affect the cost of capital?[J]. *Journal of Banking and Finance*, 2011, 35(9).
- [9] Jarrad Harford, Sattar A. Mansi, William F. Maxwell. Corporate governance and firm cash holdings in the US[J]. *Journal of Financial Economics*, 2007, 87(3).
- [10] Steven Fazzari, R. Glenn Hubbard, Bruce Petersen. Investment, Financing Decisions, and Tax Policy[J]. *The American Economic Review*, 1988, 78(2).

- [11] LU Xin,ZHENG Yangfei,LI Jianming. A study on the impact of financing constraints on corporate R&D investment--empirical evidence from Chinese high-tech listed companies[J]. Accounting Research,2013,(05):51-58+96.
- [12] Qin Shusheng. Policy support for green technology innovation[J]. Technology and Economy,2012,(01):18-21.
- [13] SUN Jianguo,HU Zhaoxia. Equity structure, corporate governance and corporate performance of SME board listed companies:An analysis based on stochastic frontier production function[J]. Investment Research,2012,(01):110-122.
- [14] CHEN De-Ping,CHEN Yong-Sheng. Research on the Relationship between Equity Concentration, Equity Checks and Balances and Firm Performance-Empirical Tests on SMEs Sector from 2007 to 2009[J]. Accounting Research,2011,(01):38-43.
- [15] Wang Hongling. Equity Structure and Corporate Governance of Listed Companies--Data from Jiangsu Small and Medium-sized Enterprises[J]. Accounting Newsletter,2010,(36):95-96+142.
- [16] LI Zengquan, XIN Xiangang, YU Xuhui. Financial Development, Debt Financing Constraints and Pyramid Structure-Evidence from Private Enterprise Groups[J]. Management World,2008,(01):123-135+188.[53]Lu Xin,Zheng Yangfei,LI Jianming. A study on the impact of financing constraints on corporate R&D investment--empirical evidence from Chinese high-tech listed companies[J]. Accounting Research,2013,(05):51-58+96.
- [17] Qin Shusheng. Policy support for green technology innovation[J]. Technology and Economy,2012,(01):18-21.
- [18] SUN Jianguo,HU Zhaoxia. Equity structure, corporate governance and corporate performance of SME board listed companies:An analysis based on stochastic frontier production function[J]. Investment Research,2012,(01):110-122.
- [19] CHEN De-Ping,CHEN Yong-Sheng. Research on the Relationship between Equity Concentration, Equity Checks and Balances and Firm Performance-Empirical Tests on SMEs Sector from 2007 to 2009[J]. Accounting Research,2011,(01):38-43.
- [20] Wang Hongling. Equity Structure and Corporate Governance of Listed Companies--Data from Jiangsu Small and Medium-sized Enterprises[J]. Accounting Newsletter,2010,(36):95-96+142.
- [21] LI Zengquan, XIN Xiangang, YU Xuhui. Financial Development, Debt Financing Constraints and Pyramid Structure-Evidence from Private Enterprise Groups[J]. Management World,2008,(01):123-135+188.