The Influence of Capital Structure of Real Estate Enterprise on Stock Fluctuation

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ABSTRACT

As one of the pillar industries in every country, the real estate industry is characterized by a significant capital demand. Daily corporate governance and operation require a large amount of capital. Therefore, high leverage is one of the essential financing methods in the real estate industry. However, the debt ratio of the real estate industry has generally exceeded the normal range. The high debt ratio makes the capital structure unreasonable and increases enterprises' financing costs and operational risks. Stock volatility is considered to be one of the vital means to measure the business risk of enterprises, and continuous high stock volatility is not conducive to the long-term stable development of enterprises. This paper focuses on the comparative analysis of real estate industry data in the United States and China, establishes a fixed-effect model to study the impact of corporate debt ratio on stock market volatility, and discusses whether deleveraging can optimize capital structure. The fixed-effect model reflects that a high debt ratio increases stock price volatility, and debt ratio is positively correlated with stock price volatility. Moreover, the debt ratio of American enterprises has a more significant positive impact on stock volatility compared with Chinese enterprises. Therefore, this paper suggests that the future development of the real estate industry can optimize the capital structure of enterprises by deleveraging to reduce operating risks.

Keywords: *Finance; Real estate; Capital structure; Corporate finance; deleveraging; Stock Volatility; Corporate debt ratio*

1. INTRODUCTION

1.1. Background

1.1.1. Social background

As a fast-developing industry, the real estate industry has been concerned by all walks of life. Because it is relevant to people's lives, it is easy to attract the attention of potential investors. In addition, the contribution of the real estate industry to tax revenue has promoted the economic development of multiple countries and regions, making the real estate industry one of the pillar industries of various countries and the key to boosting GDP. Not only that, combined with the forecast of the past development trend, the trend of the real estate industry in the future will show steady growth along with the rise of THE GDP of the two countries. The real estate industry is still a pillar industry in both the United States and China in the future.

High demand for capital characterizes the real estate industry [10]. Day-to-day corporate governance and operations require a lot of money. Therefore, high leverage is one of the critical financing methods in the real estate industry [9]. However, the debt ratio of the real estate industry is out of the normal range [3]. The high debt ratio makes the capital structure extremely unreasonable, increases the financing cost and bankruptcy risk of enterprises, and is not conducive to the long-term stable development of enterprises. Stock volatility is one of the leading indicators to measure the operational risk of an enterprise, so analyzing the relationship between corporate debt ratio and stock volatility is helpful to determine the capital structure of a company.

1.1.2. Academic background

Financing is an essential issue in the process of enterprise development. Capital structure refers to the relationship between debt financing and equity financing in corporate capital. This confirms the view of

Modigliani-Miller's theory that the capital structure of an enterprise is constituted by the proportion relationship between equity capital and debt capital. As the beginning of modern capital structure theory, Modigliani-Miller theory has been widely recognized by academia. By analyzing the relationship between corporate debt ratio and stock volatility, this paper studies the problems existing in the generalized capital structure to get the optimal solution.

Real estate enterprises generally have the financing problem of the excessive debt ratio, and the debt ratio is still soaring year by year. In China, many leading real estate companies have exceeded the warning line of debt ratio of 70%, facing the risk of financial crisis and bankruptcy. In this way, enterprises should balance the debt ratio through deleveraging. This paper is committed to analyzing the impact of deleveraging on the capital structure optimization of the real estate industry from both positive and negative aspects. Finally, to conclude whether deleveraging can optimize the capital structure.

1.2. Importance

Although there are many analyses on capital structure optimization in the academic world, there are few systematic analyses on the relationship between debt ratio and stock volatility in the real estate industry. So far, no author has conducted comparative research on the combination of the foreign real estate industry and China's real estate industry. This paper aims to fill this knowledge gap and put forward some suggestions for the future development of the real estate industry. It is expected to improve the theoretical research on capital structure optimization of the real estate industry, supplement the deleveraging system theory, and promote the future development of the real estate industry.

2. LITERATURE REVIEW

2.1. Macro point of view

The influence of capital structure on corporate performance has been widely concerned by financial academia. Especially in western countries, scholars' research on the capital structure has been perfect and made particular progress. Reinhart and Rogoff (2011) have analyzed the effects of high debt from a macro perspective. The article points out the link between high leverage and bank debt crisis [8]. The surge in public borrowing may lead to a domestic economic recession and even an international financial crisis. Pierpaolo and Federica's (2014) paper concludes that deleveraging causes currencies to depreciate in the short run [2]. Still, in the long run, it increases the value of national currencies and increases global liquidity. In general,

many western scholars found from the macro perspective that deleveraging can be used to adjust the domestic economy, conducive to the long-term stable development of the national economy.

2.2. Micro point of view

In addition, many kinds of literature analyze the optimization of the internal capital structure of companies from the micro perspective. Western and Chinese scholars have found through analysis that the optimization of capital structure is of great significance to corporate performance and is the key to enhancing corporate value. Through analyzing the return on equity and the cost of equity issuance, Lipson and Mortal's (2009) paper has concluded a link between liquidity and capital structure decisions [6]. More liquid companies have less leverage and more liquid stocks. Ahmed (2011) found that highly leveraged businesses are vulnerable to the state of the economy, increasing the risk of their operations [1]. Duan Kai (2017) proposes that equity financing has advantages over debt financing by studying the relationship between capital structure and corporate governance [4]. First, equity financing does not have the pressure of fixed repayment of principal and interest; second, the dividend payment of the company is flexible, so the dividend frequency can be decided after consultation with shareholders to reduce the cash outflow of the company and reduce the financing cost of the company. Duan pointed out that many listed companies, especially China, make mistakes when making financing decisions. Enterprise financing focuses on the feasibility of financing rather than reasonable, and debt financing just has the characteristics of simple and quick, so debt financing becomes the first choice when enterprise financing decisions. Therefore, the corporate capital structure generally exists the problem of high borrowing rate.

Scholars have never stopped studying the capital structure of the real estate industry. Li Qiuyue (2020) pointed out in the article that the capital structure of the real estate industry generally has the problem of an excessive debt ratio [7]. A debt-to-asset ratio of 50% is reasonable for most industries. However, due to the particularity of the real estate industry, the normal range of asset-liability balance is between 60-70%. Taking Vanke Group, a leading enterprise in China's real estate industry, for example, its asset-liability ratio is generally on the rise. Vanke's debt-to-asset ratio exceeded 70% from 2010 to 2018, especially in 2016 its debt-to-asset ratio exceeded 80%. Hou Yue (2020) believes that high leverage will lead to a decline in the solvency of enterprises and even ultimately affect the performance of enterprises [5]. Therefore, the real estate industry's deleveraging demand is very urgent.

2.3. The theme

In general, deleveraging was studied earlier by Western scholars than by Chinese scholars. They find that deleveraging affects not just companies but countries and the world. The research found that the capital structure of the real estate industry has problems, and the high debt ratio of enterprises even once affected the value of enterprises, so it is urgent to optimize the capital structure of the real estate industry. Although the research on capital structure and deleveraging already exist, there is still room for further exploration and improvement. This paper will take the real estate industry as the research object and hope to provide suggestions for the future development of the real estate industry by analyzing the relationship between debt ratio and stock volatility.

3. METHODOLOGY

The study included data from 161 companies from 2010 to 2020, with a total of 1532 samples. VOL is the dependent variable, LEV is the independent variable, and the rest are control variables. All variables are indented in 1% and 99% quantiles.

Table 1. Variable correspondence table

Variable	Variable definitions
VOL	volatility
LEV	Asset-liability ratio
TOP1	Shareholding ratio of the largest shareholder
lnAMOUNT	Volume (logarithm)
TURN	Turnover rate (logarithm)
GROW	Growth rate of operating income
SIZE	Enterprise size (natural logarithm of total assets)
ROE	Net interest rate on total assets
TYPE	Enterprise attribute, =1 is a Chinese enterprise

Table 2. Descriptive analysis

Variable	Obs	Mean	Std. Dev.	Min	Max
VOL	1532	41.76	17.19	14.44	103.43
LEV	1532	0.64	0.20	0.10	1.27
TOP1	1532	0.38	0.18	0.07	0.81
lnAMOUNT	1532	20.88	1.99	12.87	23.75
TURN	1532	5.48	0.97	2.31	7.35
GROW	1532	0.28	0.98	-0.80	7.31
SIZE	1532	23.06	1.76	18.43	27.26
ROE	1532	0.02	0.04	-0.15	0.15
TYPE	1532	0.86	0.34	0.00	1.00

Descriptive analysis was conducted in this study, and the results are shown in the table below. It can be seen from the table that the mean value of VOL is 41.76, and the standard deviation is 17.19. The mean value of LEV was 0.64, and the standard deviation was 0.20. The mean value and standard deviation of TOP1 were 0.38 and 0.18, respectively. The mean value and standard deviation of lnAMOUNT were 20.88 and 1.99, respectively. The mean value and standard deviation of TURN were 5.48 and 0.97, respectively. The mean value and standard deviation of GROW were 0.28 and 0.98, respectively. The mean value of SIZE is 23.06, and the standard deviation is 1.76. The mean ROE and standard deviation were 0.02 and 0.04, respectively. The mean value of TYPE is 0.86, which means 86% are Chinese enterprises.

This study analyzed the correlation between variables as shown in the following table to understand the correlation between variables. It can be seen from the table that, except for the variable GOW, other variables are significantly correlated with the dependent variable ZL at the significance level of 5%. The correlation coefficient between LEV and VOL was 0.011 (P=0.006). The correlation coefficient between TOP1 and VOL is 0.060 (P=0.018). The correlation coefficient between lnAMOUNT and VOL was 0.216 (P<0.001). The correlation coefficient between TURN and VOL was 0.465 (P<0.001). The correlation

coefficient between SIZE and VOL is -0.075 (P=0.003); The correlation coefficient between ROE and VOL was -0.097 (P<0.001). The correlation coefficient between TYPE and VOL is 0.065 (P=0.012).

Table 3. Correlation analysis

Variable	VOL	LEV	TOP1	lnAMOUNT	TURN	GROW	SIZE	ROE	TYPE
VOL	1.000								
LEV	0.011	1.000							
	0.006								
TOP1	0.060	0.114	1.000						
	0.018	0.000							
lnAMOUNT	0.216	0.107	-0.025	1.000					
	0.000	0.000	0.320						
TURN	0.465	0.013	-0.109	0.651	1.000				
	0.000	0.608	0.000	0.000					
GROW	0.027	-0.036	-0.025	-0.056	-0.016	1.000			
	0.284	0.163	0.325	0.029	0.521				
SIZE	-0.075	0.437	0.195	0.574	0.023	-0.043	1.000		
	0.003	0.000	0.000	0.000	0.363	0.095			
ROE	-0.097	-0.174	0.195	0.040	0.040	0.098	0.117	1.000	
	0.000	0.000	0.000	0.116	0.118	0.000	0.000		
TYPE	0.065	0.000	0.252	0.708	0.387	-0.040	0.385	0.113	1.000
	0.012	0.993	0.000	0.000	0.000	0.119	0.000	0.000	

Table 4. Collinearity test

Variable	VIF	SQRT VIF	Tolerance	R-Squared
LEV	1.51	1.23	0.6609	0.3391
TOP1	1.33	1.15	0.7547	0.2453
lnAMOUNT	6.96	2.64	0.1437	0.8563
TURN	2.94	1.71	0.3402	0.6598
GROW	1.02	1.01	0.9842	0.0158
SIZE	3.42	1.85	0.2924	0.7076
ROE	1.18	1.09	0.8464	0.1536
TYPE	2.55	1.6	0.3924	0.6076
Mean VIF	2.61			

In order to prevent high correlation between variables, collinearity exists, which will affect the subsequent model fitting. This study adopted The collinearity test, and the results are shown in the table below. If collinearity exists, then the VIF value of a variable is greater than 10, and the mean VIF is greater than 2. It can be seen from the table that the VIF of each variable is between 1.02 and 6.96, and the mean VIF is 2.61, indicating that collinearity does not exist.

In order to screen suitable models to fit the data, this study adopted three different models, including mixed regression, random effect, and fixed effect. And embrace the corresponding method to compare the quality of the model. Among them, the LM test is used to compare mixed regression and random effect. If it is significant, the random effect is selected; otherwise, mixed regression is selected. Hausmann test is used to compare the random effect and fixed effect. If it is significant, the fixed effect is better; otherwise, the random effect is selected. F test is adopted to change Angle fixed effect and mixed regression. If it is significant, the fixed effect is selected; otherwise, mixed regression is selected.

It can be seen from the following table that all tests are significant. The fixed effect is better than the

random effect, and the random effect is better than the mixed regression, and the fixed effect is finally selected.

Table 5. Model filtering

Inspection methods	The inspection results	Value of P
LM test	chibar2(01) = 140.64	P<0.001
Hausmann test	F(160, 1354) = 5.13	P<0.001
F test	chi2(17) = 206.49	P<0.001

4. RESULTS

In Table 6, the results of mixed regression, random effect, and fixed effect are listed, respectively. As can be seen from the table, in mixed regression and random effects, independent variable LEV has no significant influence on dependent variable VOL. In the fixed effect, LEV has a considerable impact.

Finally, the fixed-effect model is established as follows:

$$VOL_{it} = \alpha + \beta1 * LEV_{it} + \beta2 * TOP1_{it} + \beta3 * lnAMOUNT_{it} + \beta4 * TURN_{it} + \beta5 * GROW_{it} + \beta6 * SIZE_{it} + \beta7 * ROE_{it} + \sum Year + u_i + \varepsilon \quad (1)$$

The results are shown in the table below. There are four models in the table. The first model is the overall sample, the second model is the sample of foreign enterprises, the third model is the sample of domestic enterprises, and the fourth model is the interaction term of the independent variable and the enterprise attribute variable. As can be seen from the table, LEV has a significant impact on the dependent variable in model M1. For each additional unit of LEV, VOL increases by 8.173 units. In model M2, LEV had a significant effect on the dependent variable, and VOL increased by 17.989 units for each additional unit of LEV. In model M3, LEV had no significant effect on the dependent variable. In model M4, LEV and the interaction terms between LEV and TYPE have substantial effects on VOL. When LEV increases by 1 unit, VOL increases by 35.722 units; when interaction terms increase by 1 unit, VOL decreases by 31.254 units. In other words, LEV has a significant difference in influence on VOL among domestic and foreign enterprises, while LEV has a greater impact on domestic enterprises among foreign enterprises.

Table 6. Comparison of results for different models (t-statistics in parentheses: *** p<0.01, ** p<0.05, * p<0.1)

Variables	(1)	(2)	(3)
	OLS	RE	FE
	VOL	VOL	VOL
LEV	1.148	2.873	8.173***
	(0.589)	(1.209)	(2.747)
TOP1	15.421***	13.286***	10.023**
	(8.178)	(5.020)	(2.550)
lnAMOUNT	-0.231	-0.238	4.070***
	(-0.683)	(-0.537)	(5.018)
TURN	8.075***	10.094***	9.895***
	(14.262)	(15.613)	(12.038)
GROW	1.078***	0.647**	0.386
	(3.285)	(2.114)	(1.306)
SIZE	-1.105***	-1.579***	-2.657***
	(-3.290)	(-3.600)	(-4.194)
ROE	-32.789***	-19.948**	1.474
	(-3.763)	(-2.247)	(0.161)
Constant	15.678***	14.383**	-52.586***

	(3.257)	(2.226)	(-3.804)
Time-effect	Fixed	Fixed	Fixed
Observations	1,532	1,532	1,532
R-squared	0.488		0.594
F	84.81	.	116.7
chi2	.	1702	.
Number of id		161	161

Table 7. Regression analysis (t-statistics in parentheses: *** p<0.01, ** p<0.05, * p<0.1)

Variables	(1)	(2)	(3)	(4)
	m1	m2	m3	m4
	VOL	VOL	VOL	VOL
LEV	8.173***	17.989**	6.130	35.722***
	(2.747)	(2.151)	(1.526)	(4.173)
1.TYPE#c.LEV				-31.254***
				(-3.431)
TOP1	10.023**	40.157**	9.707**	10.218***
	(2.550)	(2.176)	(2.502)	(2.609)
lnAMOUNT	4.070***	5.269	4.763***	4.155***
	(5.018)	(0.938)	(5.461)	(5.141)
TURN	9.895***	8.426*	7.839***	9.773***
	(12.038)	(1.849)	(9.269)	(11.925)
GROW	0.386	0.410	0.072	0.302
	(1.306)	(0.679)	(0.286)	(1.024)
SIZE	-2.657***	-1.494	-2.834***	-2.308***
	(-4.194)	(-0.749)	(-3.412)	(-3.610)
ROE	1.474	2.565	5.334	-0.980
	(0.161)	(0.143)	(0.410)	(-0.107)
Constant	-52.586***	-86.856	-51.816***	-61.696***
	(-3.804)	(-1.119)	(-2.691)	(-4.400)
Observations	1,532	208	1,324	1,532
R-squared	0.594	0.577	0.688	0.598
Number of id	161	36	125	161
F	116.7	.	109.7	111.7
r2	0.594	0.577	0.688	0.598

5. DISCUSSION

5.1. Limitation

Although this paper makes contributions to help optimize the capital structure of enterprises by studying the relationship between the debt ratio of real estate and stock volatility in China and the United States. However, there are still regrets and limitations in the study. It is found that LEV and VOL of real estate enterprises in

the United States and China are positively correlated. Still, there are significant differences in the impact of LEV on VOL of real estate enterprises in China and the United States which indicates that there are specific differences in the effect of LEV on VOL in different real estate environments. However, the results of this paper only focus on China and the United States. They can only provide suggestions for optimizing the capital structure of the real estate industry in the two countries.

5.2. Innovation

Even so, if there are enough data in other countries to support the research method and the fixed effect model established in this paper, it can still contribute to the analysis of the impact of LEV to VOL in other countries and compare the difference of the impact of LEV to VOL in different countries. This paper focuses on the real estate industry in China and the United States through the fixed effect model. It is concluded that LEV of real estate enterprises has a positive relationship with VOL. Compared with Chinese enterprises, LEV of American enterprises has a greater positive impact on VOL.

5.3. Contact in the past

Although there has been relevant literature on the study of the capital structure of the real estate industry, there are still gaps in the relevant literature on the comparative analysis of the two countries. In this paper, data variables of enterprises in the two countries are applied to fill this knowledge gap by comparing the relationship between LEV and VOL in China and the United States and to establish a fixed-effect model that can be used for comparative analysis between multiple countries as to make contributions to the comparative analysis between other countries in the future. In addition, although some literature studies show that LEV and VOL are positively correlated, there is no research and comment on the difference in the positive correlation between them. Therefore, the model in this paper gives a more accurate interpretation of the existing theoretical basis from a new perspective.

6. CONCLUSION

6.1. Summary

This paper focuses on the real estate industry in China and the United States. Comparing the relationship between debt ratio and stock volatility of 161 enterprises in the two countries analyzes the influence of corporate capital structure on stock volatility to provide suggestions for the capital structure optimization of real estate enterprises in the two countries. Although there are literates on the capital structure of the real estate industry, there are still gaps in

the comparative analysis of enterprise data in the two countries.

In order to study the relationship between corporate debt ratio and stock volatility in the two countries, this paper establishes a fixed effect model by using descriptive analysis, correlation analysis, col-linearity test, and model screening. The results show a positive relationship between the debt ratio and stock volatility of real estate enterprises in China and the United States. It means that the high debt ratio of enterprises will increase the volatility of stock prices, thus increasing the business risk of enterprises. In addition, the model shows differences in the positive impact of the real estate industry debt ratio on stock volatility in the two countries. Compared with Chinese enterprises, LEV has a greater positive impact on the VOL of American enterprises.

6.2. Research contributions

The research method of this paper not only fills the gap in the analysis of the volatility of real estate stocks but also provides a new perspective for the existing theories. The established model can analyze the subtle differences in the impact of the volatility of debt stocks in the United States and China to put forward specific suggestions on the optimization of the capital structure of real estate. Real estate enterprises can reduce debt ratio and stock volatility by deleveraging to optimize capital structure, reduce operating risks, and achieve stable development in the future.

REFERENCES

[1] A.A. Ahmed, Financial Performance Evaluation of Some Selected Jordanian Commercial Banks, International Research Journal of Finance and Economics, 2011, vol. 68, pp. 50-63.

[2] P. Benigno, F. Romei, Debt deleveraging and the exchange rate, Journal Of International Economics, 2014, vol. 93(1), pp. 1-16. DOI: 10.1016/j.jinteco.2014.03.001

[3] R.Q. Chen, S.Q. Li, Debt Management Risks and Countermeasure Analysis in Real Estate Industry, SCIENCE & TECHNOLOGY INFORMATION, 2021. DOI: 10.16661/j.cnki.1672-3791.2105-5042-8120

[4] K. Duan, Research on capital Structure and Corporate Governance of Chinese listed Companies, Modern agriculture, 2017. DOI:10.14070/j.cnki.15-1098.2017.06.070

[5] Y. Hou, Research on capital Structure optimization of Listed companies in China, Special Zone Economy Issue, 2020.

[6] M. Lipson, S. Mortal, Liquidity and Capital Structure, SSRN Electronic Journal, 2009. DOI: 10.2139/ssrn.887413

[7] Q.Y. Li, Analysis on capital structure optimization of real estate enterprises, China Economic and Trade Guide, 2020. DOI: CNKI:SUN:JMDL.0.2020-04-043

[8] C. Reinhart, K. Rogoff, From Financial Crash to Debt Crisis, American Economic Review, 2011, vol. 101(5), pp. 1676-1706. DOI: 10.1257/aer.101.5.1676

[9] B. Sony, S. Bhaduri, Information asymmetry and financing choice between debt, equity and dual issues by Indian firms, International Review Of Economics & Finance, 2021, vol. 72, pp. 90-101. DOI: 10.1016/j.iref.2020.11.001

[10] Q.N. Xing, Research on the risks and countermeasures of real estate enterprises in debt operation, Enterprise Reform and Management, 2021, vol. 4, pp. 221-222. DOI: 10.13768/j.cnki.cn11-3793/f.2021.0422