The influence of the nature of enterprise property rights on enterprise innovation performance——The mediating effect of corporate external financing and the moderating effect of corporate information disclosure

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Abstract: Differences in corporate innovation performance brought about by the nature of corporate property rights is a topic that scholars have repeatedly explored, but there are few researches based on empirical research on Chinese companies to explore the process of influence between these two factors. Based on the unbalanced panel data of 22,072 companies in Zhongguancun High-tech Demonstration Zone from 2011 to 2014, this paper explores the influence mechanism of the nature of corporate property rights on corporate innovation performance, and examines the mediating effect of corporate external financing and the moderating effect of corporate information disclosure. The results show that: (1) state-owned enterprises have higher innovation performance than non-state-owned enterprises; (2) corporate external financing plays a part of the mediating role in the process of corporate property rights affecting corporate innovation performance; (3) corporate information disclosure has significantly positive effect on adjusting the nature of corporate property rights' affection to the process of corporate external financing. The research conclusion not only reveals the black box of the process by which the nature of corporate property rights affects corporate innovation performance, but also provides practical enlightenment for companies to better realize the transformation of innovation performance.

1. Introduction

The 2021 Report on the Work of the Chinese Government emphasizes that it is necessary to rely on innovation to promote high-quality development of the real economy, foster and expand new kinetic energy, and strengthen the dominant position and leading role of enterprise innovation. Under the national macro-level policy of vigorously advocating enterprise innovation, the difference in innovation performance caused by the nature of enterprise property rights in reality has become a topic that can not be ignored. Based on China's national conditions, In the "14th Five-Year Plan" of the Central Committee and the Central Economic Work Conference, the state has high hopes for the state-owned enterprises to play the main role of innovation, persist in technological innovation and solve the problem of "stuck neck". According to the theory of organizational legitimacy, state-owned enterprises tend to meet the expectation of the social system to play an exemplary role because of their special position in the national economy. State-owned enterprises, because of their ownership, have undertaken the important task of promoting the development of national economy, and should be the leader of national innovation strategy[1]-[2]. Existing studies have different conclusions about the impact of property rights on innovation performance. Some scholars point out that state-owned enterprises may be superior to private ownership[3]in some types of innovation output. It is considered that the innovation performance of state-owned holding enterprises is obviously higher than that of private enterprises[4]. However, some studies have concluded that non-state-owned enterprises have higher innovation performance[5], and the relationship between state-owned shares and innovation performance is inverted U-shaped[6].

Why do different property rights of enterprises lead to differences in innovation performance? Based on the resource dependence theory, organizations need to exchange with the external

environment to survive, and the demand of resources constitutes the organization's dependence on the external environment[7]. Enterprise innovation activities need the support of funds, and external financing is one of the important ways for enterprises to obtain resources from the external environment. Scholars have found that state-owned enterprises have higher financing ability in debt and equity[8], while private enterprises are obviously inferior to state-owned enterprises[9], and think that private enterprises are most affected by financing constraints, while state-owned enterprises and collective enterprises are least constrained[10]. Therefore, different property rights will have an important impact on the external financing of enterprises. The external financing of enterprises can serve the innovation activities of enterprises. If enterprises lack funds, it will directly cause the reduction of R&D investment, which will lead to the stagnation of human resources and experimental testing in the process of R&D, which will limit the innovation tendency of enterprises[11].Finally, it leads to the decline of innovation performance[12].

Information asymmetry is particularly prominent in the activities related to external financing of enterprises. In order to obtain funds at a lower cost, enterprises will conceal the relevant information that affects the external financing of enterprises or even disclose any information, resulting in adverse selection. Based on the signal theory, information disclosure can effectively alleviate the problem of information asymmetry, It enables external investors to better understand the business conditions of enterprises and enhance the value recognition of investors[13]. Therefore, in recent years, China has paid more and more attention to the disclosure of enterprise innovation information. At present, there is little research on how the nature of enterprise property rights affects the mechanism of enterprise innovation performance. There is no exploration based on the mediating role of external financing and the moderating role of corporate information disclosure.

Therefore, this paper focuses on the process of the impact of the nature of enterprise property rights on enterprise innovation performance, based on the mediating role of external financing and the Moderator role of enterprise information disclosure. Based on the unbalanced panel data of enterprises in Zhongguancun High-tech Demonstration Zone from 2011 to 2014, this paper explores three problems by using mediation effect model and moderating effect model:(1) whether the nature of enterprise property rights will affect the innovation performance of enterprises; (2) whether external financing plays an mediating role in the nature of enterprise property rights and enterprise innovation performance; (3) whether the enterprise information disclosure plays a Moderator role in the nature of enterprise property rights and the process of enterprise external financing, and finally, the robustness test and endogenous test are carried out. A clear understanding of these issues, it is conducive to the transformation of enterprises' innovation performance, the construction of high-quality external financing environment and information disclosure environment by the government, and is of great value for cultivating fertile ground for enterprise innovation and realizing the national strategy of innovation promoting development.

2. Research design

2.1. Research hypothesis

2.1.1. The nature of enterprise property rights and enterprise innovation performance

The innovation of state-owned enterprises is driven by external and internal factors. First of all, state-owned enterprises have internal innovation power in property rights, resources and entrepreneurship. Firstly, based on the theory of political legitimacy, That is to say, from a political perspective, it examines the degree of understanding of the stakeholders of new ventures on the business behavior and its existing form and structure[14]. If an enterprise responds to the national call and policy, it will have certain political legitimacy, which can increase the competitive advantage of the organization[15]. State-owned enterprises should shoulder the banner of national scientific and technological innovation task because of their ownership, actively respond to the call of national policies and increase its political legitimacy. Therefore, compared with non-state-owned enterprises, state-owned enterprises have more innovative internal motivation. Secondly, from the perspective of

resource dependence theory, it is found from the perspective of internal resources that scientific research innovation needs to obtain funds from the external environment, while state-owned enterprises and non-state-owned enterprises have different resource endowments[16].The abundant strength of state-owned enterprises makes it easier to obtain funds to carry out innovative activities, which has advantages in resources. Thirdly, the innovative spirit of the managers of state-owned enterprises will also promote the development of innovative activities of state-owned enterprises. They have experienced a wave of gradual market-oriented reform of state-owned enterprises, and being old-fashioned under the wave of change can only be eliminated. In the organizational genes of state-owned enterprises, the innovative spirit of being poor and thinking about changes will also inspire entrepreneurs to implement innovative strategies, and its role in enterprises should not be underestimated. Therefore, as the internal motivation of enterprises, entrepreneurial spirit will also promote enterprise innovation. In addition, after the modern corporate system reform of state-owned enterprises, they will increasingly face the pressure of external environment such as market competition. The fierce market competition and the reshuffle of industrial technological changes will enable enterprises to obtain the external driving force of innovation. Increasing the core competitiveness of enterprises through innovation is an important means for enterprises to survive in the market rule of survival of the fittest.

Therefore, based on the above analysis, it is considered that the innovation performance of state-owned enterprises is higher than that of non-state-owned enterprises. This paper puts forward the following assumptions:

H_0State-owned enterprises have higher innovation performance than non-state-owned enterprises.

2.1.2. The mediating role of external financing of enterprises

It is generally believed that state-owned enterprises are more likely to obtain financing. First of all, due to the special role of state-owned enterprises in China's macro-economic development and the development and stability of the whole national economy[17], they will be supported by the government and banks. The ultimate controllers of most banks are governments at all levels, and the government will intervene in state-owned enterprises to a certain extent, which makes the state-owned enterprises have a close relationship with the government and banks, and forms a community of interests[18]to a certain extent. The government has a strong control over credit resources[19]and will selectively intervene in corporate debt financing[20], so state-owned enterprises may receive special care. Non-state-owned enterprises are more likely to be discriminated against by banks, credit and ownership for political reasons, so there will be financing difficulties[21]-[22]. Secondly, compared with non-state-owned enterprises, China's state-owned enterprises are larger in size and have certain monopoly advantages in scale and stability in the process of direct financing[23]. At the same time, non-state-owned enterprises themselves have unstable operation status, as a result, it has some internal problems, such as poor capital appreciation ability, lack of self-accumulation, low credit recognition and malicious debt evasion. Such behavior will deter banks and other financial intermediaries, and make external investors stay at a respectful distance from each other. Finally, creditors will trust the ability of state-owned enterprises out of their trust in the government. It is considered that the debt financing of state-owned enterprises will be guaranteed by the government, so they tend to borrow money from state-owned enterprises[25]. Scholars' research points out that compared with private enterprises, there is almost no financing constraint in state-owned enterprises[26]. For private enterprises, the relationship between government and enterprises will be established by hiring people with government experience as directors to gain the trust of investors[27-28].

Enterprise innovation needs the support of funds. In the early stage of organizational development, only "self-sufficient" internal financing within the enterprise is enough to meet the needs of business activities. However, with the development of the organization, relying only on internal financing will seriously limit the development of enterprises, so many enterprises will turn to external financing. Based on the resource dependence theory, the survival of an organization needs to absorb resources from the surrounding environment, and it needs to depend on and interact with the surrounding

environment to achieve its goal. Therefore, enterprises need external financing in order to obtain the necessary capital demand for development and innovation. The important role of financial market in innovation is that financial market can tolerate and bear risks[29].Therefore, enterprises can spread risks to a certain extent through external financing, provide financial power for innovation activities, and thus enhance enterprise innovation performance.

Therefore, based on the above analysis, it is considered that the external financing of enterprises plays a partial mediating role in the nature of enterprise property rights and enterprise innovation performance. This paper puts forward the following assumptions:

H_1: The amount of external financing plays a partial mediating role in the nature of enterprise property rights and enterprise innovation performance.

2.1.3. The moderating role of information disclosure

Based on the information asymmetry theory, we can see that there is information asymmetry between enterprises and external investors. The information asymmetry of innovation activities is serious, which will make it vulnerable to financing constraints[30]. Before financing, in order to obtain funds at a lower cost, enterprises tend to conceal the relevant information that affects the financing of enterprises or even disclose any information. Therefore, there will be adverse selection problems in those enterprises that have a greater possibility of operating risks. Based on the signal transmission theory, in order to avoid the problems related to adverse selection under the condition of asymmetric information, enterprises need to transmit some information to external investors through signals. The disclosure of enterprise information can help creditors and investors understand the business conditions of enterprises, reduce information asymmetry, enhance the confidence of external investors and encourage them to invest. If information disclosure is not good, external investors will ask for risk premium for information disadvantage, which will push up the external financing cost of enterprises[31]. For listed companies, high-quality information disclosure helps to reduce the company's operational risks and financial risks and improve the company's value[32].Thereby attracting external financing. At the same time, according to the principal-agent theory, the enterprise management may have more information than the owner, and may make some decisions that harm the interests of the company for the purpose of self-interest. Therefore, enterprise information disclosure can help to reduce the information difference between operators and owners, thus, enterprises can gain the trust of external investors and obtain more external financing. Compared with non-state-owned enterprises, state-owned enterprises are larger in size and stable in operation. From the external environment, they can get more financing because they are supported by the government. Information disclosure can enhance investors' confidence, thus positively promoting the financing of state-owned enterprises. Based on the above deduction, it is considered that information disclosure plays a positive role in moderating the nature of enterprise property rights and enterprises' access to external financing.

H_2: Information disclosure plays a positive role in moderating the nature of enterprise property rights and external financing.
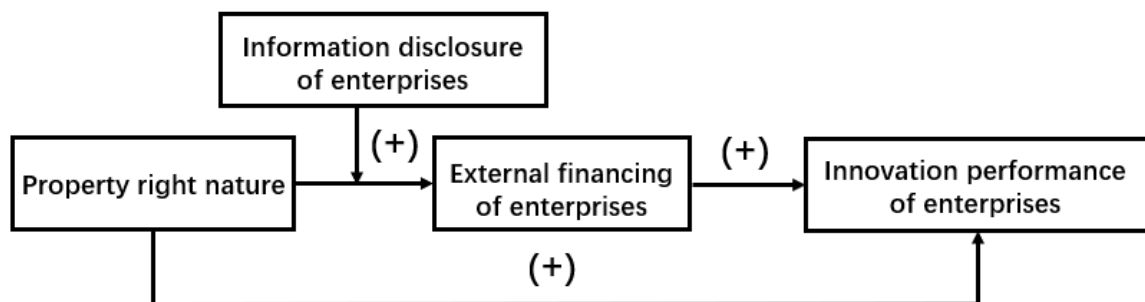

Figure 1. Research framework

2.2. Data sources

Zhongguancun National Independent Innovation Demonstration Zone has many excellent enterprises, which is a fertile ground for the innovation and cultivation of China's mechanism and system, and also a model of independent innovation demonstration zone. Based on the relevant data of high-tech enterprises provided by the Management Committee of Zhongguancun National Independent Innovation Demonstration Zone, the study eliminates the samples with missing data in the main variables. The unbalanced panel data of 47,755 observations from 22,072 enterprises during 2011-2014 were obtained for empirical research.

2.3. Index selection

Selection of interpreted variables. This paper selects enterprise innovation performance as the explained variable. Foreign scholars Acs and Audretsch[33], Freeman and Soete[34]have long discovered that patents, as the concentrated embodiment of new technologies, new processes and new products, are suitable indicators for measuring the innovation performance or invention performance of enterprises. The number of patents granted by enterprises refers to enterprises as patentees. The number of patents authorized by intellectual property administrative departments at home and abroad, including invention patents, utility model patents and design patents. In this paper, we use the method of Fan Hejun et al.[35]to measure the innovation performance of enterprises, and use the number of invention patents as the robustness test of interpreted variables. In order to make the data stable, The above two variables are treated by natural logarithm.

Selection of explanatory variables. In this paper, the property rights of enterprises are selected as explanatory variables, and enterprises are classified according to the property rights of enterprises. The state-owned enterprises are set to 1 and the non-state-owned enterprises are set to 0[36]-[38].

Selection of mediating variables. The research selects the amount of external financing as the mediating variable. Scholars pointed out that enterprise financing can be divided into exogenous financing and endogenous financing, exogenous financing can be divided into direct financing and indirect financing, and direct financing includes equity investment such as bond and stock investment and venture capital. Some scholars also use the sum of equity financing amount, bond financing amount and long-term and short-term bank loans as the standard to measure the external financing amount of enterprises[39]. Therefore, this paper selects the sum of new bond financing amount, new bond financing amount and new equity financing amount, the sum of new bond financing amount and venture capital amount obtained this year is used as the measure of external financing of enterprises. In order to make the data stable, the above variables are treated by natural logarithm.

Selection of moderating variables. This paper selects enterprise information disclosure as the moderating variable. In fact, most non-listed companies do not report internal information at all, and many accounting and financial studies use openness to measure transparency, and prove that listing in underdeveloped markets can also improve transparency[40]-[41]. Therefore, this paper draws lessons from Li[42]and other methods. Taking whether an enterprise is listed or not as a measure of information disclosure, listed enterprises will publish their own financial data for information disclosure, so listed enterprises are recorded as having information disclosure as 1, and unlisted enterprises as having no information disclosure as 0.

Selection of control variables. The amount of enterprise financing is usually influenced by many factors. The control variables commonly used in similar research are selected, namely, the age of the enterprise, the number of employees, the guarantee value[38], the profit rate and the asset-liability ratio[43], and the industry dummy variable and the time dummy variable[44]are controlled. In order to ensure data stability, in this paper, the variables with large numerical differences are treated logarithmically, including interpreted variables, intermediate variables, and the age of enterprises and the number of employees in control variables.

Table.1. Definitions of variables

variable		Measure variable
Explained variable	*LnGrants (pieces)*	The number of patent grants is logarithmic
	LnInventGrants (pieces)	The number of invention patents granted is logarithmic
Explanatory variable	*SOE*	Whether it is a state-owned enterprise, the state-owned enterprise is 1, otherwise it is 0
mediator variable	*lnBond (thousand yuan)*	The amount of new bond financing this year is logarithmic
	LnBondandstock (thousand yuan)	The sum of new bond financing amount and new equity financing amount this year is logarithmic
	lnBondandventure (thousand yuan)	The sum of the new bond financing amount and the venture investment amount obtained this year is logarithmic
Moderator variable	*Disclosure*	Whether the enterprise is listed for information disclosure
Control variable	*LnAge (year)*	The age of the enterprise is logarithmic
	LnEmployeenumber (person)	The number of employees in an enterprise is logarithmic
	FAR	The guarantee value of the enterprise, that is, the ratio of fixed assets
	ROA	Enterprise profit rate
	LEV	Asset-liability ratio
	Year	Age
	Industry	Industry

2.4. research process and model building

Generally speaking, in order to achieve the research purpose, the follow-up inspection is carried out through the following steps. First of all, using panel data, we need to determine whether to use fixed effect or random effect model. Because the property rights of enterprises in the core variables of this paper are basically unchanged during the observation period, the random effect model should be adopted. In addition, there are many cross-sections in this study, short time points belong to short panel data, and the random effect model can avoid the loss of degree of freedom. Therefore, this paper directly adopts the random effect model to calculate according to the method of Zeng Cheng and Guo Bing[45].

Based on the mediating effect model, this paper explores the direct effect of enterprise property rights (explanatory variables) on enterprise innovation performance (explained variables), and explores whether external financing plays an mediating role in enterprise property rights and enterprise innovation performance. At the same time, this paper explores the moderating effect of enterprise information disclosure on the relationship between enterprise property right nature (explanatory variable) and enterprise innovation performance (explanatory variable). Then, the mediation effect model and the moderating effect model are tested for their robustness by changing the measures of the explained variables. Finally, the endogeneity of the core variables is tested, set tool variables to deal with endogenous problems.

2.4.1. Mediating effect model

In this paper, the mediating effect test method proposed by Wen Zhonglin[46]is used for reference, and the three-step test is used to explore whether the nature of enterprise property rights affects the innovation performance of enterprises by influencing external financing. The first model mainly tests the relationship between SOE (explanatory variable) and lnGrants (explanatory variable) of enterprise's innovation performance, which we name as model (1), coefficientα_1Is the total effect, ifα_1Significant, the relationship between state-owned enterprises and innovation performance is significant, and the mediating effect test can be continued. If the coefficientα_1Significantly positive means that state-owned enterprises have higher innovation performance than non-state-owned enterprises, otherwise non-state-owned enterprises have higher innovation performance than state-owned enterprises. ifα_1If it is not significant, stop the inspection.

$$lnGrants_{i,t} = \alpha_0 + \alpha_1 SOE + \alpha_2 lnEmployeenumber_{i,t}$$
$$+\alpha_3 FAR_{i,t} + \alpha_4 lnAge_{i,t} + \alpha_5 ROA_{i,t} + \alpha_6 LEV_{i,t} + \alpha_7 Year_{i,t} + \alpha_8 Industry_{i,t} + \varepsilon_{i,t} \tag{1}$$

$$lnBond_{i,t} = \beta_0 + \beta_1 SOE + \beta_2 lnEmployeenumber_{i,t}$$
$$+\beta_3 FAR_{i,t} + \beta_4 lnAge_{i,t} + \beta_5 ROA_{i,t} + \beta_6 LEV_{i,t} + \beta_7 Year_{i,t} + \beta_8 Industry_{i,t} + \varepsilon_{i,t} \tag{2}$$

$$lnGrants_{i,t} = \gamma_0 + \gamma_1 SOE + \gamma_2 lnBond_{i,t} + \gamma_3 Employeenumber_{i,t}$$
$$+\gamma_4 FAR_{i,t} + \gamma_5 lnAge_{i,t} + \gamma_6 ROA_{i,t} + \gamma_7 LEV_{i,t} + \gamma_8 Year_{i,t} + \gamma_9 Industry_{i,t} + \varepsilon_{i,t} \tag{3}$$

In the second step, the model (2) is regressed, and the regression coefficient between the mediating variable lnBond (enterprise external financing amount) and the explanatory variable SOE (enterprise property right nature) is testedβ_1Is it significant, ifβ_1Significantly positive means that the amount of foreign financing of state-owned enterprises is higher than that of non-state-owned enterprises, ifβ_1Significantly negative, it means that the external financing amount of non-state-owned enterprises is higher than that of state-owned enterprises. In the third step, the model 3 is regressed, if γ_1 and γ_2 Both coefficients are significant, indicating that there is partial mediation, if only$\gamma_2$significantly and$\gamma_1$is not significant, it means that the external financing amount of the enterprise bears the role of complete mediating. Therefore, we should judge whether the explanatory variable SOE (the nature of enterprise ownership) influences the explanatory variable lnGrants (enterprise innovation performance) through the mediating variable lnBond (enterprise external financing amount) through the above two coefficients.

2.4.2. Moderating effect model

By putting the interaction between the moderating variable Disclosure and the explanatory variable SOE as explanatory variables into the model (4), we can verify the moderating effect of information disclosure on the ownership and external financing of enterprises. Ruo coefficientχ_2Significantly positive, it shows that the moderating variable Disclosure (enterprise information disclosure) can positively promote the relationship between the explanatory variable SOE (enterprise ownership property) and the mediating variable lnBond (enterprise external financing amount), while negative has a reverse effect.

$$lnBond_{i,t} = \chi_0 + \chi_1 SOE_{i,t} + \chi_2 Disclosure_{i,t} + \chi_3 SOE_{i,t} * Disclosure_{i,t}$$
$$+\chi_4 lnEmployeenumber_{i,t} + \chi_5 FAR_{i,t} + \chi_6 lnAge_{i,t} + \tag{4}$$
$$\chi_7 ROA_{i,t} + \chi_8 Lev_{i,t} + \chi_9 Year_{i,t} + \chi_{10} Industry_{i,t} + \varepsilon_{i,t}$$

3. Empirical analyses

3.1. Descriptive statistics

Table 2 shows the descriptive statistical results of the main variables in this study. After taking the natural logarithm, the number of patents granted by enterprises is 0.217, and the standard deviation is 0.665, which shows that there are some differences in innovation performance of enterprises. The average amount of new bond financing of enterprises in this year after taking natural logarithm is 25.6 yuan. The average value of new equity and bond financing in this year is 93.3 yuan, and that of new bonds and venture capital is 46.4 yuan. The variance of equity and venture capital is 0.736, and other variables change within the normal range.

Table.2. Descriptive statistics of variables

VARIABLES	N	mean	sd	min	max
lnGrants	76,664	0.217	0.665	0	7.493
lnInventGrants	76,664	0.117	0.458	0	7.234
SOE	76,664	0.0819	0.274	0	1
lnBond	76,664	0.0256	0.587	0	17.98
lnBondandventure	76,664	0.0464	0.736	0	17.98
lnBondandstock	76,664	0.0933	1.014	0	17.98
ROA	76,664	0.109	53.38	-1,220	14,715
LEV	76,664	0.779	13.09	-450.4	3,143
LnAge	76,661	2.230	0.570	0	4.190
lnEmployeenumber	76,664	3.137	1.699	0	10.25
FAR	76,664	0.0979	1.218	-3.278	333.9
Number of id	25,483	25,483	25,483	25,483	25,483

3.2. Regression analysis

3.2.1. The nature of enterprise property right realizes the test of innovation performance through the mediating role of enterprise external financing

Table 3 is the result that the property rights of enterprises realize the innovation performance of enterprises through the mediating role of external financing. Table 3 Regression 1 first verifies the relationship between the nature of enterprise property rights and the number of enterprise patent authorizations. In the regression results, the coefficient α_1 is 0.06, which is significantly positive at the level of 1%, indicating that there are more patents granted by state-owned enterprises.

When the new bond financing amount of mediating variable enterprises this year is taken as the measure of external financing of enterprises, the coefficient between the nature of enterprise ownership and the new bond financing amount of enterprises this year β_1, it is 0.055 and has a significant positive correlation at the level of 1%, indicating that state-owned enterprises get more external financing. After adding the new bond financing amount of the enterprise this year to the nature of enterprise property rights and the number of enterprise patent authorizations, the coefficient of enterprise property rights nature γ_1 is 0.060 and the coefficient of invention patent authorization number γ_2 is 0.031, which are all positive. It means that the enterprise innovation performance plays a partial mediating effect in the nature of enterprise property rights and enterprise financing, which shows that the nature of enterprise property rights realizes enterprise innovation performance through external financing.

As shown above, when the mediating variable is changed into the sum of the new bond financing amount and the new equity financing amount of the enterprise this year as the measure of the external financing of the enterprise, the sum coefficient of the nature of enterprise ownership and the new bond financing and equity financing amount of the enterprise this year β_1 is 0.028, which is significantly positively correlated at the level of 1%, indicating that state-owned enterprises get more external financing. After adding the sum of new bond financing and equity financing amount of

enterprises this year to the enterprise property right nature and enterprise patent authorization number, the coefficient of enterprise property right nature and invention patent authorization number is positive. This result shows that enterprise innovation performance plays a partial mediating role in the nature of enterprise property rights and enterprise financing, which shows that the nature of enterprise property rights realizes enterprise innovation performance through external financing.

When the sum of new bond financing amount and venture investment amount obtained this year is taken as the measure of external financing of enterprises, the sum coefficient of enterprise ownership nature and new bond financing and venture investment amount of enterprises this year β_1 is 0.028, which is significantly positively correlated at the level of 1%, indicating that the amount of foreign financing obtained by state-owned enterprises is more. After adding the sum of new bond financing and venture investment this year, the coefficient of property rights and invention patent authorization is positive. This result shows that enterprise innovation performance plays a part of mediating effect in enterprise property right nature and enterprise financing, and that enterprise property right nature realizes enterprise innovation performance through external financing.

Table.3. The nature of the property right of the enterprise realizes the innovation performance test through the mediating effect of the external financing of the enterprise

VARIABLES	1	2	3	4	5	6	7
	Path 1	Path 2	Path 3	Path 4	Path 5	Path 6	Path 7
SOE	0.060***	0.055***	0.060***	0.028**	0.061***	0.028***	0.061***
	(8.29)	(6.90)	(8.26)	(2.00)	(8.36)	(2.73)	(8.32)
lnEmployeenumber	0.109***	0.019***	0.108***	0.055***	0.108***	0.030***	0.108***
	(63.84)	(13.28)	(63.70)	(22.33)	(63.42)	(15.99)	(63.54)
lnAge	0.022***	0.021***	0.022***	-0.017**	0.023***	-0.006	0.023***
	(4.63)	(5.08)	(4.51)	(-2.32)	(4.69)	(-1.14)	(4.67)
FAR	0.000	-0.001	0.000	-0.002	0.000	-0.001	0.000
	(0.34)	(-0.37)	(0.35)	(-0.52)	(0.36)	(-0.26)	(0.35)
ROA	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.72)	(0.09)	(0.71)	(0.13)	(0.71)	(0.11)	(0.71)
LEV	0.000	0.000	0.000	-0.000	0.000	0.000	0.000
	(0.57)	(0.20)	(0.57)	(-0.03)	(0.58)	(0.06)	(0.57)
Industry	YES	YES	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES	YES	YES
lnBond			0.031***				
			(9.45)				
lnBondandstock					0.021***		
					(11.90)		
lnBondandventure							0.027***
							(10.59)
Constant	-0.102*	-0.115**	-0.100*	-0.166*	-0.100*	-0.087	-0.101*
	(-1.81)	(-2.33)	(-1.77)	(-1.90)	(-1.78)	(-1.32)	(-1.79)
R^2	0.1598	0.0060	0.1624	0.0102	0.1637	0.0059	0.1628
Observations	76,661	76,661	76,661	76,661	76,661	76,661	76,661
Number of id	25,483	25,483	25,483	25,483	25,483	25,483	25,483

z-statistics in parentheses
*** p<0.01, ** p<0.05, * p<0.1

3.2.2. Test results of the moderating effect of enterprise information disclosure on the nature of enterprise property rights and external financing of enterprises

The interactive terms of enterprise information disclosure and the nature of enterprise ownership are put into the equation to verify the moderating effect of enterprise information disclosure on the

nature of enterprise property rights and external financing. It can be seen from the results that the interactive term coefficient between enterprise information disclosure and enterprise ownership is significantly positive, and it is significantly positive at the level of 1%. It shows that enterprise information disclosure promotes the positive relationship between the nature of enterprise property rights and the amount of new bond financing.

Table.4. The test result of the moderating effect of corporate information disclosure on the nature of corporate property rights and corporate external financing

	8	9	10	11	12	13
VARIABLES	Path 1	Path 2	Path 3	Path 4	Path 5	Path 6
SOE	0.055***	0.047***	0.028**	0.030**	0.028***	0.022**
	(6.90)	(5.84)	(2.00)	(2.10)	(2.73)	(2.09)
Disclosure		0.406***		1.161***		0.417***
		(20.54)		(33.66)		(14.98)
lnEmployeenumber	0.019***	0.012***	0.055***	0.039***	0.030***	0.024***
	(13.28)	(8.79)	(22.33)	(15.79)	(15.99)	(12.82)
lnAge	0.021***	0.018***	-0.017**	-0.025***	-0.006	-0.009*
	(5.08)	(4.44)	(-2.32)	(-3.58)	(-1.14)	(-1.69)
FAR	-0.001	-0.001	-0.002	-0.001	-0.001	-0.000
	(-0.37)	(-0.31)	(-0.52)	(-0.43)	(-0.26)	(-0.22)
ROA	0.000	0.000	0.000	0.000	0.000	0.000
	(0.09)	(0.06)	(0.13)	(0.09)	(0.11)	(0.09)
LEV	0.000	0.000	-0.000	-0.000	0.000	0.000
	(0.20)	(0.19)	(-0.03)	(-0.06)	(0.06)	(0.05)
Industry	YES	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES	YES
xa1		0.421***		0.178**		0.294***
		(8.96)		(2.16)		(4.87)
Constant	-0.115**	-0.092*	-0.166*	-0.105	-0.087	-0.065
	(-2.33)	(-1.88)	(-1.90)	(-1.23)	(-1.32)	(-0.99)
R^2	0.0060	0.0169	0.0102	0.0311	0.0059	0.0124
Observations	76,661	76,661	76,661	76,661	76,661	76,661
Number of id	25,483	25,483	25,483	25,483	25,483	25,483

z-statistics in parentheses
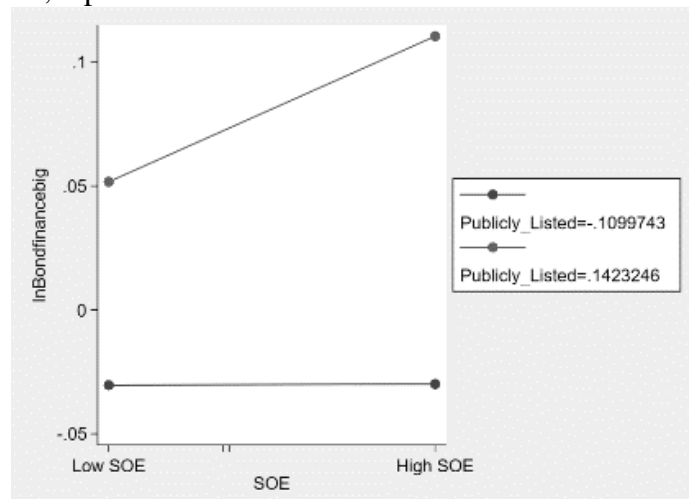*** $p<0.01$, ** $p<0.05$, * $p<0.1$

Figure 2. Information disclosure's moderating effect on the nature of property rights and new bond financing

3.3. Robustness test

The research mainly tests the robustness of the above conclusions by replacing the explained variable measure and endogeneity test. Firstly, the measure of interpreted variables is changed to the number of enterprise invention patents as the measure of robustness test. It can be seen from the test results that the significance of each variable coefficient has not changed much compared with the previous results. Overall estimation results are basically consistent. This result also enhances the persuasiveness of the conclusions of this paper, and also shows that the regression results of this paper are robust.

Table.5. Robustness test

VARIABLES	1'	2'	3'	4'	5'	6'	7'
	Path 1'	Path 2'	Path 3'	Path 4'	Path 5'	Path 6'	Path 7'
SOE	0.044***	0.055***	0.043***	0.028**	0.044***	0.028***	0.044***
	(8.24)	(6.90)	(8.16)	(2.00)	(8.28)	(2.73)	(8.25)
lnAge	0.026***	0.021***	0.025***	-0.017**	0.026***	-0.006	0.026***
	(7.64)	(5.08)	(7.48)	(-2.32)	(7.74)	(-1.14)	(7.70)
lnEmployeenumber	0.061***	0.019***	0.061***	0.055***	0.060***	0.030***	0.061***
	(51.61)	(13.28)	(51.36)	(22.33)	(51.03)	(15.99)	(51.22)
FAR	0.000	-0.001	0.000	-0.002	0.000	-0.001	0.000
	(0.29)	(-0.37)	(0.30)	(-0.52)	(0.31)	(-0.26)	(0.30)
ROA	0.000	0.000	0.000	0.000	0.000	0.000	0.000
	(0.56)	(0.09)	(0.55)	(0.13)	(0.55)	(0.11)	(0.55)
LEV	0.000	0.000	0.000	-0.000	0.000	0.000	0.000
	(0.49)	(0.20)	(0.48)	(-0.03)	(0.49)	(0.06)	(0.49)
Industry	YES	YES	YES	YES	YES	YES	YES
Year	YES	YES	YES	YES	YES	YES	YES
lnBond			0.030***				
			(12.42)				
lnBondandstock					0.017***		
					(13.06)		
lnBondandventure							0.022***
							(11.65)
Constant	-0.125***	-0.115**	-0.123***	-0.166*	-0.124***	-0.087	-0.124***
	(-3.16)	(-2.33)	(-3.10)	(-1.90)	(-3.12)	(-1.32)	(-3.14)
R^2	0.1023	0.0060	0.1063	0.0102	0.1067	0.0059	0.1059
Observations	76,661	76,661	76,661	76,661	76,661	76,661	76,661
Number of id	25,483	25,483	25,483	25,483	25,483	25,483	25,483

3.4. Endogenous test

In this part, the endogenous variables involved in the study will be introduced into the approximate exogenous instrumental variables for estimation. In this paper, logarithm of total export value of software outsourcing is used as tool variable. The export value of software outsourcing is the export value of software demand activities completed by enterprises contracting out all or part of the work in software projects to enterprises providing outsourcing services. The basic reasons for choosing this tool variable are as follows: on the one hand, state-owned enterprises bear the responsibilities closely related to the national plan, and intellectual property rights in the national lifeline industry need to be kept confidential, so the total export volume of software outsourcing is less negatively correlated (correlated) than that of non-state-owned enterprises. At the same time, the total export value of

software outsourcing has no theoretical relationship with the number of patents of enterprises (exogenous).

Two-stage least square regression of panel data is carried out on the data, and the corresponding tool variables are all related to them. Cragg-Donald Wald F statistics are all 51.06, which are higher than the weak ID test critical value of Stock-Yogo (16.38) at 10%. Through the weak tool variable test, it shows that the tool variables corresponding to the core variables are not weak tool variables. The premise of using instrumental variables is the existence of endogenous explanatory variables, so Hausman test is carried out in this paper, and the result shows that the P value is greater than 0.1, which proves that the original model does not exist endogenously.

4. Main conclusions and management implications

4.1. Research conclusion

In this paper, the unbalanced panel data of 22,072 enterprises in Zhongguancun High-tech Demonstration Zone from 2011 to 2014 are taken as research samples, and the mediating effect model and moderating effect model are used to explore the influence mechanism of enterprise property rights on enterprise innovation performance. The results show that the innovation performance of state-owned enterprises is higher; external financing plays a partial mediating role between the nature of enterprise property rights and enterprise innovation performance, and corporate information disclosure plays a positive moderating role in the process that the nature of enterprise property rights affects external financing.

4.2. Theoretical contribution and management inspiration

The theoretical contribution of the research is mainly in the following three aspects: First, the research is devoted to exploring the process that the nature of enterprise property rights affects enterprise innovation performance, which is different from the existing research that only studies the direct influence of enterprise property rights on enterprise innovation performance, and provides a new way of thinking for uncovering the transformation process of enterprise innovation performance. Secondly, in the process of exploring the nature of enterprise property rights and enterprise innovation performance, the research put the external financing and enterprise information disclosure into a model for the first time, and considered the comprehensive effect of the two factors. Finally, the study expands the application scenarios of legitimacy theory, resource dependence theory and information asymmetry theory, and deepens the understanding of this theory.

The research has three implications for the reform of enterprise managers and policy-making: for managers, they should pay attention to external financing, actively transform financing into innovative performance, and enhance the competitiveness of enterprises. At the same time, enterprises should pay attention to information disclosure, reduce information asymmetry, and make external investors understand the enterprise situation. The research results show that the innovation performance transformation of non-state-owned enterprises is weak. However, there are a large number of non-state-owned enterprises in China, which play an important role in promoting the technological innovation process and economic development in China. Therefore, for policy makers, more favorable policies should be introduced to encourage non-state-owned enterprises to implement innovation activities. We should help non-state-owned enterprises to carry out external financing through tax policies and improving work efficiency. At the same time, we should intensify efforts to improve the information disclosure system of enterprises, help enterprises and investors reduce the problem of information asymmetry, and create a better financing environment.

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