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Capital Structure and Enterprise Performance: Evidence from Non-financial Companies in China

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Abstract: The capital structure has always been the core of corporate finance. The relationship between capital structure and enterprise performance is a key issue for the decision-making and the development of corporate. This paper reviews the classical theory of capital structure and explores the influence and mechanism of capital structure on corporate performance through theoretical analysis and empirical analysis. This research uses the company's profitability and innovation ability to measure the enterprise's performance, which respectively represents its short-term competitiveness and long-term sustainable development ability. This paper takes China's non-financial listed companies from 2016 to 2020 as samples, uses the fixed effects model and considers the endogenous problem and the heterogeneity of enterprise size, ownership and industry. The empirical results show that there is an inverted U-shaped relationship between capital structure and performance. This paper further improves the discussion on the relationship between capital structure and enterprise performance, and provides some theoretical suggestions for enterprises to determine the optimal capital structure scientifically in the context of China's current deleveraging policy.

Keywords: capital structure, leverage, innovation, profitability

1. Introduction

As one of the important issues in corporate finance, theories about capital structure have been constantly developed and innovated since the M&M proposition was put forward. The capital structure of an enterprise includes two parts: debt capital and equity capital. The leverage ratio measures the proportion of equity and debt capital. Therefore, this paper uses leverage ratio as an indicator to measure capital structure and analyzes the relationship between capital structure and performance.

Previous research on the economic benefits of capital structure can be divided into inhibition theory and promotion theory. The coexistence of inhibition theory and promotion theory means that the relationship between capital structure and performance may not be a simple linear relationship. Ma Caoyuan found that Chinese enterprises' deleveraging has a two-sided impact on their productivity. For over-indebted enterprises, reducing leverage ratio is conducive to improving their productivity, while for under-indebted enterprises, deleveraging has an inhibitory effect [1].

Previous researches mainly focused on various aspects of enterprise operation, but did not explore the comprehensive impact of capital structure on enterprise performance from an overall perspective to draw general conclusions. Therefore, this paper divides enterprise performance into two aspects:

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short-term performance and long-term development ability, which are related to the profitability and innovation ability of enterprises respectively to empirically analyze the influence of enterprise capital structure on enterprise performance, and to discuss whether there is a nonlinear relationship between them.

This paper selects listed companies in China as its initial research object. Leverage ratio is used to measure corporate capital structure, corporate profitability is measured by corporate return on equity, and corporate innovation ability is measured by innovation input and output. The fixed effects model is used to explore the relationship between capital structure and firm performance.

From the perspective of enterprises, this paper measures the differentiated impact of different capital structures on enterprises, so as to provide a theoretical basis for enterprises to better search for the capital structure conducive to enterprise operation and development. From the perspective of macroeconomics, this research result also provides a policy reference for China's structural deleveraging policy.

2. Literature Review

Studies on capital structure can be traced back to M&M proposition in 1958. Modigliani and Miller pointed out that enterprise value is proportional to debt scale due to the tax shield [2]. According to the trade-off theory, increasing debt increases the risk of a financial deficit. Therefore, it was necessary to find the optimal debt ratio that could balance the cost and the benefit of debt capital [3, 4]. Jesen and Meckling take the principal-agent factor into the consideration of capital structure [5]. Driven by principal-agent problems and information asymmetry, pecking order theory put forward a pecking order framework, in which the firm prefers internal to external financing, and debt to equity if it issues securities [6].

The current debate over the economic benefits of capital structure can be divided into two categories: promotion theory and inhibition theory. Promotion theory believes that the increase of leverage ratio has a positive impact on enterprise performance. The revised M&M proposition, trade-off theory and pecking order theory provide theoretical basis for promotion theory. Bartoloni believed that debt financing is conducive to maximizing corporate value [7]. Bhagat and Welch analyzed the data from American multinational companies and found that their debt ratio was positively correlated with R&D expenditure [8]. In addition, inhibition theory believes that high leverage will bring adverse effects to enterprise operation. Morke &Nakamura believes that in order to meet the demand for collateral in bank credit, enterprises may reduce intangible asset investment that drives innovation development and increase the investment in fixed assets that can be pledged as collateral [9]. Aghion et al believes that high leverage intensifies financing constraints and squeezes the development space of enterprises, which is not conducive to the improvement of performance [10].

3. Methodology

3.1. Hypothesis

3.1.1. Capital Structure Can Promote Enterprise Performance.

It is believed that due to the interest tax shield, the value of enterprises will increase with the increase of debt. Due to the amplification effect of financial leverage, when the enterprise has reasonable financial leverage, the profit rate of its equity capital will be improved, and the shareholders will obtain additional income**.** Ross points out that companies with higher value will adopt a high leverage strategy, and enterprises can transmit positive signals through this behavior, which is conducive to enterprise performance improvement [11].

DOI: 10.54254/2754-1169/21/20230242

3.1.2. Capital Structure Can Inhibit Enterprise Performance.

The cost of debt will run out of the space for innovation and development. When the pretax profits created by the enterprises are not enough to pay the interest expenses, they need to take a part of the equity capital income to compensate the interest, and the enterprises will suffer losses as a result. Enterprises with excessive leverage may fall into financial difficulties or even bankruptcy. And this is why the trade-off theory thinks it is necessary to balance the tax shield value of debt interest and bankruptcy costs. The high leverage ratio makes external investors have a higher estimate of the probability of default, which aggravates the principal-agent problem and repress the further development of enterprise.

Based on the above, the relationship between firm capital structure and firm performance may not be linear. This paper proposes the following research hypothesis: capital structure and firm performance have an inverted U-shaped relationship, which is first promoted and then inhibited. In a certain range, the increase in debt can promote the performance of enterprises, but when the increase in debt reaches the inflection point, it can inhibit the performance of enterprises.

3.2. Model Design

This paper takes 1591 non-financial listed companies from 2016 to 2020 as the research object to explore the relationship between corporate capital structure and corporate performance. In order to control the individual effect and time effect, this paper uses the two-way fixed effects model for reference to Wu Yao's research [12]. The leverage ratio of the enterprise and its quadratic term are included in the model in view of the assumption of an inverted "U" relationship.

$$innov\_in_{it} = \beta_0 + \beta_1 Leverage_{it} + \beta_2 Leverage_{it}^2 + \gamma Controls + \mu_t + \lambda_t + \varepsilon_{it} \quad (1)$$

$$innov\_out_{it} = \beta_0 + \beta_1 Leverage_{it} + \beta_2 Leverage_{it}^2 + \gamma Controls + \mu_t + \lambda_t + \varepsilon_{it} \quad (2)$$

$$ROE_{it} = \beta_0 + \beta_1 Leverage_{it} + \beta_2 Leverage_{it}^2 + \gamma Controls + \mu_t + \lambda_t + \varepsilon_{it} \quad (3)$$

$innov\_in_{it}$, $innov\_out_{it}$, ROE_{it}, $Leverage_{it}$ represent the innovation input, innovation output, return on equity and leverage ratio of Company i in year t respectively. $Controls$ is control variable composed of other factors affecting firm performance. $\mu_t$is the time-invariant corporate individual fixed effect. $\lambda_t$is time fixed effect. $\varepsilon_{it}$is the error term.

3.3. Variable Selection

1.Explanatory variable: Leverage (Total asset/Total debt)

2.Explained variables: this paper divides enterprise performance into short-term competitiveness and long-term development ability. ROE, an indicator of enterprise profitability, is used to represent the short-term competitiveness of enterprises. Based on the research of Wang Yuze, innovation input and innovation output are used to measure the innovation ability of enterprises, which represents the long-term development ability [13].

Table 1: Variable selection.

	Variable Name	Description
Explanatory variable	Leverage	Leverage= Total Asset/Total Debt
Interpreted variable	ROE	Return on equity = Net Income/Total Equity
	Innov_in	R&D Input/Total Asset
	Innov_out	Ln(Intangible Asset)

DOI: 10.54254/2754-1169/21/20230242

Table 1: (continued).

Controls	Tobin Q	Stock Market Value / Replacement Cost of Total Assets
	Turn	Turnover rate operating income
	Size	Ln(Asset)
	Fixed	Fixed Asset / Total Asset
	Cash	Ln(Cash flow)
	Growth	Total Asset Growth Rate
	Top10	Shareholding Ratio of Top Ten Shareholders
	Intangible	Ln(Intangible asset)

4. Empirical Analysis

4.1. Data and Descriptive Statistics

This paper selects the financial data of A-share listed companies in Shanghai and Shenzhen from 2016 to 2020 as the initial research samples, all of which are from the CSMAR database. Data are excluded according to the following principles: (1) exclude financial enterprises; (2) exclude ST, *ST and delisted companies; (3) exclude companies that listed after 2016. In order to eliminate the influence of outliers, this paper carries out 1% winsorize on financial data, and finally obtains 7595 company-year observations for 1591 firms.

Table 2: Descriptive statistics.

Variable	Obs	Mean	Std.dev.	Min	Max
Leverage	7,595	0.359	0.171	0.0586	0.776
ROE	7,595	0.0636	0.106	-0.513	0.293
Innov_in	7,595	0.0259	0.0201	0.000401	0.114
Innov_out	7,595	0.0405	0.0321	0.00112	0.187
ROA	7,595	0.0419	0.0651	-0.29	0.198
Size	7,595	22.14	1.148	20.08	25.94
Fixed	7,595	0.172	0.112	0.00404	0.497
Turn	7,595	3.337	4.994	0.284	35.77
Growth	7,595	0.155	0.28	-0.29	1.677
Intangible	7,595	18.61	1.453	14.43	22.5
Cash	7,595	20.26	1.288	17.48	24.27
TobinQ	7,595	2.139	1.239	0.87	7.998
Top10	7,595	0.573	0.143	0.249	0.888

4.2. Regression Results

Stata 17 was used in the empirical analysis in this paper. Table 3 shows the regression results. columns (1), (2) and (3), the first term estimates are significantly positive, while the second term estimates are significantly negative, indicating an inverted U-shaped relationship between enterprise capital structure and performance.

The reasons for the above results may be as follows: when the leverage is low, the increase of leverage mainly reduces the cost through the tax shield, exerts a positive impact on the corporate value through the amplification effect of financial leverage, and transmits a positive value signal through the incentive-signaling approach, which improves both short-term and long-term

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performance. However, with the continuous increase of enterprise leverage and debt cost, the investment space of enterprise operations and innovation development is crowded out. Meanwhile, the increase of financial risk under a high leverage ratio aggravates the principal-agent problem and worsens the external financing environment of enterprises. At this point, the marginal income brought by the increase of leverage is offset by the marginal cost, and the continued increase of leverage will inhibit the performance of the enterprise.

The inflection point of the inverted U-shaped graph is calculated to explore the optimal leverage ratio of the enterprise. The inflection points of columns (1), (2) and (3) are 12.45%, 48.26% and 40.85%, respectively. When the corporate debt ratio is lower than 12.45%, the increase in leverage will increase the return on equity, while when the leverage is higher than 12.45%, the increase in leverage will decrease the return on equity. Similarly, for enterprises with a debt ratio lower than 48.26%, increasing leverage will lead to an increase in R&D input, while higher than 48.26%, increasing leverage will lead to a decrease in R&D input. When leverage is lower than 40.85%, the R&D output level increases; when leverage is higher than 40.85%, the R&D output level decreases. Compared with the innovation ability, which represents the long-term sustainable development of an enterprise, the inflection point of profitability, which represents the short-term operation status of an enterprise, is at a lower inflection point. Therefore, the improvement of capital structure of enterprises is a strategy that is more focused on the long term. While increasing the leverage ratio, enterprises may sacrifice short-term corporate performance in exchange for long-term development. However, when the corporate debt ratio is too low (below 12.45%), appropriately increasing the leverage can bring about the joint development of profitability and innovation ability. Therefore, enterprises with too low debt ratio should be encouraged to improve their performance by improving their capital structure. When the corporate debt ratio is too high (higher than 48.26%), increasing corporate leverage will have a negative impact on both short-term and long-term ability of enterprises, because such enterprises need to implement deleveraging strategies to improve business operation. At the same time, how to find a balance between short-term effect and long-term effect, determine the optimal capital structure of enterprises, and to improve enterprise performance are also important issues that enterprises need to face.

Table 3: Regression result.

	(1) ROE	(2) Innov_in	(3) Innov_out
Leverage	0.1512***	0.0139***	0.0357***
	(-3.4782)	(-3.6093)	(-4.8689)
Leverage2	-0.6072***	-0.0144***	-0.0437***
	(-11.4880)	(-3.0440)	(-4.8480)
Size	0.1001***	-0.0036***	0.0009
	(-15.318)	(-6.0645)	-0.9127
Fixed	-0.0712***	0.0094***	0.0278***
	(-2.7370)	-4.0639	-6.3556
Turn	-0.0001	0.0001**	0.0001*
	(-0.2563)	(-2.2733)	(-1.825)
Growth	0.0691***	-0.0055***	0
	-16.2576	(-14.3373)	(-0.0154)
Intangible	-0.0152***	0.0016***	
	(-5.4902)	(-6.3924)	

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Table 3: (continued).

Cash	-0.004	-0.0007***	-0.0028***
	(-1.4578)	(-2.7046)	(-5.9716)
TobinQ	0.0117***	0.0010***	0.0008***
	(-8.315)	(-7.999)	(-3.2144)
Top10	0.0631**	-0.0015	0.0077*
	(-2.5582)	(-0.6784)	(-1.842)
N	7595	7595	7595
R2	0.5582	0.9037	0.8614

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

4.3. Endogeneity

There is reverse causality between the capital structure and the performance of the enterprise. The change of firm performance may also have a reverse impact on the firm's available capital and risk tolerance, and then affect the financing strategy. For enterprises with poor performance, they are likely to increase leverage to obtain funds needed for business operation. At the same time, there may also be endogenous problems caused by missing variables. When selecting control variables, it is difficult to take all influencing factors into account. Other uncontrollable factors may also have an impact on enterprise performance.

In order to alleviate the adverse effects brought by the endogeneity, this paper uses the instrumental variable for further estimation. Lin Chen believed that it can be assumed that endogenous problems only occur at the individual level, but not at the industry and region level [14]. Therefore, the average value of the industry or region can be used as IV to avoid the influence of endogenous factors. This paper takes the mean value of capital structure at the industry level as the instrumental variable of enterprise capital structure by referring to the research of Lin Wei [15]. Table 4 shows the validity test of instrumental variables. The Cragg-Donald Wald F statistics in columns (1), (2) and (3) are 181.833, 154.706, 154.663, respectively, greater than Stock-Yogo weak ID test critical values (10% maximal IV size) 7.03. Kleibergen-Paap rk LM statistics are 263.719, 219.057 and 220.018 respectively. These results pass the correlation test and insufficient recognition test, which means the selection of the instrumental variables is effective. Columns (1), (2) and (3) show the regression result using two-stage least squares estimation (2SLS). After dealing with the endogeneity problem, the regression results still verify the hypothesis that there is an inverted "U"-shaped relationship.

Table 4: Regression result.

	(1) ROE	(2) Innov_in	(3) Innov_out
Leverage	20.0568	0.3240	0.1607
	(0.1834)	(0.2661)	(0.0915)
Leverage2	-6.3457	-0.5882	-0.8311
	(-0.1963)	(-0.7413)	(-0.7033)
N	7595	7595	7595
Cragg-Donald Wald F	181.833	154.706	154.663
Kleibergen-Paap rk LM	263.719	219.057	220.018

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4.4. Heterogeneity Analysis

The influence of capital structure on enterprises is heterogeneous. First, capital structure has different influences on different types of enterprises with different optimal capital structure. For example, American car rental companies Hertz and Avis, with 95% leverage, avoided a financial crisis. Secondly, enterprises are faced with scale, ownership and industry discrimination in bank credit allocation. Different enterprises face different costs and opportunities to obtain debt financing. Therefore, it is necessary to further explore the heterogeneity at the enterprise level.

4.4.1. Scale.

Enterprise size is an important factor affecting enterprise performance. Enterprises are divided into large-scale enterprises and small-scale enterprises according to the average value of their scale (total assets). According to the results of descriptive statistical analysis, the average leverage ratio of large enterprises is 43.53%, while that of small enterprises is 29.56%.

Table 5 shows the regression results of enterprises classified by size. In columns (1) and (2), the capital structure and ROE of both large and small enterprises show an inverted U-shaped relationship, but the results of small enterprises are more significant. This is because small enterprises have less assets, bigger risks, and larger dependence on debt financing based on bank loans. The increase of leverage will increase the financial risk and cost of financial difficulties while improving the profitability of enterprises, so it shows a more significant inverse "U" shaped relationship.

In Column (3) and (4), capital structure of small enterprises has no significant relationship with innovation input, while the increased leverage of large enterprises has a more significant impact on innovation input. In Column (5) and (6), the capital structure of both large and small enterprises shows an inverted U-shaped relationship with innovation output, with the inflection point on 44.56% and 46.93%. Large enterprises show more significant characteristics. This is because it is easier for large enterprises to obtain debt financing due to their abundant capital and more complete management system. Large enterprises, which occupy the main share of the market, will pay more attention to long-term innovation and development, and regard it as the main means to expand the profit. On the contrary, small enterprises are subject to great financing constraints. Innovation activities, a kind of venture capital with uncertain returns, are likely to further increase the operating pressure. Therefore, small enterprises tend to hold a more cautious attitude towards innovation and development while the leverage ratio increases. To sum up, large enterprises are more likely to use debt to improve their ability to innovate and develop.

Table 5: Regression result grouped by size.

	(1) ROE (big size)	(2) ROE (small size)	(3) Innov_in (big size)	(4) Innov_in (small size)	(5) Innov_out (big size)	(6) Innov_out (small size)
Leverage	0.0425	0.4357***	0.0104*	0.0052	0.0582***	0.0199**
	(0.6808)	(7.3134)	(1.7901)	(0.9803)	(4.3611)	(2.3339)
Leverage2	-0.2493***	-1.0507***	-0.0173***	-0.0031	-0.0653***	-0.0212*
	(-3.7814)	(-13.3444)	(-2.8034)	(-0.4421)	(-4.6116)	(-1.8409)
_cons	-0.2650***	-0.3360***	0.0490***	0.0413***	0.1074***	0.0624***
	(-3.7595)	(-4.1554)	(7.4402)	(5.8254)	(7.1043)	(5.4128)
N	3367	4083	3367	4083	3367	4083
R2	0.6334	0.5429	0.9434	0.8822	0.8996	0.8578

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

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4.4.2. Ownership.

The leverage ratio of Chinese state-owned enterprises is subject to strict restrictions and supervision. The Administration Commission of the CPC Central Committee has formulated a warning line for state-owned enterprises in different industries, requiring the leverage ratio of state-owned enterprises to be controlled within 65%. Therefore, it is important to explore the heterogeneity between state-owned enterprises and non-state-owned enterprises including private enterprises and foreign-funded enterprises.

Table 6 shows the regression results of enterprises classified by ownership.

According to Column (1) and (2), the capital structure and ROE of both state-owned enterprises and non-state-owned enterprises present an inverted U-shaped relationship, with the inflection points on 15.83% and 12.53% respectively. The inflection point of state-owned enterprises is slightly larger. Since bank credit is inclined to state-owned enterprises, they face fewer financing constraints. Non-state-owned enterprises have larger financing constraints and higher loan costs. When leverage of non-state-owned enterprises rises, the short-term economic effect of enterprises is more likely to be squeezed due to the debt repayment pressure, resulting in the decline of short-term ROE.

According to column (3) and (4), there is a negative linear relationship between the capital structure and innovation input for state-owned enterprises while there is an inverted "U" -shaped relationship for non-state-owned enterprises, with the inflection point on 48.56%. According to Column (5) and (6), the capital structure and investment output of both state-owned enterprises and non-state-owned enterprises present an inverted U-shaped relationship, and the inflection points are 23.32% and 61.62% respectively, of which non-state-owned enterprises is obviously larger. Leverage is more likely to inhibit the innovation input and output of state-owned enterprises but will promote the innovation of non-state-owned enterprises. The possible reason is that state-owned enterprises need to undertake the task of economic growth. When faced with high debt, the management tends to reduce innovation input and turn to short-term investment to achieve the development goal. For non-state-owned enterprises facing greater financing constraints, debt financing has a greater incentive effect on long-term development when facing financing difficulties, bankruptcy risk, and other problems. Thus, non-state-owned enterprises are more suitable for increasing leverage ratio.

Table 6: Regression grouped by ownership.

	(1) ROE (state-owned)	(2) ROE (non-state-owned)	(3) Innov_in (state-owned)	(4) Innov_in (non-state-owned)	(5) Innov_out (state-owned)	(6) Innov_out (non-state-owned)
Leverage	0.1548*	0.1663***	-0.0003	0.0135***	0.0341*	0.0228***
	(1.8512)	(3.2530)	(-0.0357)	(3.0516)	(1.8925)	(2.8260)
Leverage2	-0.4889***	-0.6638***	-0.0023	-0.0139**	-0.0731***	-0.0185*
	(-5.3598)	(-10.3329)	(-0.2630)	(-2.4611)	(-3.7222)	(-1.8063)
_cons	-1.2016***	-1.9541***	0.0664***	0.0873***	-0.1596***	0.1067***
	(-5.5032)	(-14.3329)	(3.1469)	(7.2305)	(-3.3759)	(4.8698)
N	1975	5590	1975	5590	1975	5590
R2	0.6344	0.5585	0.9315	0.8991	0.9124	0.8425

z statistics in parentheses

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

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4.4.3. Industry.

There is obvious heterogeneity in the optimal capital structure of enterprises in different industries. This paper divides enterprises into technology-oriented industries and non-technology-oriented industries. Technology-oriented enterprises are defined as those in need of large R&D investment, such as the Internet service industry, the software and information technology industry, etc. Descriptive analysis shows that the average innovation input of technology-oriented enterprises is 3.49%, which is significantly higher than that of non-technology-oriented enterprises (1.96%). The leverage ratio of technology enterprises is 33.11%, slightly lower than that of non-technology enterprises (37.87%). Table 7 shows the regression results of enterprises grouped by industry.

Columns (1) and (2) show that whether the enterprise is technological or non-technological, there is a significant inverted U-shaped relationship between the capital structure and the ROE. The inflection points are 16.83% and 12.71%, respectively, which means that technology enterprises are more likely to improve their profitability by increasing their leverage ratio.

The heterogeneity is mainly reflected in the impact on innovation ability. Columns (3) and (4) show that there is a significant inverted U-shaped relationship between the capital structure and innovation input of technology enterprises and non-technology enterprises. The inflection points were 45.65% and 41.27% respectively. For technology enterprises, leverage ratio has a stronger incentive effect on innovation input, and the inflection point is higher. The financing obtained by raising leverage ratio will be more invested in the innovation field.

Columns (5) and (6) show that the secondary term estimation of technology-oriented enterprises are not significant, meaning the capital structure has no significant inhibiting effect on innovation output. This is because for technological enterprises, innovation is very important to their long-term development and short-term profits. Enterprises always regard innovation as an important aspect of development, and innovation output always occupies an important part of enterprise assets. Therefore, the increase of leverage ratio does not have a significant impact on enterprise R&D and innovation. However, the capital structure of non-technology enterprises has a significant inverse "U" relationship with innovation output, and the inflection point is "37.70%".

Table 7: Regression grouped by industry.

	(1) ROE (tech)	(2) ROE (non)	(3) Innov_in (tech)	(4) Innov_in (non)	(5) Innov_out (tech)	(6) Innov_out (non)
Leverage	0.3020***	0.1094**	0.0147**	0.0071*	0.0232**	0.0328***
	(4.1764)	(2.0880)	(2.0226)	(1.8734)	(2.1745)	(3.2029)
Leverage2	-0.8970***	-0.4303***	-0.0161*	-0.0086*	-0.0215	-0.0435***
	(-9.8746)	(-6.8543)	(-1.7307)	(-1.8819)	(-1.5841)	(-3.5262)
_cons	-1.8135***	-1.4082***	0.1204***	0.0758***	0.0353	0.0610**
	(-8.7861)	(-10.4949)	(5.7297)	(7.6830)	(1.1593)	(2.2978)
N	3196	4370	3196	4370	3196	4370
R2	0.5530	0.5878	0.9057	0.8880	0.8413	0.8792

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

5. Conclusion

The empirical results show that there is an inverted U-shaped relationship between capital structure and firm performance, which first promotes and then inhibits. When the leverage is lower than

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12.45%, the capital structure promotes the ROE, while when it is higher than 12.45%, it inhibits the ROE. When the leverage is lower than 48.26%, the capital structure promotes the innovation input of enterprises but inhibits it when higher than 48.26%. When leverage is lower than 40.85%, the capital structure promotes the innovation output, while when it is higher than 40.85%, it inhibits the output. For enterprises with a low leverage ratio, increasing the leverage ratio is conducive to improving profitability and innovation ability and achieving both short-term and long-term progress. For enterprises with high leverage ratio, deleveraging is needed to improve corporate performance. For enterprises with a moderate leverage ratio, the positive effect of increasing leverage ratio on short-term ability turns earlier than that on long-term ability, which means that enterprises may need to sacrifice short-term earnings to achieve long-term development while increasing leverage ratio. The result of regression is still valid after taking endogeneity into consideration. The influence of leverage ratio on enterprise performance varies with different scale of enterprises, ownership, and industry.

This paper provides policy suggestions for deleveraging policy in China. First, structural deleveraging should be carried out for different types of enterprises according to the "optimal capital structure" and prevent a one-size-fits-all deleveraging that impedes corporate development. Secondly, improve the corporate financing environment, enrich equity investment channels, and promote the development of direct financing while optimizing indirect financing channels such as bank loans. Reduce corporate financing costs and enable enterprises to optimize corporate leverage ratios under a more flexible mechanism. Meanwhile, this paper also provides a new exploration direction for future research: after exploring the relationship between capital structure and short-term, long-term enterprise performance, how enterprises can further seek a balance between short-term and long-term goals and establish an optimal capital structure according to their own goals is worth exploring.

References

[1] *Ma C,Zhu Y.Deeveraging. (2020). Optimal capital structure and enterprise productivity.Finance & Trade Economis, 41(07): 99-113.*

[2] *Modigliani, F., & Miller, M. H. (1958). The cost of capital, corporation finance and the theory of investent. The American economic review, 48(3): 261-297.*

[3] *Scott Jr, J. H. (1976). A theory of optimal captal structure. The Bell Journal of Economics, 33-54.*

[4] *Kraus, A., & Litzenberger, R. H. (1973). A state-preference model of optimal financil leverage. The journal of finance, 28(4):911-922.*

[5] *Jensen, M. C., & Meckling, W. H. (2019).Theory of the firm: Managerial behavior, agency costs and ownership sructure. Corporate Governance. Gower, 77-132.*

[6] *Myers, S. C., & Majluf, N. S. (1984). Corporate financing and investment decisions when firms have information that investors do no have. Journal of financial economics, 13(2): 187-221.*

[7] *Bartoloni, E.(2013).Capital structure and innovation:causality and determinants. Empirica, 40:111–151.*

[8] *Bhagat, S., & Welch, I. (1995). Corporate research & development investments international comparisos. Journal of Accounting and Economics, 19(2-3): 443-470.*

[9] *Morck, R., & Nakamura, M. (1999). Banks and corporat control in Japan. The Journal of Finance, 54(1):319-339.*

[10] *Philippe Aghion, George-Marios Angeletos, Abhijit Banerjee, Kalina Manova.(2010). Volatility and growth: Credit constraints and the composition of investment, Journal of Monetary Economics, 57(3):246-265.*

[11] *Ross S A. (1977).The determination of financial structure: the incentive-signalling approach. The bell journal of economics, 23-40.*

[12] *Wu Y,Shen K.(2020).How Capital Structure Affects Enterprise Innovation——An Empirical Analysis Based on Listed Companies in China.Industrial Ecnomics Research, (03):57-71.*

[13] *Wang Y,Luo N,Liu W.(2019).What kind of leverage is conducive to enterprise innovation.China Industrial Economics, (03):138-155.*

[14] *Lin C, Lin P, Song F M, et al. (2011). Managerial incentives, CEO characteristics and corporate innovation in China's private sector. Journal of comparative economics, 39(2):176-190.*

[15] *Lin W.(2013)Enterprise Innovation Incentive: An Explanation from the Rising labor cost in China . Management World, (10):95-105.*