

Financing Constraints and Stock Price Volatility Empirical Evidence from Shanghai and Shenzhen A-share listed Companies

Xuan Xiang¹, Fei Dong¹, Junxiu Chen¹

¹Southwest University, Chongqing, China

Abstract. Based on the theoretical analysis of financing constraints and stock price volatility, the hypothesis of “corporate financing constraints inhibiting corporate stock price volatility” is proposed. After data cleaning, the cross-sectional data based on A-share was used to make an empirical analysis of the relationship between financing constraints and stock price volatility of listed companies in 2018 through regression model. The study found that when companies relax financing constraints, due to widespread overinvestment, the stock price of companies will fluctuate more. In addition, we have shown that by replacing the return of financing constraint indicators and the regression of subsamples based on enterprise size, market type and ownership, the conclusion of the study is more robust. The research reveals the mechanism of the impact of financing constraints on the volatility of corporate stock prices. The conclusions have practical significance for investors, corporations and relevant regulatory authorities.

1 Introduction

The fluctuation of stock prices is an eternal topic in the capital market. Whether in theoretical research or in practice, people have long paid attention to the fluctuation of stock prices. In most cases, this concern views stock price fluctuations as a risk and as a direct cause of losses to market participants.

Since China is in a period of economic transformation, the difficulty of corporate financing has always been an important issue facing China. How to solve the external financing dilemma of enterprises is a topic that is generally concerned by academics and related personnel. Faced with the impact of the current epidemic, corporate financing difficulties have become more prominent. The central bank has reduced the release of liquidity and partially eased the plight of corporate financing.

In a market economy environment, financing constraints will increase the business risks faced by enterprises, that is, “financing constraint risks”. Ball and Browns (1968) also believe that the information about financing restrictions disclosed by listed companies will be passed on to investors, and due to the asymmetry of information, external investors will use the financing restrictions disclosed by operators as a signal to corporate financing. In theory, stock price fluctuations have a positive correlation with corporate financing constraints. However, a positive relationship is premised on the effective use of integrated funds by the enterprise. Therefore, this article studies the impact of financing constraints on the fluctuation of corporate stock prices from the perspective of corporate over-investment, in order to study the research perspective in this field.

This article uses the data of A-share non-financial listed companies in Shanghai and Shenzhen in 2018 to empirically analyze the impact of financing constraints on the fluctuation of corporate stock prices. The study found that in the case of widespread over-investment, stock price fluctuations intensified with the reduction of corporate financing constraints.

This article is organized as follows. The second part is the literature review, the third part is the research design, the fourth part is the empirical test and interpretation, the fifth part is the robustness test, and finally the conclusion part.

2 Literature Review

Financing constraints have always been a hot topic in corporate finance, and many scholars have conducted some research. Due to the incomplete capital market, there are financing constraints. Some scholars believe that corporate financing constraints come from external factors. A study represented by Fazzari and Athem (1987) found that the market incompleteness caused by information asymmetry led to financing constraints. Hadlock and Pierce (2010) proposed to use the internal characteristics of the company's age and size to describe the degree of corporate financial constraints. The existence of financing constraints will affect the company's stock price, corporate innovation and risks to the company. Whited et al. (1992) (6) Through empirical research, it is also found that there is a positive correlation between financing constraints and company earnings.

As can be seen from the compilation of relevant documents on financing constraints, the existing literature mainly studies the reasons for the formation of financing

1634030589@qq.com

constraints and their impact on listed companies, and less literature directly studies the investment behavior of enterprises with financing constraints, and then analyzes the company value and enterprise risk issues that affect the fluctuation of the company's stock price are discussed. In view of the shortcomings of the existing literature, this article chooses to conduct further research from the perspective of stock price fluctuations, and empirically test the relationship between financing constraints and stock price fluctuations. According to this study, reducing financing constraints may lead to over-investment and increase risks for companies, and ultimately increase changes in the company's stock price.

First, in emerging markets, companies face many investment opportunities. If the financing restrictions are eased, more funds will be used for investment. Related studies have found that in the real world, corporate overinvestment is widespread (Rao Yulei et al. Tang Cedar et al., 2007; Wang Pingdeng, 2009). Wang Yanchao (2009) found that companies with soft or weak constraints have more cash holdings. It is easier to cause over-investment than companies with strong financing constraints. Xie Haiyang and so on. (2011) pointed out that bank borrowing will not prevent excessive investment behavior. On the contrary, it has become a capital provider for excessive investment. Therefore, with the enhancement of the convenience of corporate financing, the investment capacity of enterprises will also be improved. Coupled with the general trend of excessive investment by enterprises, the relaxation of corporate financing constraints will undoubtedly promote excessive investment by enterprises. The greater the degree of overinvestment, the greater the risk to the company, the greater the impact of the company's intrinsic value, and the greater the volatility of the company's stock price. In summary, this article proposes this assumption. Due to the widespread overinvestment phenomenon, companies face fewer financing constraints, leading to greater fluctuations in corporate share prices.

The possible marginal contribution of this article lies in. First of all, the existing literature on financing constraints mainly focuses on the reasons for the formation of financing constraints and their impact on listed companies, but has not yet focused on the analysis of financing constraints. Impact on stock price volatility mechanism. Secondly, this article studies the impact of financing constraints on the fluctuation of corporate stock prices, and makes up for the gaps in related research. Finally, the conclusions and recommendations of this article have practical significance for investors, listed companies and relevant regulatory authorities.

3 Research design

3.1 Sample selection and data sources

Based on the annual data of Shanghai and Shenzhen A-share listed companies in 2018, this paper studies the relationship between stock price volatility and financing constraints of listed companies. In this paper, the original sample is treated as follows: First, to exclude financial

listed companies, Second, to exclude companies marked as special treatment during the sample period, and third, to exclude the missing samples of the main research variables. A final sample of 3,394 studies was obtained. The financial data used by the Institute is derived from the Cathay-Pacific CSMAR database, the Wind database, all calculations are done using the metering software Stata15.0 and Excel, in order to eliminate the effects of outliers. we have all the continuous variables in the 1% and 99% fraction of the Windsor tail ingest processing.

3.2 Testing the model

To test the hypothesis, the following regression model is established.

$$SPV_i = \beta_1 WW_i + \beta_2 DAR_i + \beta_3 FAR_i + \beta_4 ROA_i + \beta_5 Lnsiz_i + \beta_6 Lnage_i + u_i \quad (1)$$

Among them, the SPV_i represents the stock volatility of the i th enterprise in 2018, the WW_i indicates the degree of financing constraints of the second enterprise in 2018, and the "DAR" $_i$ represents the asset-liability ratio of the i th enterprise in 2018. The "FAR" $_i$ represents the proportion of fixed assets of the second enterprise in 2018, the ROA_i represents the return on assets of the second enterprise in 2018, the $Lnsiz_i$ represents the size of the enterprise of the i th enterprise, and the $Lnage_i$ represents the age of the business of the i th business (years).

- Explained Variable. Volatility of Corporate Share Price (SPV)

In the above regression model, the variable SPV is interpreted as representing the volatility of stock prices. Stock price volatility refers to the standard deviation of the stock price over a period of time. In theory, if the stock market is effective, then the change in stock price is caused by the change in the intrinsic value of the stock. Risk (Zhou Ziyuan, 2010). Based on the 2018 daily closing price data of listed companies in the most recent year in the CSAMR database (stock market series-stock market transactions), this study calculated the standard deviation of the price of each listed stock as the volatility of the company's stock price. The following explanatory variables also come from the Cathay Energy Database.

- Explaining variables

Financing constraints

The degree of financing constraints for explanatory variables in the enterprise model. Financing (Fincon), the existing literature is based on various indicators constructed based on the financial statements of the enterprise, and then identifies whether the enterprise is subject to financing constraints and the degree of financing constraints. However, the relationship between corporate behavior or financial characteristic variables and financing constraints is unstable and does not correspond to each other. Therefore, the measurement of financing constraints has always been a controversial field in the literature. The main method of financing constraint measurement is Investment-Cash Flow Sensitivity Index, Fazzari et al.(1987) Kaplan et al. (1997).The KZ index was designed based on the comprehensive weight of financial indicators; on the basis of the research conducted on Whited and Wu and Hadlock and Pierce, the WW index

was used as the benchmark index to measure the relative financing constraints of enterprises, and SA was used. The index is tested for robustness. The WW index turns white, and Wu 3 measures the Euler equation by wide-moment estimation, and obtains six explanatory factors for financing constraints, namely, long-term debt level TLTD (long-term debt / total assets), cash flow ratio CF (generated by operating activities Net cash flow / total assets x 100%), the cash dividend payment virtual variable DIVPOS (the value of the listed company paying cash dividends is 1, the relative value is 0), the natural asset synonymous with LnTA, the business operating income growth rate (SG) And the business industry operating income growth rate (ISG), and then calculated according to the given coefficient, the higher the value, the higher the degree of financing constraints.

- Control variables

According to the research of previous scholars, this paper further controls the variables of enterprise characteristics as follows.

The control variable is the size of the enterprise (Size), which is expressed in terms of the total assets of the enterprise. The larger the enterprise, the stronger its ability to resist risks, the expected volatility of the stock price and its inverse function. Change the relationship. The second is the Age of Enterprise (Age). As the company's listing life comes to arithmetic, the earlier the time to market, the company has more experience in dealing with risks, and the expected experience of stock price fluctuations and its reverse changes is more abundant; ROA) is expressed as the ratio of total profit to total assets.

3.3 Describe statistics

Table1. Description statistics

Variable	Observation	Saverage	Standard deviation	Minimum	Max
SPV	3394	3.3077	4.4063	0.1380	77.5532
WW	3394	-1.0210	0.0691	-1.3020	-0.8611
DAR	3394	0.4388	0.4134	0.0098	18.7904
FAR	3394	0.1987	0.1558	0.00003	0.9208
ROA	3394	0.0100	0.3753	-19.1382	0.3789
LnSize	3394	22.2481	1.3503	17.0739	28.5200
Lnage	3394	2.9640	0.2904	1.3863	4.7875

Note. The SPV_i represents the stock volatility of the i enterprise in 2018, the WW_i indicates the degree of financing constraints of the i.e. enterprise in 2018, and the "DAR"_i represents the asset-liability ratio of the i.e. enterprise in 2018. The FAR_i represents the proportion of fixed assets of the second enterprise in 2018, the ROA_i represents the return on assets of the second enterprise in 2018, the "Lnsize"_i represents the size of the enterprise of the i.e. i indicates the age of the business of the i-business (years).

The study begins by describing all variables to understand the characteristics of the sample. The statistical results of the main variable descriptions are shown in Table1. The average price volatility (SPV) is 3.3077, the maximum value is 77.5532, and the minimum value is 0.1380, indicating that the overall stock price fluctuation of the sample company is large, and the standard deviation is 4.4063, indicating that there are large differences in stock price fluctuations between different companies. The

difference between the maximum and minimum values of the financing constraint indicator (WW) and the standard deviation are also small, reflecting the small difference in the degree of financing constraints between companies. The minimum and maximum values of the asset-liability ratio (DAR) are very different, but the standard deviation is relatively small (0.4134), which reflects the excessive use of financial leverage by various companies. The overall difference is not significant. The average fixed asset ratio (FAR) is 0.1987, that is, the fixed assets of the sample companies account for a small proportion of total assets, at 19.97%. The return on assets (ROA) has a wide range of values, with a standard deviation of 0.3753, which is relatively small, indicating that the profitability of a single enterprise has extremely high value, but the difference between enterprises is not large, and the overall profitability is weak.

4 Empirical test

Based on the factor of stock price volatility of listed companies, we carry out multi-linear regression based on the six financial indicators mentioned in Part III (financing constraint WW index, asset-liability ratio, asset yield, proportion of fixed assets, enterprise size, enterprise age). Table 2 reports the results of the diversified regression of share price volatility and financing constraints.

Table2. Regression Results

	Estimated symbol	estimated coefficient	t value
Intercept		21.0920	14.36***
WW	-	-18.4565	-8.64***
DAR	+	0.0012	0.00
FAR	-	-3.0890	-6.63***
ROA	+	2.1515	4.00***
Lnsize	-	-1.3658	11.69***
Lnage	-	-1.8986	-7.46***
F value	+	67.23***	
Sample size		3394	
Adj-R ²		0.1048	

Note. the significance levels of 0.01, 0.05, and 0.1, respectively, are for the values in parentheses, which are t-values.

Regression results are calculated by the author using the Stata software.

Using the method proposed by Whited and Wu to measure financing constraints, the coefficient of the WW index is -18.4565, which is significant at the level of 1%, which is consistent with the forecast, indicating that the company faces stronger financial constraints. For companies, the smaller the fluctuation in stock prices. In other words, when the financing constraints of enterprises are alleviated, due to the widespread phenomenon of excessive investment by enterprises (Rao Yulei et al., 2006; Tang Cedar et al., 2007; Wang Equal, 2009), they face risks. As the scale of the enterprise becomes larger, the intrinsic value of the enterprise is affected, thereby increasing the volatility of the company's stock price,

while maintaining the previous assumptions. The regression of control variables is as follows. The estimated coefficient of asset-liability ratio (DAR) is positive, but not significant, indicating that the company's financial leverage will not have a significant impact on stock price fluctuations. The return on asset (ROA) coefficient is significantly positive at the level of 1%, indicating that when the profitability of a company is stronger, the volatility of the company's stock price is greater, and when the profitability becomes better, the risk may be more Big. Overinvestment will eventually lead to greater fluctuations in the company's stock price. The estimated coefficient (Lnsiz) of the enterprise size is significantly negative at 1%, which indicates that the larger the enterprise size, the smaller the risk to the enterprise. The fixed asset ratio (FAR) coefficient is negative and significant at the level of 1%, indicating that when fixed assets account for a large proportion of total corporate assets, the corresponding proportion of current assets is

smaller, the The smaller the proportion of assets. The liquidity of an enterprise, the worse its ability to resist risks. The coefficient of the company's age (Lnage) is significantly negative, which means that the longer the company's time to market, the stronger its ability to deal with external shocks and the greater its ability to withstand risks, so the less volatile the stock price.

5 Robustness test

In order to verify the effective reliability of the results, this paper uses replacement financing constraint indicators, sub-sample regression and other means to carry out robustness testing, in which, sub-sample regression is carried out according to the enterprise size, market type and ownership standards, the results are shown in Tables 4 and 5.

Table3. Robustness test based on ownership and financing constraint indicators

	Ownership (1)			Replace the indicator (2)
	State	Non-state-owned		WW replaced with SA
Intercept items	5.7769 (2.83***)	23.5627 (10.97***)	Intercept items	25.6319 (2.3031***)
WW	-6.6280 (-2.12**)	-19.9681 (-7.35***)	SA	1.0095 (2.15**)
DAR	-1.2241 (-2.17**)	0.6384 (1.17)	DAR	0.2670 (0.77)
FAR	-2.4875 (-5.18***)	-3.0131 (-4.18***)	FAR	-3.0974 (-6.63***)
ROA	5.9983 (3.85***)	2.3595 (3.74***)	ROA	1.2646 (3.31***)
Lnsiz	-0.3341 (-1.94*)	-1.5657 (-10.42***)	Lnsiz	-0.5320 (-8.59***)
Lnage	-0.6587 (-1.78*)	-1.7773 (-5.41***)	Lnage	-2.2807 (-9.04***)
F value	14.54***	39.14***	F value	44.52
Sample size	1015	2379	Sample size	3394
Adj-R ²	0.0942	0.0878	Adj-R ²	0.0704

Note. the significance levels of 0.01, 0.05, and 0.1, respectively, are for the values in parentheses, which are t-values.

Regression results are calculated by the author using the Stata software.

5.1 Testing based on ownership

Table 3 (1) reports the results of regression by sample of the nature of the enterprise, which shows that the estimation coefficient of the WW index is negative, the same as the full sample regression results. The estimate coefficient of the assets-liability ratio (FAR) of state-owned enterprises and non-state-owned enterprises is different, but the results are not as significant as the full sample regression results, indicating that the company's financial leverage will not have a significant impact on stock price fluctuations. The estimation coefficient symbol and significance of other control variables are basically the same as the conclusions reached by full sample regression, which support the hypothesis of this paper.

5.2 SA Index Alternative WW Index

Given that there is only a small correlation between the SA index and the WW index, the SA index can effectively replace the WW index as a proxy variable for corporate financing constraints. Its advantage is that the size of the enterprise and the age of the enterprise are calculated by two less exogenous variables. When possible, try to avoid endogenous interference with test results. Therefore, this article uses SA instead of the WW index for regression. The SA index is negative, and the greater the absolute value, the more severe the financial constraints of the enterprise. Therefore, this paper expects that the sign of the SA index estimation coefficient is positive, ie, when the SA index is negative As the value gets smaller and smaller, more companies face financing constraints, the less the volatility of corporate stock prices and financing

constraints. As shown in Table3, the SA indicator is used as the model's regression explanatory variable into the model. From column (2), the coefficient of the financing constraint variable SA index is significantly positive at the level of 1%, indicating that when the company is subject

to financing constraints, the smaller the volatility of the company's stock price, the result is consistent using the WW index The regression results show that the core conclusion of this paper is not affected by the financing constraint index.

Table4. Robustness Test based on enterprise size and market type

	Size of the enterprise (1)		Market Type (2)		
	Big business	Smes	Shanghai	Shenzhen	GEM
Intercept items	16.8232 (10.13***)	28.31585 (9.56***)	17.9111 (8.93***)	9.2475 (5.13***)	38.3770 (5.85***)
WW	-18.8855 (-8.17***)	-16.8560 (-3.61***)	-12.3707 (-4.05***)	-15.6248 (-6.81***)	-26.2968 (-3.37***)
DAR	-0.2608 (-0.55)	0.2704 (0.31)	-0.5094 (-0.82)	-0.7162 (-1.60)	1.5289 (1.10)
FAR	-3.1479 (-6.21***)	-2.5218 (-2.49***)	-2.7018 (-4.45***)	-2.7586 (-5.37***)	-3.2702 (-1.55)
ROA	1.3726 (2.21**)	3.6471 (3.45***)	3.7826 (3.88***)	-0.0825 (-0.16)	4.6842 (2.72***)
Lnsize	-1.2560 (-9.76***)	-1.4609 (-5.85***)	-0.9592 (-5.87***)	-0.8796 (-6.53***)	-2.3315 (-5.18***)
Lnage	-1.4320 (-5.18***)	-3.0522 (-5.53***)	-1.7917 (-4.91***)	-0.6476 (-2.27**)	-3.3012 (-3.71***)
F value	42.15***	24.89***	28.80***	18.68***	11.88***
Sample size	2375	1019	1348	1317	729
Adj-R ²	0.0942	0.1234	0.1102	0.0788	0.0823

Note. the significance levels of 0.01, 0.05, and 0.1, respectively, are for the values in parentheses, which are t-values.

Regression results are calculated by the author using the Stata software.

5.3 Testing based on enterprise size

In this paper, according to the standard of division of large and medium-sized enterprises published by the National Bureau of Statistics in 2017, and the enterprise's operating income, total assets amount and the value range of employees, the enterprise is divided into large enterprises and small and medium-sized enterprises, the results of the sample regression are shown in Table 4 (1).

The regression results show that the coefficient of the WW index is significantly negative at the level of 1%. The DAR coefficients of large enterprises and SMEs are different, but not significant. The regression conclusion variables of other controls are the same as the entire sample regression. Therefore, the core assumption is still stable.

5.4 Testing based on market type

Finally, this paper adopts the market type classification standard in CSMAR Guotaian database, and divides the market type of the sample enterprises into three types. Shanghai, Shenzhen and GEM.

Table 4 (2) reported the results of sub-sample regression by market type, in which the regression of all market types of sample enterprises found that the WW index coefficient is significantly negative, and the asset-liability ratio (DAR) coefficient is not significant, consistent with the full sample regression results. The difference is that the estimated coefficient of the return on assets (ROA) of Shenzhen market is negative, but not significant, indicating that the profitability of Shenzhen

listed enterprises may have a significant impact on the volatility of the enterprise's share price; However, the above-mentioned regression results still support the core conclusion.

In summary, after the sample-based regression of the sample enterprises, the relevant influence mechanism is consistent with the above-mentioned empirical conclusions, thus indicating that the results of the study are more robust.

6 Conclusion

This article takes China's A-share non-financial listed companies in 2018 as a research sample and analyzes the impact of financing constraints on the fluctuation of corporate stock prices through empirical analysis. The results show that the negative financing constraint of the company affects the volatility of the company's stock price, that is, the smaller the volatility of the company's stock price when the company is subject to greater financing constraints. After replacing the financing constraint variables and dividing the firm size, ownership and market type by the sample firm, the conclusion is still valid.

The conclusion of this article enriches the literature on financing constraints and the fluctuation of corporate stock prices. At the same time, the conclusion of this article can provide a reference for listed companies, investors and relevant regulatory authorities. For listed companies, financing constraints can alleviate internal capital constraints, but if the funds are not used effectively, it will be counterproductive, thereby increasing the risk of corporate stock price stability. For investors, when choosing an enterprise to invest, in addition to paying

attention to the company's financial statements and conducting basic and technical analysis, you can also pay attention to the company's past investment status through a variety of channels to observe whether the company is over-invested or high Risky corporate investment activities. For the corresponding regulatory authorities, it is necessary to increase the construction of China's financial market, speed up the process of capital allocation marketization, improve the efficiency of external financing allocation of enterprises, and take measures to supervise excessive investment by enterprises. In order to avoid excessive investment by enterprises due to increased cash holdings and affect the stability of the entire financial market, that is, the regulatory department should strictly review the investment activities of enterprises, and at the same time reduce the difficulties of corporate financing constraints and promote enterprise development. The healthy development of the national economy.

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