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Regional High Debt Risk and Enterprise Innovation

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Abstract: Local governments have a significant impact on business activities and enterprises' behavior. This paper selects the data of A-share listed companies and uses panel data regression analysis model to test the mechanism of regional high debt risk inhibiting innovation. The research findings are as follows: First, the expansion of local government debt restricts enterprises' investment in innovation and research and inhibits their innovation ability by improving corporate financing constraints, reducing government subsidies and tax incentives. Excessive local debt may lead to lower credit ratings, higher interest rates, limited financing channels, and thus crowding out corporate financing. In this case, enterprises may be forced to reduce R&D-related investment. As a result, local government debt inhibits firms' ability to innovate through financing constraints..Second, the mixed ownership reform and strategic differentiation can help enterprises to reverse their disadvantages and increase innovation and R&D investment. Mixed reform can reduce the policy burden of enterprises and reduce government intervention so that enterprises can focus more on innovation activities. Strategic differentiation leads to continuous learning and improvement process, and it will stimulate the innovation vitality of enterprises and achieve the growth of innovation performance.

Keywords: enterprise innovation, Local government debt, Financing constraints.

1. Introduction

In recent years, local governments have adopted proactive fiscal policies to achieve the goal of structural adjustment and stable growth, resulting in a continuous expansion of debt scale and an increase in financial risks, these changes have had a significant impact on the business activities and financial position of enterprises. It is of great significance for reducing the burden of enterprises, improving the vitality of enterprises, and promoting the healthy development of the economy. The development of enterprise innovation ability is affected by many factors, among which macro factors play a crucial role, which can affect the innovation activities and results of enterprises as a whole, local government behavior plays an important role in the process of enterprise innovation and may have a crowding effect on enterprise innovation. Excessive issuance of local government bonds may occupy financial resources, raise the financing cost of enterprises, and inhibit enterprise innovation. Therefore, studying the impact of local government debt on enterprise innovation is one of the important bases for evaluating the effect of economic stimulus policies.

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Based on the above research background, this paper attempts to study the internal mechanism of limiting the innovation ability of enterprises under high debt risk from three aspects: government subsidies, tax incentives, and financing constraints, and test whether mixed ownership reform and strategic differentiation weaken the negative impact of local government debt on enterprise innovation ability. The marginal contributions are mainly reflected in the following aspects. First, in this paper, successful cases of listed companies overcoming the inhibition effect of regional high debt risk on enterprise innovation. It complements the lack of theory and enriches the relevant literature, which is of theoretical significance. Second, it may be able to broaden the research field of financing constraints. This paper focuses on high-tech enterprises in areas with high debt risk and makes an in-depth analyses of how they carry out innovative activities under high financing constraints, to expand the application scope of financing constraints theory. Thirdly, through a series of in-depth analyses, this paper provides a reference for local governments to formulate policies to alleviate the financing constraint pressure of high-tech enterprises and stimulate innovation, which has practical significance.

2. Literature review

In terms of macro factors, enterprise digitization, government financial subsidies, and tax incentive policies all have significant positive impacts on the innovation capability of enterprises. The expansion of local government debt mainly inhibits enterprises' innovation ability by intensifying their financing constraints[1]. At present, some scholars have noticed that local government debt has a significant negative impact on enterprise innovation[2]. Xiong Hu and Shen Kunrong mentioned that the increase in the scale of local government debt occupied a large amount of credit resources, affected the availability of enterprises' innovation investment funds, intensified the financing constraints on enterprises, and reduced their R&D capital investment[3].

In summary, local government debt mainly inhibits the innovation ability of enterprises through the channel of financing constraints, and its explicit and implicit debts have a significant negative impact on the innovation ability of enterprises[4]. By combing and summarizing the existing literature, we find that the existing literature deeply discusses the negative impact of the expansion of local government debt on enterprises through empirical tests, but few literatures discuss the influence mechanism of government subsidies and tax incentives on the inhibition of local government debt on enterprises' innovation ability. Therefore, based on the basis of referring to relevant theories and research, this paper will analyze the internal mechanism of limiting the innovation ability of enterprises under high debt risk from three aspects, including government subsidies, tax incentives, and financing constraints. And analyze whether the mixed ownership reform and strategic differentiation weaken the negative impact of local government debt on the innovation ability of enterprises.

3. Theoretical analysis and hypothesis

Excessive local debt may lead to lower credit ratings, higher interest rates, limited financing channels, and thus crowding out corporate financing [5]. In this case, enterprises may be forced to reduce R&D-related investment. As a result, local government debt inhibits firms' ability to innovate through financing constraints. When local government debt expands, local governments under financial pressure may reduce preferential tax policies in some areas to increase fiscal revenue, thus easing the pressure on debt repayment. The reduction of tax incentives caused by excessive local government debt will cause enterprises to reduce their R&D investment in innovation, thus inhibiting their innovation ability and output of innovation results. When local government debt expands, the financial pressure on local governments increases and they may be forced to cut or suspend certain

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government subsidy programs to reduce the debt burden. And a reduction in government subsidies could harm enterprises' ability to innovate.

Based on this, this paper puts forward hypothesis 1: local government debt has a significant negative impact on enterprise innovation

Mixed ownership reform refers to a reform mode in which state-owned enterprises introduce non-state capital to participate in the operation and management of enterprises. Mixed reform can reduce the policy burden of enterprises and reduce government intervention so that enterprises can focus more on innovation activities. The mixed reform improves the management supervision and incentive mechanism of enterprises. The mixed reform improves the financing ability of enterprises. After the mixed reform, enterprises can usually obtain more financing channels and financing costs, break the financing constraints caused by the rising local government debt, and help enterprises increase investment in innovation and research and development.

Hypothesis 2: Mixed ownership reform weakens the negative impact of local government debt on enterprise innovation.

Strategic differentiation is a strategy for enterprises to gain competitive advantages in the market by offering unique products or services to meet the specific needs of consumers. First, strategic differentiation requires companies to constantly explore and develop new products to meet consumers' changing needs and preferences. This continuous exploration and experimentation prompts enterprises to invest more resources in research and development and innovation, thus driving technological progress and product innovation. Secondly, through differentiated competition with competitors, enterprises can reduce the direct competitive pressure and reduce the intensity of market competition, so that it is easier to achieve innovation results and improve the success probability of innovation. Finally, the implementation of a differentiation strategy requires enterprises to constantly learn and improve to adapt to market changes and consumer demand, and this continuous learning and improvement process helps to stimulate the innovation vitality of enterprises and achieve the growth of innovation performance.

Hypothesis 3: Strategic differentiation of enterprises weakens the negative impact of local government debt on enterprise innovation.

4. Data source and model setting

The measurement and definition of variables are shown in table 1. In this paper, the annual data of A-share listed companies in Shanghai and Shenzhen from 2012 to 2022 are selected as samples, mainly from the CSMAR database. Local government debt is constructed at the city level.

Table 1: Variable definitions

Variable Types	Variable name	Variable symbol	Variable description
Explained variable	Corporate innovation	INO_1	R&D expenditure/operating income
Explanatory variables	Local government debt	LNDEBT	Ln(outstanding local government debt)
Mediating variable	Financing constraint	FC	SA index absolute logarithm
	Tax benefits	Taxp	Return of all taxes /(Return of all taxes + all taxes paid)
	Government subsidy	GS	The amount of government grants disclosed in the notes accompanying the year-end financial statements
Adjusting Variables	Depth of mixed ownership reform	NONSTATE	Share of all state shareholders held by top 10 shareholders/Share held by top 10 shareholders

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Table 1: (continued).

	Degree of strategic variance	DS	The average of the absolute value of the standardized strategic dimension
Control variable	Business size	Size	Total assets log
	Asset-liability ratio	Lev	Total liabilities/Total assets
	Return on assets	ROA	Net profit/average total assets
	Economic situation	LNGDP	Ln(GDP)
	Operating income growth rate	Growth	Growth in revenue as a percentage of total revenue in the previous year

To test how local government debt affects enterprise innovation, this paper sets the following regression model:

$$INO_{it} = \beta_0 + \beta_1 LNDEBT_{it} + X_{it}\psi + \gamma_i + \lambda_t + \varepsilon_{it}$$

Where the subscript represents the individual enterprise and the subscript represents the year. X_{it} is a series of control variables; γ_i and λ_t are individual and year fixed effects, respectively; ε is a random perturbation term. The robust standard error method was used for modeling.

5. Empirical analysis

5.1. Descriptive statistics

Table 2 shows the descriptive statistics of the main variables.

Table 2: Descriptive statistical analysis

Variable	Obs	Mean	Std.Dev.	Min	Max
INO_1	23804	-4.271	1.444	-16.271	-0.628
INO_2	23848	0.020	0.024	0.000	0.534
LNDEBT	21550	7.279	1.134	1.94	9.218
Lev	23848	0.411	0.294	0.008	31.467
Size	23848	22.231	1.355	17.806	29.535
ROA	22173	0.038	0.125	-2.285	12.211
LNDGDP	23848	9.114	1.085	4.542	10.71
Growth	22065	0.449	15.122	-0.997	1878.372

5.2. Benchmark return

In Table 3, model (1) and model (2) present a significance at 0.01 level and model (3) presents a significance at 0.05 level. This indicates that the balance of local government debt has a significant negative impact on the ratio of R&D expenditure to business revenue, so hypothesis 1 is confirmed.

Table 3: Baseline regression

	(1) INO_1	(2) INO_1	(3) INO_1
LNDEBT	-0.0878***	-0.1345***	-0.0396**
CONTROLS	YES	YES	YES
CONS	2.4085***	2.3462***	0.6269
	(0.18)	(0.19)	(0.79)

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Table 3: (continued).

N	19864	19864	19864
R^2	0.148	0.157	0.079
adj. R^2	0.148	0.157	-0.145
YEAR	NO	YES	YES
FE	NO	NO	YES

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

5.3. Adjustment effect test

This paper examines the moderating effects of mixed ownership reform and strategic differentiation, and the regression results are shown in Table 4. The results indicate that both mixed ownership reform and strategic differentiation significantly weaken the inhibitory effect of local government debt on enterprise innovation. Hypothesis 2 and hypothesis 3 are confirmed.

Table 4: Test of adjustment effect

	(1) INO_1	(2) INO_1	(3) INO_1	(4) INO_1
LNDEBT	-0.0385^{**}	0.0029	-0.0394^{**}	-0.0437^{***}
	(0.02)	(0.02)	(0.02)	(0.02)
NONSTATE	-0.1951^{***}	-0.2076^{***}		
	(0.05)	(0.05)		
NONSTATE_LNDEBT		0.3174^{***}		
		(0.03)		
DS			-0.0397^{**}	-0.0350^{*}
			(0.02)	(0.02)
DS_LNDEBT				0.0633^{**}
				(0.03)
CONTROLS	YES	YES	YES	YES
CONS	0.5107	0.3049	0.6600	0.6384
	(0.79)	(0.78)	(0.79)	(0.79)
N	19864	19864	19864	19864
R^2	0.080	0.088	0.079	0.079
adj. R^2	-0.143	-0.133	-0.144	-0.144
YEAR	YES	YES	YES	YES
FE	YES	YES	YES	YES

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

5.4. Intermediation effect

Model (1) indicates that the degree of corporate financing constraints increases with the expansion of the scale of local government debt. As a result, the R&D funds available to enterprises are reduced, and the innovation of enterprises is reduced. Model (2) indicates that when local government debt expands, they will be forced to cut or suspend some government subsidy projects, and this will hurt the innovation ability of enterprises. Model (3) in Table 5 shows that when local government debt expands, local governments will reduce preferential tax policies under financial pressure. The

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reduction of tax incentives will cause enterprises to reduce R&D investment in innovation, thus inhibiting the innovation ability of enterprises.

Table 5: Test of intermediary effect

	(1) FC	(2) GS	(3) Taxp
LNDEBT	0.006**	-2.1090**	-0.0196***
CONTROLS	YES	YES	YES
_cons	1.590**	-78.1088***	0.1959***
	(31.508)	(14.64)	(0.02)
N	19484	18622	19904
R^2	0.035	0.005	0.052
YEAR	YES	YES	YES
FE	YES	YES	YES

Standard errors in parentheses
* $p < 0.1$, ** $p < 0.05$, *** $p < 0.01$

5.5. Heterogeneity test

Different regions in China have certain differences in the level of economic development, the structure of property rights, the scale of investment, and the policies they enjoy. In this paper, the total sample is divided into three sub-samples of the eastern region, central region, and western region for regression. The results in Table 6 show that enterprise innovation in the central region is more susceptible to the impact of local government debt.

Table 6: Heterogeneity test

	(1) East	(2) Mid	(3) West
LNDEBT	-0.0218	-0.2250**	-0.0035
	(0.02)	(0.09)	(0.10)
CONTROLS	YES	YES	YES
CONS	3.3759***	-1.3269	-0.5119
	(0.98)	(1.62)	(2.82)
N	14310	2962	2585
R^2	0.089	0.095	0.092
adj. R^2	-0.138	-0.144	-0.111
YEAR	YES	YES	YES
FE	YES	YES	YES

Standard errors in parentheses

6. Conclusion

The findings of this paper are as follows: First, the expansion of local government debt inhibits their innovation ability by improving enterprises' external financing constraints and reducing government subsidies and tax incentives; Second, mixed ownership reform and strategic differentiation can reduce the policy burden of enterprises, break the financing constraints caused by rising local government debt, and help enterprises to reverse their disadvantages and increase investment in innovation and research and development. Therefore, this paper puts forward the following suggestions. (1) The company should releases resources and increases capital inflows. (2) The company should adhere to

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innovation-driven development and implement the concept of differentiated competition. (3) The government should defuses debt risks and reduces the harm to enterprises.

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