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Analysis of the Effect of Credit Fluctuation on Capital Structure of Listed Companies: A Research Direction Based on Industry Perspective

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Abstract

Based on the industry heterogeneity, this paper uses the data of Listed Companies in the A stock market of China for 2003-2015 years to study the impact of credit volatility on the capital structure. The results show that both the credit fluctuation and the capital structure are positively related to the listed companies in different industries, but the significant level is different. During the different policy period, this paper studies the effect of credit fluctuation on the capital structure of listed companies under the heterogeneity of policy environment. The empirical results show that after considering the heterogeneity of industries, the relationship between credit volatility and capital structure of listed companies is different under different policy environments. In the environment of loose credit, there is a significant positive correlation between the credit fluctuation and the capital structure of the listed companies in different industries. But under the tight and steady credit environment, the relationship between the credit fluctuation and the capital structure of the listed companies in different industries is not significant. Based on this, this paper puts forward the policy suggestions to optimize the capital structure of the listed companies.

Key words: Credit fluctuation; Capital structure; Heterogeneity

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INTRODUCTION

The capital structure of a company is the proportional relationship between the long-term debt of a company and the total assets. It reflects the relationship between the sources of channel and the proportion of the listed companies to obtain long-term capital. The long and short term debt financing obtained by the company through debt financing channels has the characteristics of debt maturity. And the payment of interest has the income of the tax shield. And the company's equity financing through the equity financing channel is the inflow of resources. It only has the residual claim, and does not need to be paid extra regularly. The choice of the company's capital structure determines the efficiency of the company's resource allocation. The capital structure of the company is not only the composition of various kinds of capital in the company, but also determines the choice of financing strategy and the cost of financing.

The choice of the optimal decision of the company's capital structure mainly depends on the marginal cost of the company's debt. This is mainly from the two aspects of the impact. On the one hand, a company's financing through debt financing channels may cause financial crisis. On the other hand, companies will pay for preventing financial crisis and solving financial difficulties. If the credit environment is loose, the possibility of the company's financial crisis and the cost of solving it will be reduced, and vice versa. The higher the leverage ratio of the company is, the capital structure will also

increase. Because of the different operating indexes such as capital structure and cash flow of Listed Companies in various industries, the capital cost of company debt is different. Therefore, even in the same credit environment, the performance of the listed companies with industry heterogeneity will be very different in the capital structure decision.

The current development of China's capital market is still immature. China's financial market system is dominated by banks. The main way for most Chinese companies to finance is to get credit borrowing from the banks. This makes the loan of the bank system more important in the capital structure of the company. This is the reason why the supply fluctuation of bank credit funds has a direct impact on the decision of the company's capital structure. The country affects the credit scale of the banking industry through the credit policy. As economic management and supervision institution, the government supervises the behavior of the banking industry. Related authorities, through guiding the banking industry, continuously improve the efficiency of the use of credit funds, in order to optimize the capital structure of listed companies and have an impact on the financing decisions of micro enterprises. This paper, taking 2003 as the starting point of the study period, will study the relationship between China's credit fluctuation and the capital structure of the listed companies. In order to suppress the trend of economic overheating, China began to implement a tight credit policy in 2004. In order to cope with the financial crisis, China began to implement the expansion of the credit policy in 2008. In order to keep the economy steady and steady growth, China began to carry out a moderate and steady credit policy in 2011. The interest rate of our country was completely marketed until 2015. The regulation of credit policy in China has completed the adjustment process of "contraction - expansion - robust". In this paper, the completion of the interest rate marketization is the end point of the study period. Based on the study of the relationship between credit scale fluctuation and corporate capital structure, this paper tries to explore how microcosmic listed companies can adjust investment and financing behavior and optimize capital structure in a timely manner according to the change of macro policies.

1. LITERATURE REVIEW

Before the mid 80s of last century, when studying the factors influencing the capital structure of a company, scholars generally took the industry factor as an exogenous variable to study it. That is to say, it is assumed that industry factors do not have an impact on corporate debt and equity portfolio. However, we find that there are common differences in capital structure between companies in different industries. This must be explained in the perspective of industry heterogeneity. In 1986, James and Lewis published "Oligopoly and financial structure: the limited liability effect". This is of pioneering significance. Since then, researchers have begun to pay attention to the impact of industry heterogeneity on the capital structure of the company. Since then, Bolton and Scharfstein (1990), Banejee, Dasgupta and Kim (2008), Khanna and Tice (2000) have put forward the same view on theoretical models and practical research.

Schwartz and Aronson (1967) selected the period from 1928 to 1961 to study. The study covers four industries and more than thirty-two companies. The conclusion is that there are significant differences in capital structure in the four industries of gas, mining, industry and railway. Companies in the same industry have a similar capital structure. Guo and Sun (2003) selected 12 industries from the A stock market to analyze the data of these industries during the period from 1999 to 2001. They found that the company's industry had a significant impact on its own capital structure. For example, the industry with the highest debt ratio is the financial and insurance industry. And the index of the capital debt ratio is also very different between different industries. The company's industry heterogeneity can make a 9.5% explanation of the difference in the company's capital structure. Jiang, Liu, and Li (2008) studied the two non financial listed companies of China's Shanghai Stock Exchange and the Shenzhen Stock Exchange. They think that for different industries, the difference in capital structure is mainly caused by the characteristics of the liquidity of assets, development opportunities and so on.

In the different industries, the industrial barriers and the industrial concentration determine the competitiveness of the industry. Generally speaking, the higher the concentration of the industry is, the smaller the competitiveness of the industry is, and then the company's debt ratio will be higher. If the competitive intensity of an industry is high, the relationship between market supply and demand will have a greater impact on the price of the product and the profit of the enterprise. As a result, the risk of business bankruptcy is even greater. When an enterprise makes a financing decision, it must also take into account the risk of its own bankruptcy. In general, in order to reduce the risk, the company will use a relatively low level. When AndresAlmazan and Molina (2005) studied the company's capital structure dispersion in the same industry, they chose industry data from 1992 to 2000. They find that if the industry of the studied company has a high degree of concentration or the financial tools commonly used in the industry, the difference of capital structure between companies will be relatively large. As for the selection of enterprise capital structure, Mackay and Phillips (2005) believe that industry factors have a very important impact. Through empirical analysis, they find that if the industry has a relatively high degree of concentration, enterprises will have relatively high capital leverage, and the dispersion of industry

capital structure will be relatively low. Zhu, Chen, and Wu (2002) analyzed the case of Yanjing Beer, and found that the market competition also affected the capital structure. Jiang Fuxiu and Liu Zhibiao (2005) carried out the classification analysis of the industry. They found that in different industries, the capital structure of the enterprise is related to the competition of the product in the market. In a mature industry, the relationship between the two is a significant positive correlation. For the recession or growth industry, it is the opposite. Jiang, Qu, Lu, and Li (2008) selected listed companies in China from 1999 to 2004 as the research object. They set up a dynamic model of the capital structure of the enterprise, and found a negative correlation between the competitiveness of the product and the deviation of the target capital structure. However, the competition changes in the product market will not have a significant impact on the adjustment speed of the capital structure of the enterprise.

Based on the analysis of the capital structure trade-off theory, Magnus and other researchers (2008) think that in the debt financing process, due to the heterogeneity of the industry, the cost of bankruptcy risk in different industries is different. This will enable companies in different industries to have a certain heterogeneity in the choice of financial leverage and capital structure. Because of the similar market environment and similar industry characteristics, the listed companies with industry homogeneity have the same quality in the choice of capital structure. With the continuous improvement of the market environment in China, the decision-making background of Listed Companies in different industries is different. Based on the heterogeneity of industries, the theory of capital structure decision heterogeneity discovered by Magnus will be tested and analyzed on the basis of the sample of Listed Companies in China's A share market.

To sum up, because of the heterogeneity of the company, there is a great difference in the impact of credit fluctuation on the capital structure of the company. In a banking dominated financial system, this paper will take credit scale change as a measurement factor, take full account of the impact of industry heterogeneity, study its impact on capital structure, and compare the empirical results, so as to draw corresponding conclusions and policy recommendations.

2. EMPIRICAL ANALYSIS

From the perspective of industry classification, this paper makes an empirical study on the relationship between the credit fluctuation and the capital structure of the listed companies in different industries. In this paper, the A shares listed companies in Shanghai and Shenzhen stock markets from 2003 to 2015 are taken as the research object. According to the first level classification standard of industry in Wind Database (see Table 1), the relationship between credit fluctuation and capital structure of listed companies is studied from the perspective of industry heterogeneity.

Table 1
Wind Database for Industry Classification Standards

First level industry	Secong level industry	First level industry	Secong level industry
Public utility	Public utility Ⅱ	Energy	Energy Ⅱ
Industry	transport	Material	Material Ⅱ
	Capital goods	Medical care	Medical care equipment and services
	Business and professional services		Pharmaceutical, biotech and life sciences
Discretionary Consumer	Retail	Finance	Insurance Ⅱ
	Media Ⅱ		Pluralistic finance
	Durable consumer goods and clothing		Real estate
	Automobile and auto parts		Banking
	Consumer service Ⅱ	Information Technology	Semiconductor and semiconductor manufacturing equipment
Daily consumption	Family and personal supplies		Technical hardware and equipment
	Food, drink and tobacco		Software and service
	Food and retail sales of major goods Ⅱ	Telecommunication Service	Telecommunication service Ⅱ

Source: Wind Database

2.1 Measurement Model Setting

This paper will select the growth rate of credit scale, the growth rate of short-term credit scale and the growth rate of long-term credit scale as the core explanatory variables. This paper selects the control variables from the micro corporate level and the macro economic level to construct the measurement model. There are some unobservable variables in the listed companies, but these factors also have an impact on the company's capital structure. Therefore, this paper will select the empirical model of panel data intercept, and control the fixed effect of the enterprise to the regression estimation in the empirical test.

$$\text{Leverage}_{i,t} = \alpha + \beta_1 \text{Credit}_{i,t} + \beta_2 \text{Control}_{i,t} + \varepsilon_{i,t} + \mu_t.$$

Among the variables included in the model, i is the listed companies, t is the year and $\text{Leverage}_{i,t}$ is the capital structure of the i listed companies in year t. Credit_t is the credit scale fluctuation variable for period t and $\text{Control}_{i,t}$

is the control variable of i listed companies in period t. μ_t and $\mathring{a}_{i,t}$ represents individual factors and the observation sample's random perturbation.

2.2 Main and Control Variable Selection

2.2.1 Capital Structure

The capital structure of listed companies is the ratio of long-term debt to total assets, which reflects the relationship between the channel and the proportion of long-term capital of listed companies, so the study on short-term debt financing is not included in the capital structure. For the measurement of capital structure, this paper adopts the measure of asset liability ratio and the non-current debt ratio, that is, the proportion of non-current liabilities to total assets (Lev). To measure capital structure of listed companies, the foreign research literature generally uses the ratio of interest bearing debt to total assets, or the ratio of interest bearing debt and total market value. However, due to historical reasons and China's national conditions, circulating shares and non tradable shares remain in a state of coexistence for a long time. The pricing of non tradable shares remains controversial. This makes it impossible to measure the capital structure by using the ratio between interest bearing debt and the total market value of the company. Therefore, the empirical research literature in this area generally uses the ratio between interest bearing debt and total assets to measure the capital structure of listed companies. Due to the imperfection of China's securities market, the market value of listed companies fluctuates greatly. According to the practice of most scholars, this paper selects the ratio between interest bearing debt and total assets to measure the capital structure of listed companies, and uses them as explanatory variables of the model.

2.2.2 Credit Fluctuation Variables

According to the theoretical analysis and hypothesis, this paper defines the credit fluctuation variables. This paper will choose credit growth rate as a variable to describe credit fluctuation. Specifically, this paper will use the total size of the credit growth rate (To_credit), short-term credit growth rate (St_credit) and long-term credit growth rate (Lt_credit) as a description of our credit fluctuation variables, to examine the relationship between capital structure and credit scale fluctuations between companies.

2.2.3 Other Control Variables

According to the experience of empirical research, the other control variables of this paper will be selected from many angles, such as company, industry and macro economy. At the company level, the paper will choose the size of the company (Scale), profitability (Profit), non-debt tax shields (Ntds), flow rate (Flow_ra), the level of Holdings (Control) as control variables of firm characteristics. At the macroeconomic level, this paper focuses on the influence of macroeconomic situation on the explanatory variables, so this paper will select the natural logarithm of GDP (lnGDP) and the macroeconomic climate index (Mac_index) as a characterization of China variables to measure the economic situation under control. See Table 1 for details.

Table 2
Lists and Implications of Empirical Model Selection Variables

Variable name	Description	Variable definitions and meanings
Capital structure	Lev	The product of the ratio of assets to liabilities and non-current liabilities.
Asset liability ratio	Ast_deb_ra	Total liabilities divided by total assets.
Non-current debt ratio	Uldeb_ra	Non-current liabilities divided by total liabilities.
Credit scale growth rate	To_credit	The credit scale at the end of this term minus the credit scale at the end of the last term, then divided by the credit scale at the end of the term. It can measure the easing extent of credit.
Growth rate of short-term loans	St_ credit	The short term credit size at the end of this period minus the short term credit at the end of the last term, then divided by the short term credit scale at the end of the term. It can measure the easing extent of the short-term credit.
Medium and long-term loan growth rate	Lt_ credit	Thelong-term credit scale at the end of this period minus the long-term credit scaleat the end of the last term, then divided by the long-term credit scale at the end of this term. It can measure the easing degree of long-term credit.
Company size	Scale	Total assets scale.
Profitability	Profit	Return on assets.
Non-debt tax shield	Ndts	Pre-tax profit minus the quotient of tax expense and corresponding tax rate, divided by the total assets.
Current ratio	Flow_ra	The current assets divided bythe current liabilities.
Holding level	Control	Ownership concentration.
Macroeconomy	lnGDP	Natural logarithm of GDP.
Economic climate index	Mac_index	Macroscopic consistent composite index.

2.3 Data Source and Processing

In 2003, the People's Republic of China Banking Regulatory Commission was established. In the same year, the state-owned commercial banks began the shareholding system reform. The people's Bank of China began to formulate the credit expected control target at the beginning of each year. We use 2003 as the starting point for our analysis. The full market rate at the end of 2015 is the end point of our study's time span. Therefore, this paper will set the time span of the

study from 2003 to 2015. This paper selects the quarterly data of listed companies of A shares in Shanghai and Shenzhen two cities as the research object, and makes the following screening: (a) in the sample period, excluding the debt ratio of less than 0 or more than 1 of listed companies; (b) in the sample period, excluding the listed companies with missing observation data; (c) excluding ST and ST* listed companies; (d) excluding listed companies in the financial sector. In this paper, a balanced panel data with 2,828 items is obtained. And according to the first class classification standard of Wind Database to the industry, the industry classification of the database is carried out. The data of capital structure and control variables come from the data of Listed Companies in Wind database. Credit related data from the annual data statistics released by the people's Bank of China website. The macro economic data comes from the data statistics of CEInet Statistics Database.

2.4 Descriptive Statistics

Generally speaking, the financial and insurance industry in our country is a significant high debt industry. The information technology industry, the wholesale and retail industry, the real estate industry also have a relatively high asset liability ratio. This is determined by the business characteristics of the industry itself. These industries need a lot of money, so the debt rate is high. In contrast, in some industries, there is a lot of money in itself, and the demand for foreign capital is small, so the debt rate is low.

By observing the two variables of asset liability ratio and non current liability ratio, which can be explained variables, we can find that the highest asset liability ratio of listed companies is in the financial industry, reaching 118.9. This is mainly due to the division of the Wind industry classification standards. The real estate is divided into financial industry. In the composition of the Real Estate Company, the proportion of fixed assets is larger, and the assets that can be used for bank mortgage are more. Therefore, the behavior of debt financing through the bank channel leads to the high asset liability rate of the real estate industry.

We can find that the industry with the highest rate of non current liabilities in listed companies is public utilities, reaching 0.398, which is higher than other industries. This may be related to the large-scale construction of public infrastructure in China in recent years. This kind of investment is basically achieved through the financing of non liquidity long-term liabilities. In every industry, there are some listed companies with non current debt ratio close to 0, and some listed companies with non current debt ratio close to 1. This reflects that even in the same industry, China's listed companies' preference for non-liquidity long-term liabilities still has a certain heterogeneity.

Table 3
Statistical Description of the Public Utility Industry

Variance	Number	Mean	Variance	Minimum	Maximum
Ast_deb_ra	4,775	60.21	61.54	1.233	2283
Uldeb_ra	4,540	0.398	0.238	0.00	0.999
Scale	4,795	12.85	1.506	5.572	17.23
Profit	4,697	1.704	53.34	-3010	57.33
Ndts	4,775	0.052	0.064	-0.279	0.239
Flow_ra	4,774	1.119	1.291	0.0186	24.25
Control	3,966	25.07	24.24	0	97

Table 4
Statistical Description of the Energy Industry

Variance	Number	Mean	Variance	Minimum	Maximum
Ast_deb_ra	2,828	46.96	30.75	0.0236	745.6
Uldeb_ra	2,592	0.245	0.194	0.00	0.999
Scale	2,837	13.16	1.819	8.239	19.31
Profit	2,793	5.627	28.21	-731.2	149.0
Ndts	2,829	0.008	0.061	-0.495	0.186
Flow_ra	2,828	5.236	95.48	0.0570	4011
Control	2,376	29.83	27.78	0.340	109.4

Table 5
Statistical Description of the Material Industry

Variance	Number	Mean	Variance	Minimum	Maximum
Ast_deb_ra	19,886	54.46	148.8	-8.720	12402
Uldeb_ra	18,077	0.195	0.172	0.00	0.999
Scale	19,938	12.34	1.324	4.948	17.00
Profit	19,338	3.453	81.41	-5481	7591
Ndts	19,884	0.033	0.071	-0.653	0.555
Flow_ra	19,891	2.121	14.24	-60.96	1883
Control	16,329	24.07	21.68	0	90.86

Table 6
Statistical Description of the Industry

Variance	Number	Mean	Variance	Minimum	Maximum
Ast_deb_ra	24,098	58.19	328.0	0.00	27633
Uldeb_ra	21,131	0.274	0.194	0.00	0.999
Scale	24,162	12.33	1.429	1.632	18.47
Profit	23,649	5.570	70.78	-4804	7337
Ndts	24,090	0.035	0.072	-0.623	0.655
Flow_ra	24,112	2.389	23.18	-20.58	3529
Control	19,681	24.95	22.68	0.0100	115.0

Table 7
Statistical Description of the Discretionary Consumer

Variance	Number	Mean	Variance	Minimum	Maximum
Ast_deb_ra	17,620	59.28	223.2	0.387	10324
Uldeb_ra	15,030	0.235	0.157	0.00	0.999
Scale	17,683	12.15	1.196	3.866	17.67
Profit	17,204	4.542	81.07	-7989	3649
Ndts	17,619	0.036	0.056	-0.516	0.353
Flow_ra	17,635	1.934	3.507	0.00148	258.4
Control	14,483	24.28	21.71	0.140	115.5

Table 8
Statistical Description of the Daily Consumption

Variance	Number	Mean	Variance	Minimum	Maximum
Ast_deb_ra	7,616	47.02	27.17	0.00	577.8
Uldeb_ra	6,774	0.226	0.152	0.00	0.999
Scale	7,641	12.24	1.028	8.411	15.97
Profit	7,501	5.606	19.52	-723.7	512.9
Ndts	7,617	0.037	0.055	-0.526	0.355
Flow_ra	7,621	2.084	3.229	-12.37	107.4
Control	6,287	25.81	22.38	0.150	93.08

Table 9
Statistical Description of the Medical Care Industry

Variance	Number	Mean	Variance	Minimum	Maximum
Ast_deb_ra	7,052	36.50	21.93	0.295	201.9
Uldeb_ra	6,480	0.260	0.160	0.00	0.999
Scale	7,079	11.86	1.035	7.549	15.13
Profit	7,004	7.242	21.69	-907.3	171.7
Ndts	7,052	0.028	0.063	-0.684	0.361
Flow_ra	7,055	4.058	10.91	0.135	678.8
Control	5,832	26.10	21.74	0.0400	93.03

Table 10
Statistical Description of the Finance Industry

Variance	Number	Mean	Variance	Minimum	Maximum
Ast_deb_ra	9,819	118.9	2,321	0.601	133,298
Uldeb_ra	7,170	0.229	0.183	0.00	0.999
Scale	9,857	13.22	2.325	2.511	21.53
Profit	9,594	2.972	69.52	-4181	895.7
Ndts	8,223	0.018	0.051	-0.505	0.286
Flow_ra	8,420	2.060	3.340	0.001	73.73
Control	8,140	26.05	25.08	0.100	125.2

Table 11
Statistical Description of the Information Technology

Variance	Number	Mean	Variance	Minimum	Maximum
Ast_deb_ra	12,824	40.65	94.45	0.405	3,443
Uldeb_ra	11,231	0.236	0.156	0.00	0.999
Scale	12,869	11.72	1.109	3.980	16.50
Profit	12,656	6.659	27.94	-1363	841.7
Ndts	12,827	0.027	0.062	-0.682	0.359
Flow_ra	12,839	4.558	11.89	-23.73	741.9
Control	10,309	22.43	19.61	0	92.10

Table 12
Statistical Description of Telecommunication Service

Variance	Number	Mean	Variance	Minimum	Maximum
Ast_deb_ra	209	30.87	21.66	1.780	67.91
Uldeb_ra	164	0.219	0.121	0.00	0.999
Scale	210	12.97	2.650	9.154	17.94
Profit	210	6.776	8.369	-1.875	45.35
Ndts	210	0.036	0.056	-0.515	0.354
Flow_ra	210	5.841	8.546	0.130	48.47
Control	178	24.50	20.61	1.670	74.58

The data shows that the average value of the listed companies in ten industries is close. These similar data is related to the size of the company, the concentration of equity and the tax shield of non debt. But these companies have a big difference in profitability. Among them, the most profitable industry is the health care industry, with a mean of 7.242. The worst - earning industry is the utility industry, with a mean value of only 1.704. The average value of the telecom service industry is the largest, with a mean of 5.841. The mean of the average flow rate is the utility industry with a mean value of only 1.119. This is mainly because the country's financing for public utilities is basically debt financing. It not only includes non-liquid long-term liabilities, but also a large number of short-term liabilities. But its assets are mainly in the form of fixed assets, and the liquidity is less, so the liquidity ratio is low. And most of the public utilities are infrastructure projects. The investment cycle of these projects is long, and it is difficult to profit in the short term, so its profitability is low.

3. EMPIRICAL RESULTS

In the process of empirical evaluation, the empirical model can be estimated not only by the fixed effect model, but also by the random effect model. There are some factors in the listed company. These factors can not be observed, and will have an impact on the company's capital structure. And the company's characteristic variables have a certain degree of incomplete exogeny among different companies. Therefore, this paper will select the fixed effect model to estimate the empirical model. Therefore, in the empirical regression of this section, the fixed effect model is used to estimate and analyze. In this section, in the form of each empirical result, 10 separate sectors are listed in this paper according to the classification standards of the Wind database for the industry. And each industry has a regression estimate on whether to control the fixed effect of the enterprise. In each industry's corresponding regression data, the first one is a regression result which is not controlled by the fixed effect of enterprises, and the other one is the regression result after controlling the fixed effect of enterprises.

3.1 Empirical Test of the Influence of Credit Volatility on the Capital Structure of Listed Companies Based on Industry Heterogeneity

The data in Table 13 is the empirical results of the impact of the total credit scale fluctuation on the capital structure of Listed Companies in different industries. The regression results show that after controlling the fixed effects of enterprises, the growth rate of total credit is positively correlated with the capital structure of Listed Companies in some industries, with a significant level of 1%. These industries are utilities, materials, industries, optional consumption, daily consumption, health care, finance and

information technology. The growth rate of the total credit scale has a positive correlation with the capital structure of the listed companies in the energy industry, and the significant level is 5%. The growth rate of the total credit scale has a positive correlation with the capital structure of the listed companies in the telecom service industry, with a significant level of 10%. This shows that the capital structure of these industries is sensitive to the change in the total credit scale. In the process of capital structure decision making, the listed companies will respond positively to the positive growth of the total credit scale, otherwise, they will reduce the capital structure of the company.

When the substitution effect between long-term credit and short-term credit is equivalent, the impact of the total credit scale growth on the capital structure of listed companies will decrease. As shown in Table 14, there is a significant negative correlation between the growth rate of short-term credit scale and the capital structure of Listed Companies in two industries. The two industries are the telecommunications service industry and the energy industry, with the impact coefficient of 45.9% and 21.1%, respectively. As shown in Table 15, there is a significant positive correlation between the growth rate of long-term credit scale and the capital structure of Listed Companies in two industries. The two industries are the telecommunications service industry and the energy industry, with the impact coefficient of 39.2% and 27.3%, respectively. The effect of long-term credit and short-term credit on the capital structure of the listed companies in these two industries is equivalent, and the direction is opposite. This is the main reason for the lower significant correlation between the growth rate of the total credit scale and the capital structure of the listed companies in these two industries.

3.2 Empirical Test on the Effect of Term Structure Based Credit Fluctuation on the Capital Structure of Listed Companies

(a) An Empirical Analysis of the Effect of Short-term Credit Scale Fluctuation on the Capital Structure of Listed Companies in Different Industries

The data in Table 14 is the empirical results of the impact of short-term credit scale fluctuation on the capital structure of Listed Companies in different industries. The regression results show that the growth rate of short-term credit scale has a significant negative correlation with the capital structure of Listed Companies in some industries. These industries are energy, health care, information technology and telecommunications services. There is a significant positive correlation between the growth rate of short-term credit scale and the capital structure of Listed Companies in some industries. These industries are industries, daily consumption and optional consumption industries. The relationship between the growth rate of short-term credit scale and the capital structure of some industry listed companies is not significant. These industries are utilities, materials and finance.

Among them, there is a significant positive correlation between the growth rate of short-term credit scale and the capital structure of Listed Companies in some industries. This is mainly due to the large proportion of human capital in the daily consumption and the optional consumption industry. Therefore, these industries have a certain financing preference for short-term credit. When the capital structure of the company is rising and the scale of production is enlarged, the number of corresponding workers will increase. Further short-term credit will be obtained through debt financing channels to meet the company's financing needs. In China, industrial industry is similar to the situation of daily consumption and optional consumption industry, which are still in a period of large proportion of human capital. Therefore, there is a significant positive correlation between the capital structure of the listed companies and the short-term credit fluctuation in these industries.

(b) The Empirical Analysis of the Effect of the Long-term Credit Scale Fluctuation on the Capital Structure of the Listed Companies in Different Industries

The data in Table 15 is the empirical results of the impact of long-term credit scale fluctuation on the capital structure of Listed Companies in different industries. The regression results show that the growth rate of long-term credit scale has a significant positive correlation with the capital structure of the listed companies in all industries.

Table 13
The Empirical Results of the Impact of Total Credit Scale Fluctuation on the Capital Structure of Listed Companies in Different Industries

Variable	Public utility		Energy		Material		Industry		Discretionary consumer		Daily consumption		Medical care		Finance		Information technology		Telecommunication service	
To_credit	0.549***	0.523***	0.307*	0.249**	0.178***	0.164***	0.147***	0.174***	0.0953	0.186***	0.085	0.190***	0.115	0.200***	0.321***	0.383***	0.234***	0.203***	0.254	0.596*
	(0.158)	(0.104)	(0.160)	(0.120)	(0.055)	(0.042)	(0.051)	(0.035)	(0.059)	(0.042)	(0.073)	(0.052)	(0.079)	(0.061)	(0.103)	(0.078)	(0.062)	(0.048)	(0.326)	(0.304)
LnScale	0.045***	0.0765***	0.016***	0.044***	0.027***	0.030***	0.030***	0.039***	0.011***	0.234***	0.005***	0.018***	0.017***	0.025***	0.033***	0.053***	0.021***	0.025***	0.009*	0.036***
	(0.002)	(0.003)	(0.002)	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.005)	(0.010)
Profit	-0.000***	-0.000***	0.000	-0.000	-0.000	-0.000**	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000**	-0.000	-0.000	-0.000***	-0.000	-0.000	-0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Ndts	-0.004***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.001***	-0.001***	-0.010***	-0.009***	-0.001***	-0.001***	0.000***	-0.000*	-0.001***	-0.001**	-0.004	-0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
Flow_ra	0.001	0.005***	0.000	0.000	0.000	-0.000	0.001***	0.001***	-0.000	0.0018***	0.001*	0.001**	-0.000***	-0.000	0.007***	0.005***	-0.000	0.000**	-0.001	0.003
	(0.002)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.002)
Control	-0.000**	0.000	0.000	-0.000	-0.000	-0.000	0.000	0.000***	0.000	0.000***	0.000***	0.000***	0.000***	0.000***	0.001***	0.000***	-0.000	0.000	-0.001***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
lnGDP	0.012***	0.043	0.010***	-0.000	-0.002*	-0.001	0.003***	0.003***	0.003**	0.001	0.003*	0.000	-0.002	-0.005***	0.005*	0.003	0.005***	0.004***	-0.009	-0.013
	(0.004)	(0.003)	(0.004)	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.009)	(0.008)
Mac_index	0.001	0.003***	0.001	0.002***	0.003***	0.003***	0.001***	0.001***	0.000	0.001***	-0.000	0.000	0.000	0.001**	0.001**	0.002***	0.001***	0.001***	-0.002	-0.004**
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.002)	(0.002)
Constant	-0.502***	-1.096***	-0.191	-0.603***	-0.407***	-0.450***	-0.306***	-0.482***	-0.070*	-0.258***	0.009	-0.173***	-0.093*	-0.218***	-0.524***	-0.809***	-0.263***	-0.306***	0.328	0.127
	(0.123)	(0.091)	(0.118)	(0.101)	(0.040)	(0.035)	(0.035)	(0.029)	(0.042)	(0.036)	(0.053)	(0.046)	(0.057)	(0.056)	(0.080)	(0.064)	(0.042)	(0.039)	(0.232)	(0.273)
Observations	3,731	3,731	2,178	2,178	14,719	14,719	17,283	17,283	12,309	12,309	5,536	5,536	5,357	5,357	5,980	5,980	9,153	9,153	141	141
R-squared	0.422	0.336	0.309	0.254	0.313	0.112	0.402	0.193	0.123	0.081	0.071	0.069	0.127	0.091	0.226	0.244	0.213	0.110	0.386	0.346
Enterprise fixed effect	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y

Note. The data in brackets is the standard deviations generated in the regression process. ***, ** and * indicate, respectively, that the marked regression coefficients are significant at the 0.01, 0.05 and 0.1 levels.

Table 14
The Empirical Results of the Impact of Short-Term Credit Scale Fluctuation on the Capital Structure of Listed Companies in Different Industries

Variable	Public utility		Energy		Material		Industry		Discretionary consumer		Daily consumption		Medical care		Finance		Information technology		Telecommunication service	
To_credit	0.338***	0.091	0.113	-0.211**	-0.048	-0.039	0.186***	0.196***	0.066	0. 131***	0.032	0. 092**	0.064	-0.166***	0.008	-0.012	-0.065***	-0.066***	0.240	-0.459*
	(0.130)	(0.088)	(0.127)	(0.098)	(0.044)	(0.035)	(0.040)	(0.028)	(0.046)	(0.034)	(0.056)	(0.042)	(0.061)	(0.049)	(0.084)	(0.064)	(0.017)	(0.019)	(0.261)	(0.250)
LnScale	0.045***	0.080***	0.016***	0.048***	0.027***	0.031***	0.029***	0.039***	0.011***	0.024***	0.004***	0.0188***	0.0183***	0.034***	0.033***	0.054***	0.020***	0.023***	0.005	0.053***
	(0.002)	(0.003)	(0.002)	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.005)	(0.012)
Profit	-0.000***	-0.000***	0.000	0.000	-0.000	-0.000**	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000**	-0.000***	-0.000**	-0.000	-0.000	-0.000***	-0.000	-0.002	-0.002**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Ndts	-0.004***	-0.003***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	0.000***	-0.000	-0.002***	-0.001***	-0.001*	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Flow_ra	0.001	0.006***	0.000	0.000	0.000	0.001***	0.001***	0.001***	-0.000	0.002***	0.001**	0.001***	-0.000***	0.000	0.007***	0.005***	-0.000	0.000**	-0.001	-0.000
	(0.002)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.002)
Control	-0.000	0.000	0.000	-0.000	0.000	-0.000	0.000	0.000***	0.000	0.000***	0.000***	0.000***	0.000***	0.000***	0.001***	0.000***	0.000	0.000*	-0.001***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
lnGDP	0.006*	-0.004	0.008**	-0.003	-0.005***	-0.004***	0.002**	0.002**	0.002**	0.000	0.002	-0.000	-0.001	-0.004***	0.002	-0.002	0.002*	0.002**	-0.003	-0.010
	(0.003)	(0.002)	(0.003)	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.008)	(0.008)
Mac_index	-0.000	0.001**	0.001	0.002***	0.002***	0.002***	0.001**	0.001***	0.000	0.000**	-0.000	0.000	-0.000	0.001**	0.001	0.001***	0.000	0.000	-0.003*	-0.003
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.002)	(0.002)
Constant	-0.279**	-0.837***	-0.164	-0.622***	-0.290***	-0.356***	-0.255***	-0.395***	-0.0234	-0.222***	0.043	-0.148***	-0.070	-0.308***	-0.412***	-0.662***	-0.168***	-0.209***	0.404*	-0.234
	(0.118)	(0.086)	(0.114)	(0.095)	(0.040)	(0.034)	(0.036)	(0.028)	(0.042)	(0.035)	(0.052)	(0.043)	(0.058)	(0.054)	(0.075)	(0.060)	(0.043)	(0.038)	(0.215)	(0.247)
Observations	3,481	3,481	2,018	2,018	13,490	13,490	15,653	15,653	11,278	11,278	5,092	5,092	4,867	4,867	5,612	5,612	8,173	8,173	128	128
R-squared	0.420	0.338	0.302	0.254	0.312	0.112	0.399	0.198	0.122	0.081	0.068	0.070	0.126	0.096	0.223	0.241	0.212	0.103	0.404	0.374
Enterprise fixed effect	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y

Note. The data in brackets is the standard deviations generated in the regression process. ***, ** and * indicate, respectively, that the marked regression coefficients are significant at the 0.01, 0.05 and 0.1 levels.

Table 15
The Empirical Results of the Impact of Long-Term Credit Scale Fluctuation on the Capital Structure of Listed Companies in Different Industries

Variable	Public utility		Energy		Material		Industry		Discretionary consumer		Daily consumption		Medical care		Finance		Information technology		Telecommunication Service	
To_credit	0.222*	0.294***	0.273**	0.273***	0.170***	0.154***	0.291	0.045*	0.077*	0.092***	0.075	0.115***	0.221**	0.352***	0.270***	0.304***	0.098**	0.194***	0.192	0.392*
	(0.115)	(0.074)	(0.112)	(0.083)	(0.040)	(0.030)	(0.036)	(0.025)	(0.042)	(0.030)	(0.051)	(0.036)	(0.056)	(0.043)	(0.073)	(0.055)	(0.043)	(0.034)	(0.228)	(0.234)
LnScale	0.045***	0.081***	0.016***	0.046***	0.027***	0.032***	0.029***	0.040***	0.011***	0.025***	0.004***	0.019***	0.018***	0.032***	0.033***	0.054***	0.020***	0.024***	0.005	0.040***
	(0.002)	(0.003)	(0.002)	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.001)	(0.005)	(0.012)
Profit	-0.000***	-0.000***	0.000	0.000	-0.000	-0.000**	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000***	-0.000**	-0.000	-0.000	-0.000***	-0.000	-0.001	-0.001
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Ndts	-0.004***	-0.003***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	0.000***	-0.000	-0.002***	-0.001***	-0.001*	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)
Flow_ra	0.001	0.006***	0.000	0.000	0.000	0.001***	0.000***	0.001***	0.000	0.002***	0.001**	0.001***	-0.000***	0.000	0.007***	0.005***	0.00	0.00**	-0.001	0.001
	(0.002)	(0.002)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.003)
Control	-0.000	0.000*	0.000	-0.000	-0.000	-0.000	0.000	0.000***	0.000	0.000***	0.000***	0.000***	0.000***	0.000***	0.001***	0.000***	0.000	0.000***	-0.001***	-0.002***
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
lnGDP	0.007**	-0.001	0.011***	0.002	-0.003**	-0.002*	0.002*	0.001	0.003**	0.001	0.003**	0.001	-0.001	-0.004***	0.005**	0.002	0.003**	0.002**	-0.007	-0.011
	(0.004)	(0.003)	(0.004)	(0.003)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.002)	(0.001)	(0.001)	(0.010)	(0.009)
Mac_index	-0.001	0.001**	0.000	0.002***	0.002***	0.002***	0.001*	0.001***	-0.000	0.000*	-0.000	0.000	-0.000	0.001**	0.001	0.001***	0.000	0.000	-0.003	-0.003
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.002)	(0.002)
Constant	-0.266**	-0.896***	-0.190*	-0.681***	-0.326***	-0.389***	-0.232***	-0.000***	-0.026	-0.000***	0.035	-0.181***	-0.076	-0.306***	-0.461***	-0.723***	-0.155***	-0.216***	0.415*	-0.053
	(0.118)	(0.088)	(0.114)	(0.096)	(0.040)	(0.034)	(0.036)	(0.029)	(0.042)	(0.035)	(0.052)	(0.044)	(0.058)	(0.055)	(0.075)	(0.060)	(0.043)	(0.039)	(0.219)	(0.283)
Observations	3,481	3,481	2,018	2,018	13,490	13,490	15,653	15,653	11,278	11,278	5,092	5,092	4,867	4,867	5,612	5,612	8,173	8,173	128	128
R-squared	0.420	0.341	0.304	0.256	0.313	0.114	0.398	0.196	0.122	0.082	0.068	0.071	0.126	0.094	0.225	0.245	0.211	0.101	0.403	0.355
Enterprise fixed effect	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y

Note. The data in brackets is the standard deviations generated in the regression process. ***, ** and * indicate, respectively, that the marked regression coefficients are significant at the 0.01, 0.05 and 0.1 levels.

3.3 An Empirical Test of the Influence of Credit Volatility on the Capital Structure of Listed Companies Under the Policy Environment Heterogeneity

In 2004, under the situation of overheated economy, the country introduced the credit tightening policy and related measures to avoid the inflation risk and inhibit the overall rise of prices. The State Council, in the report of the People's Republic of China government work, points out that we should appropriately control the scale of credit, expand the issuing scale of corporate bonds, and gradually increase the proportion of direct financing of enterprises. It was not until 2006 that China's credit control went out of the contraction channel and entered the expansion channel. In 2008, in order to cope with the world financial crisis, the central government implemented an active monetary policy to speed up the scale of credit. It was not until 2011 that the central government turned from expansionary credit policy to moderately stable credit policy. Therefore, this paper divides the period from 2003 to 2015 into 3 periods: 2003-2006 years are credit control tightening period, 2007-2010 years are credit control expansion period, and 2011-2015 years are credit control stable period. In the case of industry heterogeneity, this paper controls the firm's fixed effect of the empirical model. Under the heterogeneity of policy environment, the empirical results of the impact of credit fluctuation on capital structure of listed companies are shown in Table 16, Table 17 and Table 18. Considering the heterogeneity of industries, the relationship between capital structure and credit fluctuation is different in different policy areas, but it reflects the industrial development status, industrial policy trend and macroeconomic environment at that time.

(a) In the past 2003-2006 years, the state has implemented a tight credit policy. According to Table 16, when the fixed effect is not controlled, the relationship between total credit scale growth rate and capital structure of listed companies is not significant. After controlling the fixed effect of enterprises, the total growth rate of credit has a significant correlation with the capital structure of material industry, industry and financial industry, and the negative correlation is 10%, 10% and 5% respectively.

During this period, the state adopted a tight credit policy. The contraction of credit scale has led to the rising cost of listed companies through debt financing. But at the same time, the cost of equity financing has been raised indirectly. Therefore, in the case of tight credit scale, listed companies do not have to choose equity financing channels to finance. In addition, when the credit scale is tight, the bank's lending threshold has increased. The unlisted small and medium sized enterprises are more difficult to reach the bank lending threshold. At this time, the banking industry is more willing to lend money to the listed companies in order to ensure the security of funds and the stability of profits, especially the large state-owned listed companies. This makes a negative correlation between the fluctuation of the credit scale and the changes in the capital structure of the listed companies.

Because China is in the period of accelerated economic growth, real estate, steel and cement and other related building materials, and related industries, such as finance and transportation, are booming. Even if the country implements a tight credit policy to curb economic overheating, it is still unable to curb the long-term financing needs of the material, industrial and financial sectors. Therefore, the empirical results show that the total credit growth rate has a significant negative correlation with the capital structure of the listed companies in the material, industrial and financial industries.

(b) In the past 2007-2010 years, China has implemented an expansionary credit policy. According to Table 17, under the control of fixed effects, there is no significant relationship between the total credit scale growth rate and the capital structure of the listed companies in the telecommunication service industry. There is a significant positive correlation between the total credit growth rate and the capital structure of Listed Companies in other industries.

In this period, the positive correlation between the credit fluctuation and the capital structure of the listed companies is due to the state's implementation of the extended credit policy. The expansion of bank credit scale makes the cost of debt financing by listed companies decrease, and the degree of decline is greater than that of equity financing. At the time of the financial crisis, the demand of listed companies to increase long-term financing to resist the financial crisis was greatly increased. The capital structure level of the corresponding company will also rise. Therefore, there is a significant positive correlation between the credit fluctuation and the capital structure of the listed companies in this period.

The outbreak of the world financial crisis led the central government to launch a comprehensive plan for the rescue of the market in September 2008. The rescue plan involves a wide range of fields, including infrastructure construction, affordable housing projects, health care industry, culture and education industry, independent innovation and structural adjustment, and post earthquake reconstruction. There are nine industries involved in such a wide range of rescue plans. These nine industries are nine of the ten industries that are separated from the Wind first level industry classification standards. There is a significant positive correlation between the total credit growth rate and the capital structure of the listed companies in these industries. However, the total growth rate of credit is only not significant with the capital structure of the listed companies in the telecom service industry. This is mainly due to the restructuring of the whole industry in the telecom industry in this period, making the order of the whole industry rearranged. The complete restructuring of the industry has resulted in no

significant relationship between the capital structure and the total credit growth rate.

(c) In the past 2011-2015 years, the state carried out a prudent credit policy. According to Table 18, without controlling the firm's fixed effect, the relationship between the total growth rate of credit and the capital structure of the listed companies in various industries is not significant. After controlling the fixed effects of enterprises, there is a positive correlation between the growth rate of total credit and the capital structure of public utilities and health care industry listed companies, with a significant level of 1% and 5% respectively.

This period is the implementation period of China's "12th Five-Year" plan. The development of the national infrastructure in this period was rapid, especially the implementation of the concrete projects such as the 12th Five-Year comprehensive transportation system planning in the field of traffic. The plan leaned all kinds of resources in the market to utilities such as infrastructure, including banks' financial support through credit. And most of the financing needs of this kind of infrastructure construction are long term. This makes a positive correlation between the total growth rate of credit and the capital structure of Listed Companies in public utilities, which has a significant level of 1%.

In recent years, the degree of aging in China has increased. By the year 2014, the total number of elderly people in China ranked the first in the world. Therefore, the health care industry related to aging has become a key support and development industry. The development prospects of Listed Companies in this industry are good, and the corresponding long-term financing needs are increased. The level of capital structure of these companies is rising in the environment of the state's prudent credit policy. This makes a positive correlation between the total credit growth rate and the capital structure of the listed companies in the field of health care, which has a significant level of 5%.

Table 16
The Empirical Results of the Impact of Total Credit Scale Fluctuation on the Capital Structure of Listed Companies in Different Industries From 2003 to 2006

Variable	Public utility		Energy		Material		Industry		Discretionary consumer		Daily consumption		Medical care		Finance		Information technology		Telecommunication service	
To_credit	-0.141	-0.216	-0.329	-0.164	-0.141	-0.180*	-0.074	-0.177*	-0.134	-0.072	-0.214	-0.178	-0.069	-0.164	-0.299	-0.348**	-0.098	-0.192	0.397	0.143
	(0.587)	(0.217)	(0.538)	(0.301)	(0.247)	(0.102)	(0.235)	(0.101)	(0.235)	(0.103)	(0.269)	(0.139)	(0.313)	(0.184)	(0.378)	(0.170)	(0.268)	(0.125)	(0.292)	(0.165)
LnScale	0.037***	0.191***	0.035***	0.100***	0.026***	833.4***	302.5***	1,203***	90.28***	718.9***	0.003	0.000	0.003	-0.025	81.04**	1,004***	237.7***	635.6***	1,272***	4,841**
	(0.005)	(0.015)	(0.004)	(0.024)	(0.002)	(0.007)	(0.002)	(0.008)	(0.002)	(0.009)	(0.003)	(0.012)	(0.004)	(0.021)	(0.004)	(0.011)	(0.003)	(0.011)	(0.020)	(0.102)
Profit	0.000	-0.000	0.001**	-0.000	-0.000	-0.000	-0.000	-0.000***	0.000*	-0.000***	-0.000*	0.000	0.000	0.000**	-0.000**	-0.000***	0.000	-0.000***	-0.007*	-0.006**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.003)	(0.002)
Ndts	-0.004***	-0.003***	-0.001***	-0.001**	-0.003***	-0.002***	-0.002***	-0.002***	-0.002***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001**	-0.000	-0.002***	-0.002***	-0.001***	0.002*	-0.009*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.003)
Flow_ra	0.007	0.040***	-0.001	0.002	0.017***	0.028***	0.002	0.008***	0.001	0.034***	0.004	0.013***	-0.001	0.002*	0.021***	0.033***	0.023	0.052***	0.344**	0.480***
	(0.005)	(0.004)	(0.002)	(0.002)	(0.002)	(0.002)	(0.001)	(0.002)	(0.002)	(0.004)	(0.003)	(0.003)	(0.001)	(0.001)	(0.003)	(0.003)	(0.002)	(0.002)	(0.084)	(0.058)
Control	0.002**	0.002	-0.004***	0.001	0.001**	0.000	-0.001**	-0.002***	-0.001***	-0.001*	0.000	-0.003***	-0.001*	-0.000	0.004***	-0.000	0.000	-0.001**	-0.038***	-0.029***
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.000)	(0.001)	(0.005)	(0.004)
lnGDP	-0.004	-0.007	-0.002	-0.002	-0.007	-0.008***	-0.004	-0.009***	-0.001	-0.001	-0.009	-0.005*	-0.002	-0.002	-0.004	-0.007**	-0.003	-0.005**	0.036**	0.027**
	(0.012)	(0.005)	(0.011)	(0.006)	(0.005)	(0.002)	(0.005)	(0.002)	(0.005)	(0.002)	(0.005)	(0.003)	(0.007)	(0.004)	(0.008)	(0.003)	(0.005)	(0.003)	(0.012)	(0.007)
Mac_index	-0.007	-0.002	0.000	0.001	0.000	0.002*	0.002	0.005***	-0.000	0.001*	0.002	0.002	0.003	0.000	0.000	0.001	0.002	0.003**	-0.020**	-0.015**
	(0.005)	(0.002)	(0.005)	(0.003)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.003)	(0.002)	(0.003)	(0.001)	(0.002)	(0.001)	(0.006)	(0.003)
Constant	0.627	-1.869***	-0.234	-1.173**	-0.047	-0.933***	-0.338	-1.646***	0.066	-0.930***	-0.079	-0.024	-0.119	0.420	0.067	-1.070***	-0.251	-0.843***	-0.311	-5.522**
	(0.553)	(0.321)	(0.512)	(0.488)	(0.238)	(0.151)	(0.226)	(0.152)	(0.225)	(0.154)	(0.248)	(0.205)	(0.315)	(0.347)	(0.342)	(0.208)	(0.249)	(0.192)	(0.306)	(1.485)
Observations	563	563	242	242	1,669	1,669	1,593	1,593	1,350	1,350	646	646	608	608	875	875	678	678	13	13
R-squared	0.385	0.379	0.395	0.115	0.303	0.175	0.371	0.194	0.178	0.101	0.077	0.106	0.120	0.025	0.069	0.194	0.295	0.086	0.998	0.998
Enterprise fixed effect	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y

Note: The data in brackets is the standard deviations generated in the regression process. ***, ** and * indicate, respectively, that the marked regression coefficients are significant at the 0.01, 0.05 and 0.1 levels.

Table 17
The Empirical Results of the Impact of Total Credit Scale Fluctuation on the Capital Structure of Listed Companies in Different Industries From 2007 to 2010

Variable	Public utility		Energy		Material		Industry		Discretionary consumer		Daily consumption		Medical care		Finance		Information technology		Telecommunication service	
To_credit	0.342**	0.650**	-0.196	0.743***	0.178**	0.316***	0.232***	0.305***	0.145**	0.374***	0.297***	0.367***	0.014	0.274**	0.070	0.197**	0.252***	0.495***	-0.579	-0.334
	(0.162)	(0.280)	(0.176)	(0.276)	(0.074)	(0.102)	(0.060)	(0.092)	(0.068)	(0.106)	(0.084)	(0.111)	(0.110)	(0.127)	(0.127)	(0.074)	(0.092)	(0.108)	(0.484)	(0.389)
LnScale	0.081***	0.039***	0.097***	0.015***	0.045***	0.025***	0.037***	0.025***	0.033***	0.009***	0.029***	0.000	0.049***	0.015***	0.058***	0.031***	0.017***	0.017***	0.009	-0.008
	(0.006)	(0.003)	(0.006)	(0.002)	(0.003)	(0.001)	(0.002)	(0.001)	(0.003)	(0.001)	(0.004)	(0.002)	(0.006)	(0.002)	(0.003)	(0.002)	(0.004)	(0.002)	(0.020)	(0.007)
Profit	-0.000***	-0.000***	0.000	0.000	-0.000	-0.000	-0.000**	-0.000	-0.000***	-0.000***	-0.000	-0.000***	-0.000**	-0.000*	-0.000*	0.000	-0.000	-0.000***	-0.003**	-0.002**
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Ndts	-0.002***	-0.005***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.002***	-0.001***	-0.001***	-0.001***	-0.001***	0.000	0.001***	-0.001***	-0.001***	-0.001	-0.001*
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Flow_ra	0.014***	0.009***	-0.001	-0.001	0.001***	0.001**	0.000	0.000	0.004***	0.001	0.002**	0.002***	-0.000	-0.000	0.013***	0.016***	0.000	0.000	-0.000	-0.000
	(0.003)	(0.003)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.003)	(0.001)
Control	0.001***	0.000	-0.001***	-0.000	-0.000	0.000	0.000**	0.000	0.000**	-0.000**	0.000**	0.000***	0.000	0.000	0.000***	0.001***	0.001	-0.000***	-0.001	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)
lnGDP	0.006	0.016**	-0.009	0.024***	0.000	0.005*	0.004**	0.007***	0.002	0.009***	0.007***	0.011***	-0.002	0.007*	-0.009	0.005	0.004	0.013***	0.000	0.004
	(0.005)	(0.008)	(0.005)	(0.008)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.002)	(0.003)	(0.003)	(0.004)	(0.004)	(0.005)	(0.003)	(0.003)	(0.013)	(0.011)
Mac_index	0.000	0.001	0.001	0.004**	0.002***	0.002***	0.002***	0.002***	0.002***	0.002***	0.001**	0.001*	0.001	0.002*	0.001	0.001	0.002***	0.002***	-0.007**	-0.006**
	(0.001)	(0.002)	(0.001)	(0.002)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.001)	(0.003)	(0.002)
Constant	-0.869***	-0.507**	-1.052***	-0.727***	-0.566***	-0.416***	-0.511***	-0.439***	-0.430***	-0.310***	-0.453***	-0.191*	-0.533***	-0.310***	-0.689***	-0.510***	-0.304***	-0.458***	0.682	0.767**
	(0.144)	(0.247)	(0.150)	(0.244)	(0.065)	(0.090)	(0.052)	(0.082)	(0.061)	(0.094)	(0.079)	(0.098)	(0.100)	(0.112)	(0.105)	(0.152)	(0.085)	(0.099)	(0.425)	(0.343)
Observations	1,552	1,552	826	826	5,305	5,305	5,700	5,700	4,388	4,388	2,014	2,014	1,800	1,800	2,459	2,459	2,634	2,634	54	54
R-squared	0.260	0.386	0.310	0.234	0.098	0.280	0.130	0.326	0.098	0.136	0.090	0.072	0.074	0.110	0.217	0.234	0.041	0.175	0.303	0.462
Enterprise fixed effect	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y

Note. The data in brackets is the standard deviations generated in the regression process. ***, ** and * indicate, respectively, that the marked regression coefficients are significant at the 0.01, 0.05 and 0.1 levels.

Table 18
The Empirical Results of the Impact of Total Credit Scale Fluctuation on the Capital Structure of Listed Companies in Different Industries From 2011 to 2015

Variable	Public utility		Energy		Material		Industry		Discretionary consumer		Daily consumption		Medical care		Finance		Information technology		Telecommunication service	
To_credit	0.900	1.234***	0.633	0.553	0.002	0.070	0.237	-0.035	-0.085	0.007	-0.231	-0.179	0.349	0.432**	-0.207	-0.013	0.190	0.007	1.932	1.031
	(0.830)	(0.356)	(0.766)	(0.456)	(0.238)	(0.139)	(0.189)	(0.109)	(0.248)	(0.148)	(0.369)	(0.216)	(0.345)	(0.213)	(0.570)	(0.335)	(0.224)	(0.123)	(1.242)	(1.041)
LnScale	0.051***	0.069***	0.015***	0.061***	0.029***	0.038***	0.033***	0.036***	0.015***	0.028***	0.007***	0.024***	0.023***	0.071*	0.041***	0.057***	0.021***	0.036***	0.022***	0.047*
	(0.003)	(0.004)	(0.003)	(0.008)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.004)	(0.002)	(0.004)	(0.002)	(0.004)	(0.001)	(0.002)	(0.008)	(0.027)
Profit	-0.001***	-0.000	-0.002***	-0.001***	-0.000***	-0.000***	-0.000***	-0.000**	-0.001***	-0.000***	-0.000***	-0.000**	-0.000**	0.000	-0.001***	-0.001***	-0.000***	-0.000***	-0.001	-0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.002)	(0.002)
Ndts	-0.004***	-0.002***	-0.003***	-0.002***	-0.002***	-0.001***	-0.002***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.001***	-0.000***	-0.001***	-0.001***	-0.001***	-0.001	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
Flow_ra	-0.006**	0.004***	0.000	0.000	0.000	0.000	0.001***	0.001***	-0.001**	0.000*	0.000	0.001*	-0.001***	0.000	0.005***	0.004***	-0.000*	0.000	-0.005*	0.001
	(0.002)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)	(0.000)	(0.000)	(0.003)	(0.004)
Control	-0.001***	-0.000*	0.000	0.000	-0.000	0.000***	-0.000***	-0.000	0.000**	0.000***	0.000	0.000***	0.000***	0.000***	0.000***	0.000	0.000*	-0.000	-0.003***	0.000
	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.001)
lnGDP	0.005	0.006*	0.008	0.006	-0.002	-0.002	0.000	-0.002*	0.001	0.000	-0.002	-0.002	-0.004	-0.004*	-0.001	-0.001	0.001	-0.001	0.016	0.004
	(0.008)	(0.003)	(0.008)	(0.004)	(0.002)	(0.001)	(0.002)	(0.001)	(0.002)	(0.001)	(0.004)	(0.002)	(0.003)	(0.002)	(0.005)	(0.003)	(0.002)	(0.001)	(0.014)	(0.012)
Mac_index	0.005***	0.006***	0.003**	0.003***	0.003***	0.003***	0.002***	0.001***	0.001	0.001*	0.001	0.001**	0.001*	-0.000	0.001	0.003***	0.001***	0.001***	0.004	-0.000
	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.001)	(0.000)	(0.001)	(0.001)	(0.001)	(0.001)	(0.000)	(0.000)	(0.002)	(0.003)
Constant	-0.817***	-1.292***	-0.378*	-1.054***	-0.469***	-0.644***	-0.340***	-0.366***	-0.119*	-0.308***	0.0158	-0.256***	-0.212**	0.114	-0.471***	-0.793***	-0.275***	-0.442***	-0.743*	-0.704
	(0.225)	(0.131)	(0.219)	(0.217)	(0.065)	(0.054)	(0.054)	(0.048)	(0.069)	(0.059)	(0.100)	(0.095)	(0.097)	(0.105)	(0.156)	(0.126)	(0.063)	(0.051)	(0.372)	(0.640)
Observations	1,616	1,616	1,110	1,110	7,745	7,745	9,990	9,990	6,571	6,571	2,876	2,876	2,949	2,949	2,646	2,646	5,841	5,841	74	74
R-squared	0.456	0.243	0.376	0.161	0.351	0.098	0.463	0.096	0.154	0.074	0.097	0.061	0.171	0.065	0.225	0.105	0.254	0.124	0.409	0.127
Enterprise fixed effect	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y	N	Y

Note. The data in brackets is the standard deviations generated in the regression process. ***, ** and * indicate, respectively, that the marked regression coefficients are significant at the 0.01, 0.05 and 0.1 levels.

CONCLUSION

According to the classification standard of the Wind database to the industry, this paper classifies the A shares listed companies in Shanghai and Shenzhen two cities. In this paper, the listed companies in the A share market from 2003 to 2015 are classified as the research object. From the perspective of industry classification, this paper uses an empirical method to study the effect of credit volatility on the capital structure of listed companies. The results of the study are shown below.

After the fixed effect is controlled, there is a positive correlation between the growth rate of total credit and the capital structure of Listed Companies in some industries, with a significant level of 1%. These industries are utilities, materials, industry, daily consumption, optional consumption, health care, finance and information technology. However, there is a positive correlation between the growth rate of the total credit scale and the capital structure of the listed companies in the energy industry and the telecom service industry at a significant level of 5% and 10%.

Considering the heterogeneity of industries, this paper studies the empirical results of the impact of credit fluctuation on the capital structure of listed companies under the heterogeneity of policy environment. We can find that after considering the heterogeneity of industries, the relationship between capital structure and credit fluctuation of listed companies is different under different macroeconomic credit policies. But the relationship between capital structure and credit fluctuation in different periods can well reflect the industrial development status, industrial policy trend and macroeconomic environment at that time.

THE POLICY RECOMMENDATIONS

As an important factor affecting the financing environment, the credit policy is related to the financing decisions and capital structure of listed companies. China is in a period of strategic opportunities, and relevant authorities should make good use of macro credit policy and make good use of the policy tools that influence the capital structure of micro enterprises. Make the credit policy play a good impact on the capital structure of listed companies, and promote the continuous optimization of the capital structure of listed companies.

Firstly, we recommend that first, China should continue to deepen the market-oriented interest rate reforms, improve the pricing and transmission mechanism of the interest rate of deposit and loan, and optimize the interest rate structure of commercial banks. Interest rate is the objective embodiment of capital price. Interest rate policy affects money supply and corporate financing, and it is an important policy measure of market economy regulation. In the process of market allocation of resources, interest rate should play a basic role in regulating. Reasonable interest rate policy will make the flow of funds more reasonable and more efficient. Therefore, in the pricing of deposit and loan interest rates, financial institutions should be given more operational space. The existing transmission mechanism of interest rate policy should be further optimized and improved.

Secondly, the central bank should reduce the frequency of deposit reserve policy, and keep the difference of deposit reserve adjustment. When the deposit reserve rate is adjusted, the scale of the credit will change with the total amount of available funds. This change will affect the level of the company's current liabilities, and ultimately lead to the corresponding adjustment of the company's capital structure. Although the adjustment of the reserve requirement has significant effect on the credit market, the negative impact of the policy tool on the market may be too much. Therefore, it is suggested that the central bank should gradually reduce the use of the deposit reserve rate adjustment means, and even should gradually stop the means. Because the domestic financial market of China is immature and imperfect, the government has limited operational tools for macro-control. Therefore, in the foreseeable future, the deposit reserve ratio will continue to be an important regulatory policy. However, the central bank should make appropriate use to reduce the cost of capital structure adjustment, and make the credit policy more effective in regulating the credit market. The existing statutory deposit reserve system should be further optimized so as to make it more targeted to the structural problems of the credit market.

Thirdly, the relevant authorities should further improve the capital constraint mechanism of prudential supervision, and improve the multi-level capital adequacy supervision system. The authorities should improve the countercyclical capital buffer mechanism, reduce credit market volatility, introduce leverage regulation, and strengthen the capital supervision system. China's Banking Regulatory Commission (CBRC) has effectively reduced the systemic risks of banks by establishing the capital restraint mechanism of prudential supervision. In 2004, the CBRC promulgated the measures for the management of capital adequacy ratio of commercial banks. In the aspect of raising capital for commercial banks, the supervision of the banking regulatory bureau is becoming more and more standardized, and a more perfect capital restraint mechanism has been established. In the allocation of bank resources, the CBRC should guide banks to allocate credit resources more reasonably by means of countercyclical capital requirements. Commercial banks obtain a large amount of capital through the capital market, and the capital adequacy ratio has been significantly improved. CBRC should establish a more

perfect supervision system. CBRC also needs to guide the improvement of bank risk measurement tools, so that the risk management ability of commercial banks will be strengthened.

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