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The Dual-Track Effect of Short-Term Debt Ratio on Investment Scale of Chinese Listed Firms: An Empirical Test Based on SOE-Private Enterprise Property Right Heterogeneity

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Abstract. Taking Chinese A-share listed companies from 2014 to 2024 as the sample, this study examines the impact of short-term debt ratio on corporate investment scale and the heterogeneous effect of property rights. The two-way fixed effects model and instrumental variable method (2SLS) are adopted to address endogeneity issues. The results show that: in the direct regression, the short-term debt ratio is significantly negatively correlated with investment; after addressing endogeneity, the two exhibit a significant positive correlation. Under the heterogeneity of property rights, the positive effect of short-term liabilities share on corporate investment is more pronounced in private enterprises than in state-owned enterprises. This study reveals the endogenous interference in the interplay between short-duration debt and investment, and provides a basis for formulating differentiated financing policies.

Keywords: Short-term Debt Ratio, Investment Scale, Moderating Effect, Instrumental Variable Method, Property Right Heterogeneity.

1. Introduction

Corporate investment is the core link connecting capital supply and the development of the real economy, and it is one of the most dynamic links in economic operation. From a macro perspective, as a key driving force for promoting economic growth, the scale and efficiency of corporate investment are deeply affected by the debt structure, especially by the proportion of short-term debt [1]. The composition of the debt structure includes many different types of debts, which are highly diverse. Debts of different maturities and types have significant differences in their functional paths and impact intensity on corporate investment, among which this share of short-duration liabilities is particularly worthy of attention. It has characteristics such as a short repayment period, concentrated repayment pressure, low financing costs, and high sensitivity to a company's liquidity and asset structure. These features enable it to be a financing method with both flexibility and volatility. This characteristic also makes short-term debt play a dual role in corporate investment. On the positive

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side, it may help restrain over-investment by strengthening creditor supervision, thereby promoting investment optimization [2]. On the negative side, if a company continuously adopts this model, it may increase corporate liquidity risks and further lead to inefficient investment [3]. Alternatively, rising refinancing risks may further worsen under-investment [4, 5].

At present, scholarship regarding the influence of short-duration liabilities upon firm-level investment scale is relatively abundant, but the following problems still exist: First, most studies focus on debt structure aspects such as total debt and the ratio of long-term to short-term debt, while research on the unique impact of the proportion of short-term debt itself needs to be further deepened; Second, the analysis from the perspective of corporate heterogeneity is insufficient. Existing literature mostly uses large enterprises as research samples [6]. Meanwhile, in the Chinese context, these studies ignore the differences in financing and investment choices due to ownership heterogeneity — SOEs usually have more stable financing channels and lower financing constraints, while private enterprises face credit discrimination and a lack of long-term financing. This ownership difference is very likely to lead to significant heterogeneity in the impact of the proportion of short-term debt on the investment scale of the two types of enterprises, but existing studies have not yet conducted a systematic examination of this issue. In China, bank loans account for more than 60% of total social financing. Debt-based financing plays a dominant role in social financing, and short-term debt is also a vital source of investment funds among Chinese enterprises. This share of short-duration liabilities is directly linked with the investment decisions alongside the scales of enterprises with different ownership types. Moreover, state-owned enterprises (SOEs) and private enterprises differ in terms of ownership heterogeneity, such as access to financing and governance mechanisms. This provides a typical scenario for exploring the "dual-track effect" of the proportion of short-duration liabilities on corporate investment scale. Therefore, China is an ideal research setting for studying the relationship between the proportion of short-duration liabilities and corporate investment scale, as well as the impact of ownership heterogeneity.

2. Theoretical analysis and research hypotheses

2.1. The impact of short-duration liabilities ratio on enterprise investment scale

Short-term debt pertains to the obligations that an enterprise is required to settle within a period of one year or within one operating cycle. This category encompasses short-term loans, accounts payable, notes payable, and other similar liabilities. Such debt usually needs to be repaid through current assets or new current liabilities, and it reflects an enterprise’s short-term capital liquidity pressure [7]. Short-term debt typically has lower financing costs because of its short term and low interest rate sensitivity. Surveys show that about 60% of enterprises give priority to short-term debt when choosing financing instruments, especially during periods of loose monetary policy. However, over-reliance on short-duration liabilities may lead to increased financial vulnerability [8]. In this study, short-term debt is defined as "the collection of debts that need to be repaid within one year". Therefore, this study uses current liabilities in the accounting sense to measure it. In this sense, the two are different expressions of the same concept. From the perspective of agency theory, short-term debt has a relatively complex impact on corporate investment. First, short-term debt can alleviate agency costs to a certain extent. Due to its short repayment period, it will push managers to maintain the stability of corporate cash flow and the liquidity of assets, force more efficient allocation of performance and resources, or promote long-term investment planning through short-term debt. Second, the strengthened external supervision can reduce the possibility of managers concealing information or engaging in irregular operations and mitigate agency problems caused by information

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asymmetry. All these can enhance the controllability of corporate investment and reduce information asymmetry. For enterprises, with more transparent information, the decision on whether to expand investment scale will become clearer. However, payments for short-term debt will increase enterprises' investment pressure and reduce their motivation for investment. Based on the above analysis, this study will conduct multiple tests to identify the actual impact of the relationship. And based on real-world observations, we put forward the subsequent conjecture:

H1:Lies a marked negative correlation between the short-duration liabilities ratio of listed companies in China and their investment scale.

2.2. Hypothesis on corporate ownership heterogeneity

In the Chinese context, SOEs enjoy implicit government guarantees, and the government can provide credit endorsement for them. SOEs can obtain funds through low-cost channels such as policy-based long-term credit and financial subsidies, which significantly decreases their dependence on short-term debt. Their investment behavior is more guided by policy objectives , for example, large SOEs play a role in stabilizing employment and regulating capacity. As a result, the marginal investment effect of short-term debt tends to be weakened. Private enterprises, however, face ownership-based credit discrimination and a lack of long-term financing channels, so they are forced to rely on rolling short-term debt to maintain their operations. Only private enterprises face financing constraints, and these constraints significantly affect their productivity [9]. Further underscoring the disadvantaged position of private enterprises in accessing financing. From the supply side, market entities tend to prioritize services for large enterprises, which is unfavorable for private enterprises to obtain long-term loans. From the perspective of private enterprises themselves, during the period of extensive and rapid development, they are often accompanied by high debt levels. According to the financing constraint theory, short-term debt becomes a key lever to support their investment by alleviating liquidity pressure. Furthermore, the rapid expansion further magnified the driving effect of short-duration liabilities on the scale of investment.

H2: The proportion of short-duration liabilities in the private enterprise group has a significantly stronger impact on corporate investment scale than that in the state-owned enterprise (SOE) group.

3. Research design

3.1. Source of data

This paper will systematically examine the relationship between the short-duration liabilities of Chinese listed companies and their investment scale, while investigating the Heterogeneity impact of the nature of company ownership on this relationship. The initial sample of this article includes the data of Chinese companies listed on A-share over a 10-year period from 2014 to 2024, which are obtained from the CSMAR Database. This paper excludes data on ST companies, companies in the financial industry (based on the CSRC 2012 Industry Classification), and the companies that have already been delisted. The final sample data consists of 38,417 observations from 5,189 firms. In addition, to address the issue of heteroscedasticity, all continuous variables in this paper were truncated at the 1% and 99% levels. The Hausman test statistic has passed a significance test at the 1% level, indicating that the fixed effects model should be selected. Therefore, this study adopts the two-way fixed effects model to explore the relationship between the proportion of short-term debt and the investment scale of Chinese listed enterprises.

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3.2. Model specification

To test the influence of the short-duration liabilities ratio on the investment scale of Chinese listed companies as proposed in Hypothesis H1, the following benchmark regression model is specified.

$$Cis_{i,t} = \alpha + \beta_1 Std_{i,t-1} + \beta Controls + \phi_i + \varsigma_t + \varepsilon_{i,t} \tag{1}$$

To examine corporate ownership heterogeneity hypothesis proposed in Hypothesis H2, the following model is specified:

$$Cis_{i,t} = \alpha + \beta_1 Std_{i,t-1} \times Ownership + \beta_2 Controls + \phi_i + \varsigma_t + \varepsilon_{i,t} \tag{2}$$

3.3. Variable definition

Among them, $Cis_{i,t}$ denotes the investment scale of listed enterprise i in year t; $Std_{i,t-1}$ denotes the proportion of short-duration liabilities of listed enterprise i in year t-1; and the intercept term and the error term are represented by α an $\varepsilon_{i,t}$, respectively. In Model (2), a series of control variables were included to address endogeneity issues, such as omitted variable bias. Including: Fixed asset ratio (FAR), Ownership concentration (Oc), Total executive compensation (S), Management shareholding ratio (MSO), Tobin's Q, Return on Equity (ROE), Long-term leverage ratio (LTL). Table 1 indicates the symbols and measurement methods of each variable.

Table 1. Definitions of variable

Variable	Symbol	Measurement Method
Investment Scale of Listed Enterprises	Cis	Capital Expenditure / Total Assets
Short-term Debt Ratio	Std	Total Current Liabilities / Total Debt
Cash Flow Adequacy	CF	Net Cash Flow from Operating Activities / Total Assets
Firm Size (Asset-based)	Size	Natural Logarithm of Total Assets
Return on Assets	ROA	Return on Assets (standard financial indicator)
Return on Equity	ROE	Return on Common Shareholders' Equity
Leverage Ratio	Lev	Total Liabilities / Total Assets
Ownership Concentration	Oc	Total Shareholding of the Largest Shareholder / Total Shares
Fixed Asset Ratio	Far	Fixed Assets / Total Assets
Total Executive Compensation	S	Total Executive Compensation
Management Shareholding Ratio	MSO	Number of Shares Held by Management / Total Shares of the Enterprise
Tobin's Q	Q	Enterprise Market Value / Asset Replacement Cost
Long-term Leverage Ratio	LTL	Long-term Loans / Total Assets
Firm Age	Age	Current Year - Establishment Year + 1

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4. Empirical results and analysis

4.1. Basic regression analysis and data presentation

The descriptive statistics of the core variables of the model are presented in Table 2. The core variables are the enterprise investment scale (Cis) and the short-term debt ratio (Std). Cis serves as a key indicator for measuring the intensity of enterprise investment, with a sample mean of 0.047, meaning that the average capital expenditure accounts for 4.7% of total assets. The median is 0.048, which is close to the mean, indicating that the distribution of investment scale is relatively symmetrical. The extreme value range is 0 to 0.217, reflecting that most enterprises have stable investment, while a few have aggressive investment characteristics. The mean of Std is as high as 0.811, indicating that short-term debt occupies an important position in the debt structure of the sample companies. The median is 0.813, slightly higher than the mean, showing that the majority of enterprises have a Std concentrated at a relatively high level, close to or exceeding 80%.

Table 2. Variable descriptive statistics

Variables	Obs	Mean	Std	Min	Max	P50
Cis	38417	0.047	0.044	0.000	0.217	0.048
Std	38417	0.811	0.174	0.273	1.000	0.813
Variables	Obs	Mean	Std	Min	Max	P50
Far	38417	0.201	0.151	0.002	0.667	0.202
Lev	38417	0.407	0.204	0.055	0.897	0.417
LTL	38417	0.065	0.091	0.000	0.425	0.065
Mso	38417	15.527	20.048	0.000	69.053	15.444
Oc	38417	33.017	14.541	8.242	73.056	33.828
ROA	38417	0.038	0.067	-0.230	0.222	0.3893
ROE	38417	0.041	0.163	-0.998	0.318	0.0378
S	38417	5.45e+06	4.96e+06	6.94e+05	3.07e+07	5567016.028
Q	38417	2.024	1.284	0.830	8.510	2.129
Size	38417	22.237	1.289	19.878	26.296	/
CF	38417	0.048	0.067	-0.154	0.240	/
Age	38417	21.360	6.355	4.000	71.000	21.320

The test findings of the correlation analysis among the various factors are presented in Table 3. The correlation coefficient between Std and Cis is -0.198, indicating a preliminary negative correlation between Std and the Cis of listed enterprises.

Table 3. Correlation coefficient matrix

	Cis	Std	Far	Lev	LTL	Mso	Oc	ROA	ROE	S	Q	Size	CF	Age
Cis	1													
Std	-0.198	1												
Far	0.310	-0.289	1											
Lev	-0.050	-0.214	0.108	1										

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Table 3. (continued)

LTL	0.148	-0.811	0.276	0.537	1									
Mso	0.150	0.175	-0.142	-0.301	-0.216	1								
Oc	0.041	-0.040	0.091	0.007	0.057	-0.040	1							
ROA	0.147	0.097	-0.064	-0.360	-0.190	0.186	0.166	1						
ROE	0.120	0.036	-0.035	-0.262	-0.104	0.106	0.152	0.840	1					
S	0.041	-0.090	-0.068	0.122	0.121	-0.134	-0.022	0.115	0.125	1				
Q	0.012	0.124	-0.101	-0.220	-0.222	0.011	-0.105	0.136	0.037	-0.054	1			
Size	-0.025	-0.314	0.131	0.487	0.464	-0.370	0.161	-0.008	0.079	0.467	-0.362	1		
CF	0.160	-0.016	0.200	-0.153	-0.040	0.023	0.125	0.450	0.324	0.121	0.069	0.083	1	
Age	-0.132	-0.099	0.034	0.187	0.139	-0.250	-0.052	-0.115	-0.072	0.112	-0.085	0.209	-0.002	1

4.2. Two-way fixed effects

This paper conducts tests for multicollinearity and the Hausman test. Vif =2.23<5 indicates that there is basically no collinearity problem. Hausman test(P=0.0000)indicates the two-way fixed effects should be selected for the basic regression analysis.

This paper employs a two-way fixed effects model to address the endogeneity issue by controlling for individual and time fixed effects. Additionally, a series of control variables are incorporated into the model, including enterprise size (Size), fixed asset ratio (Far), asset return rate (ROA), and management shareholding ratio (Mso), etc. Table 4 shows that the regression coefficient for the short-term debt ratio β_1=-0.016(the standard error is 0.004), and p<1%, significantly negative. This indicates that, when controlling for variables like the size of enterprises, profitability, and asset structure, when the Std increases by 1 unit, the enterprise's investment scale will significantly decrease by 0.016 units. The two variables show a negative correlation. Moreover, it is demonstrated that Std has an extremely significant negative impact on the enterprise's investment scale in terms of statistics. This is supported by the baseline regression results and confirms Hypothesis H1.

Table 4. Two-way fixed effects results

Variables	Coefficient	Standard error	Significance
Std	-0.016	(-0.004)	***
Far	-0.032	(-0.005)	***
Lev	0.000	(-0.003)	
LTL	0.036	(-0.010)	***
Mso	0.000	(0.000)	***
Oc	0.000	(0.000)	***
ROA	0.010	(-0.008)	
ROE	0.008	(-0.002)	***
S	0.000	(0.000)	***
Q	0.002	(0.000)	***
Size	0.003	(-0.001)	***

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Table 4. (continued)

CF	0.004	(-0.004)	
Age	-0.002	(0.000)	***
Constant	0.049	(-0.025)	**

*** p<0.01, ** p<0.05, * p<0.1

4.3. Endogeneity test and instrumental variable regression

Endogeneity issues may lead to estimation errors when studying the relationship between Std and Cis. There are three main sources of endogeneity: Firstly, there is a reverse causal relationship. In reality, enterprises' investment scale expansion might result in a rise in the demand for short-term financing, thereby causing an increase in short-term liabilities, which forms a two-way causal relationship between the proportion of short-term liabilities and the scale of investment. Secondly, there is omitted variable bias. Some factors may simultaneously affect enterprise investment and short-term liabilities, but they are not included in the variables of the research design. For example, industry cyclical fluctuations, etc., may cause endogeneity problems; Thirdly, there is measurement error. Short-term liabilities are affected by certain policies and environments, which may give rise to measurement bias of the variables. For the sake of underpinning the credibility of the research findings, this study conducts endogeneity tests, including considering time lags and using instrumental variable analysis for verification.

There may be a bidirectional causal relationship between the share of short-term debt and enterprises' investment scale. When enterprise investment scale expands, it may lead to a rise in the demand for short-term debt, forming a reverse causal chain where investment drives short-term debt. In the Chinese context, there will be a problem of maturity mismatch. To address the endogenous relationship between the share of short-term debt and enterprises' investment scale, this paper employs the two-stage least squares method (2SLS), by adopting the lagged leverage ratio as the instrumental variable and combining it with dynamic panel GMM for testing [10]. When using the lagged one-period Std as the instrumental variable, the regression reflects the past financing decisions of the enterprise and has a relatively weak endogenous correlation with the current investment, and removes the interference of reverse causality. At the same time, it controls the past debt decision habits and tendencies of the enterprise, more accurately reflecting the real impact of short-term debt on investment. Therefore, this paper chooses to use the lagged one-period short-term debt ratio as the instrumental variable. Through the logic of "estimating endogenous factors during the first phase + assessing causal impacts in the second phase", the endogeneity interference is removed. This stage of research has a total of 32,639 observations.

Validity Test of Instrumental Variables. The validity of the instrumental variable is verified through the weak instrument test and the non-identification test. Table 5 shows the results.

Table 5. Instrumental variable validity test

Type of test	Statistical quantity/value	Reference standard	conclusion
Under identification	P=0.000	α=0.01	The instrumental variable satisfies the minimum relevance requirement.
Cragg-Donald F	F=14,000	Critical Value=16.38	No weak instrumental variable issue.

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Regression Result. In the first stage, Std (g, which refers to the short-duration liabilities of the prior period) serves as the dependent variable, whereas the control variables are considered as the independent variables. The association between the instrumental variable and the endogenous variable is confirmed. In the second stage, the enterprise investment scale is taken as the dependent variable, and the fitted value of the short-term debt ratio from the first stage is substituted to estimate the net causal effect of Std on the investment scale. This is in Table 6.

Table 6. Regression results

Variables	First Stage	Second Stage	Significance	Economic Significance
Instrumental Variables				
Std	0.023***(0.007)	-	***	Endogenous Variable
Std_ g	0.401***(0.011)	-	***	Instrumental Variable (Strong Relevance)
Key Explanatory Variables				
Far	-0.016*** (0.006)	0.092***(0.003)	***	Significantly promotes (↑9.2%)
Lev	0.195***(0.005)	-0.011***(0.003)	***	Significantly inhibits(↓1.1%)
LTL	-1.267*** (0.021)	0.134***(0.013)	***	Significantly promotes (↑13.4%)
Control Variables				
ROA	-0.008(0.019)	0.088***(0.009)	***	Profitability drives investment positively
Size	0.003***(0.001)	-0.003*** (0.000)	***	Negative scale effect
Q	-0.001**(0.001)	0.001***(0.000)	/*	Market valuation has a positive impact
CF	0.030***(0.009)	0.017***(0.005)	***	Cash flow has a positive effect
Age	0.000(0.000)	-0.001*** (0.000)	***	Increasing age inhibits investment
S	-0.000*(0.000)	0.000***(0.000)	*/***	Weakly significant impact
Mso	0.000***(0.000)	0.000***(0.000)	***	Weakly significant impact

The instrumental variable has a strong correlation with the endogenous variable, meeting the "correlation" requirement of the instrumental variable. At the same time, it can be concluded that the higher the proportion of fixed assets in enterprises, the lower the demand for short-term liabilities; the higher the total debt level, the higher Std, and the liability structure has the characteristic of "reliance on short-term debts". Enterprises with abundant cash flow are more likely to obtain short-term liabilities. The possible reason is that sufficient cash flow serves as an endorsement for short-term debt repayment ability, which can lower the financing threshold for enterprises.

Std is significantly beyond the 1% significance level. This indicates that after correcting for endogeneity, when it rises by 1 percentage point each time, the enterprise's investment scale increases by an average of 0.023 percentage points. This verifies the core assumption that "short-term debt promotes enterprise investment". Moreover, the cash flow coefficient is significantly positive, suggesting that cash flow has a direct promoting effect on investment. This might be because cash flow, as an internal source of funds, can alleviate financing constraints.

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4.4. Test of property heterogeneity

The nature of enterprise property rights is a key factor influencing financing behavior and investment decisions. Due to the existence of budgetary soft constraints, financing advantages, and policy goal orientation in state-owned enterprises, the relationship between their short-term debts and investments may significantly differ from that of non-state-owned enterprises. Based on the instrumental variable method (2SLS), this paper conducts heterogeneity tests on sub-samples of state-owned enterprises and non-state-owned enterprises, and the core conclusions are as follows.

From the empirical results, "Short-Term Debt Ratio (Std_lag)" exerts a notably positive influence on the scale of investment of enterprises of both kinds. However, there are distinct differences in the intensity of this impact based on the ownership structure: After controlling for other variables, in the sample of state-owned enterprises, for every 1 percentage point increase in the proportion of short-term debt, the investment scale increases by 0.0148982 percentage points ($P < 0.001$), indicating that short-term debt has a marginal promoting effect on the investment of state-owned enterprises, but the intensity is relatively weak; in the sample of private enterprises, for every 1 percentage point increase in the proportion of short-term debt, the investment scale significantly increases by 0.0192098 percentage points ($P < 0.001$), not only is the positive impact more significant, but the marginal effect is approximately 29.0% higher than that of state-owned enterprises.

From the data analysis, it can be seen that the difference in the positive effect and intensity of short-term liabilities of state-owned enterprises and non-state-owned enterprises on investment stems from the differences in financing environments caused by the diverse characteristics of ownership rights: From a contrasting angle, state-owned enterprises, with their flexible budget constraints and implicit government guarantees can obtain long-term credit resources at a lower cost, and their dependence on short-term debts is naturally lower [11]. Short-term debts are more often used as a liquidity supplement rather than the core source of investment funds, so their marginal promotion effect on investment scale is relatively weak. From a contrasting angle, non-state-owned enterprises are restricted by external credit discrimination and narrow long-term financing channels, and have to depend more on short-term borrowings to alleviate the investment funding gap. This strong dependence relationship means that a slight change in the proportion of short-term debts can exert a more remarkable positive promotive impact on investment scale.

5. Conclusion

In this study, whether to use the lagged one-period Std as an instrumental variable for the regression has a completely different impact on "The Relationship between Short-Term Debt Ratio and Investment Scale of Chinese Listed Enterprises". In the direct regression, the ratio of short-term debt exerts a notably restraining influence on the scale of investment, and the two are in a significant negative relationship. The authors believe that this is caused by various reasons, such as some enterprises experiencing cash flow strain due to insufficient investment and thus passively increasing the short-term debt ratio to maintain normal operation of the enterprise. At this time, the result of the direct regression reflects the reverse causal relationship of short-term debt increase caused by insufficient investment, rather than the real impact of how short-term debt impacts investment. Meanwhile, the investment preferences and habits of enterprises also affect the result of the direct regression. For example, risk-averse enterprises tend to choose low investment and high short-term debt to avoid financial risks, which may also lead to the short-term debt ratio and the investment scale having a negative correlation.

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Furthermore, under the unique national conditions of China, enterprises generally adopt the short-term debt utilization mechanism of "borrowing new to repay old", which results in short-term debts actually fulfilling the function of long-term financing. The credit of Chinese commercial banks is cyclical in nature. They tend to provide short-term loans when enterprises expand their investments. Most Chinese listed enterprises have relatively good reputations, and their development prospects are generally good. Moreover, they have a high dependence on short-term loans from banks. Therefore, a significant positive relationship is ultimately presented.

The endogeneity contradiction revealed by the instrumental variable method indicates that this relationship is inversely affected by the financing behavior of enterprises, expanding the theoretical boundaries of short-term bond risks. Especially in the Chinese context, the heterogeneous responses of enterprises of different ownership natures show that the former are not significantly influenced by policy, while the latter have a weakened negative effect due to financing constraints, suggesting the issue of heterogeneity in debt sources.

Based on these findings, policy formulation should adopt a dual-track approach: for enterprises, it is recommended to optimize the matching of debt maturities; enterprises with abundant cash flow can moderately increase short-term debts to support investment, while high-debt enterprises need to be vigilant about liquidity risks. For the government, it is necessary to deepen the reform of the financing market, establish a short-term debt risk warning mechanism for non-state-owned enterprises, and alleviate their financing constraints through special credit tools. Future research can further explore the dynamic mechanism of the role of short-term debts based on the monetary policy cycle, providing policy basis at the temporal level for the optimization of the debt structure.

Authors contribution

All the authors contributed equally and their names were listed in alphabetical order.

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