

The Impact of Financial Leverage on Firm Performance – Based on the Moderating Role of Operating Leverage

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ABSTRACT

Risks and returns are two key considerations while firms make decision. Since Chinese economic environment is becoming more open, the diversity of finance is promoted; therefore, the studies on the impact of capital structure on firm operation and corresponding solutions are significant. There have been several researches focusing on this topic to find out the relationship between financial leverage and firm performance. This paper uses a sample of Chinese listed companies covering the period 2010-2019, to study the impact of financial leverage on firm performance, measured by return on assets (ROA). By using OLS and 2SLS methods to take linear regression, this research shows that the relationship between financial leverage and firm performance is significantly negative, while operating leverage positively moderates this relationship. In addition, by further researches, this study shows that the moderating role of operating leverage could be insignificant in real estate industry. This research is of certain significance for enterprises' financing decision-making and risk management. It suggests that high debts are harmful to a firm's performance, since it could introduce extra financial risks and agency costs; nonetheless, control the selling, general and administrative expense could be a good way to solve this problem. Based on all the researches above, some suggestions come up: Firstly, firms should maintain a proper capital structure. Moreover, management could adjust operating leverage to release the negative consequence of debt. Finally, real estate enterprises could afford higher financial leverage than other enterprises. At the end of this paper, the limitations of this paper are listed, and suggestions for future researches are put forward.

Keywords: *Capital structure, firm performance, operating leverage, moderating role*

1. INTRODUCTION

With the development of market economy in China, the entry threshold of the industry fell. Therefore, the scale of the industry continued to expand, making the competition of the industry become more and more fierce. This made enterprises increase demand for funds in the process of creation, production and operation. Before the 21st century, financial conservatism became a common phenomenon. Most firms preferred equity financing. However, after the opening of the market, equity financing has been unable to meet the needs of enterprises for a larger amount of capital. As a result, debt financing scale is increasing. Nevertheless, according to Choi and Richardson [1] the proportion of debt capital in enterprise assets will bring additional benefits and risks to the enterprise through the financial leverage effect, thus affecting the value of the company and performance of the company. Hence, understanding the impact of financial leverage on companies and making trade-offs is becoming increasingly important for Chinese companies.

Since both financial leverage and operating leverage are connected with firms' risks, firms often make a trade-off between them. Numerous cases have proved that it might not be enough for companies to focus only on financial leverage.

A comprehensive focus on operating leverage and financial leverage could enable a firm to better control the risks and quality of operation process.

Accordingly, this research chooses Chinese listed companies as a sample to test the relationship between financial leverage and firm performance. Furthermore, this research will test the moderating role of operating leverage on such relationship, which could help companies have a deeper understanding of financial leverage. If the results are significant, regulating operating leverage could be a new way to deal with the adverse effects of debt financing.

To research empirically on the relationship between financial leverage and firm performance, as well as the moderating effect of operating leverage, this paper takes the following steps, which will be explained in the following sections in detail. Section 2 will outline the literature review on the existing studies. Section 3 will list the hypothesis of this study. Section 4 will introduce the methodology and research design. Section 5 will show the specific empirical results and give an explanation. Section 6 will take robustness test and endogenous tests. Section 7 will research further based on industry-differences. Section 8 will give an evaluation of the research results, and suggest corresponding recommendations for future studies on this topic.

2. LITERATURE REVIEW

Since financial risk and performance are two vital areas of concern to enterprises, there have been a significant number of researches on these two topics. This part will give a brief review on the existing literatures from the following three aspects: the effects of financial leverage, factors influencing firm performance, the relationship between financial leverage and firm performance.

The existing literatures of financial leverage often focus on two aspects, risks and returns. Before 2010, risk was the main research direction of financial leverage. Hamada [2] analyzed 304 electric utility firms, and found that companies with high financial leverage tend to have more severe systematic risks, which would lead to high volatility of common stock price. However, recent researches on financial leverage have become more interested in the return of companies. The study of Ozdagli [3] found that high financial leverage could decrease the market beta of stock returns, which meant a negative correlation between financial leverage and stock returns. Besides, Obreja [4] suggested that operating leverage plays a moderating role in the negative relationship between financial leverage and equity risk premiums.

Firm performance has always been a core issue in academia. Many researches have studied different factors that affect firm performance. The study of Calantone et al. [5] analyzed the whole industry of America. They found a positive impact of learning orientation on firm performance, while innovativeness plays the role as a mediator in this relationship. Moreover, Wright et al. [6] suggested that the higher the quality of human resources management, the better the performance of the enterprise. These years, since people have become more concerned about corporate social responsibility (CSR), more studies have started to focus on the relationship between CSR and firm performance. Mackey et al. [7] found that investing in CSR activities could have different impacts on different aspects of corporate performance. The corporate market value could be promoted by taking more social responsibility, while the future cash flow might not change. Furthermore, Lins et al. [8] suggested that taking social responsibility could not only promote firms' profitability, but increase the firms' growth rate and employee efficiency at the same time.

There have been many researches on the topic of the relationship between firm performance and financial leverage; however, after summarizing these researches of domestic and foreign scholars, it could be found that the results of these literatures vary, while the majority of which are negative. The research of Sullivan [9] became a fairly early literature to find a negative correlation between financial leverage and firm performance; while there did exist the problem of not selecting random samples. Danis et al. [10] suggested that the relationship between financial leverage and corporate performance is negative on the whole. Nevertheless, when it is close to the optimal level of financial leverage, this relationship could be positive. There are also researches found positive relationship. The study of Xu [11] showed a positive correlation between financial leverage and firm performance using the data from America

manufacturing industry. Moreover, Campello [12] argued that the impact of financial leverage on firm performance follows a U-rate. Debt could be harmful, if the level of it is relatively high. This result is complied with the MM theory [13]. There are also a few researches focusing on the moderating effect of this relationship. However, most of these researches focused on the moderating role of firm size alone. Hamid et al. have contributed to such research. Besides, there are also few papers studying the moderating effect related to board. For example, Pham and Nguyen studied the moderating role of board size and board independence.

To sum up, the existing literatures mainly focused on two aspects and drew a series of practical and theoretical conclusions. However, from the literatures listed above, it can be seen that, although there have been several researches on the relationship between financial leverage and firm performance, studies on the moderating effect on the relationship are scarce and monotonous, since most researchers studied the moderating roles of corporate nature, while only few examined the effects of financial index and operating capacity. Hence, this research will study the impact of financial leverage on firm performance, taking into account of the moderating role of operating leverage, which could make up for the deficiency of existing literature.

3. HYPOTHESIS DEVELOPMENT

Although debt financing is deemed to be cheaper than equity financing, it doesn't always mean more debt leads to higher performance. There are mainly two reasons. Firstly, debt can bring financial risks to the operation process [2]. These financial risks may increase the agency problem in the firms. Secondly, debt can introduce extra agency costs to a firm [14]. To safeguard the return on investment, debtholders usually impose proviso on the debt agreement. This proviso can restrict a firm's future financing, followed by a future restriction on the firm's growth. These two drawbacks can make it difficult for firms to expand further. The studies of Danis et al. [10], Xu [11] and Sullivan [9] all found that the impact of financial leverage on firm performance is negative. Therefore, this study hypothesize that:

H1: there is a negative relationship between financial leverage and firm performance.

Operating leverage is positively related to a firm's systematic risk [15]. Since operating leverage and financial leverage can both lead to an increase in a firm's risk, firms usually balance between them [16]. This means there might exist a negative relationship between operating leverage and financial leverage. Based on the negative correlation between firm performance and financial leverage indicated in hypothesis 1, operating leverage may positively moderate the relationship between financial leverage and firm performance. The study of Chen, Harford and Kamara [17] argued that operating leverage plays a vital role in the negative relationship between capital structure and firm performance. Therefore, this study hypothesize that:

H2: operating leverage positively moderate the negative impact of financial leverage on firm performance.

4. SAMPLE SELECTION AND RESEARCH DESIGN

4.1. Sample Selection

The sample of this research is based on the data of all Chinese corporations listed in Shanghai Stock Exchange and Shenzhen Stock Exchange from 2010 to 2019. However, this research excludes any financial organizations and special treatment (ST) firms; in addition, this research also expunges data from all companies with incomplete information. After screening, this research obtains 10790 observations. In order to eliminate the disturbance of outliers, all variables have been winsorized at 1% and 99%. All data are obtained from a database named CSMAR. Moreover, analysis in this research is accomplished by three statistical analysis software named STATA 14.0, SPSS 19.0 and Eviews 8.

4.2. Variable Selection

4.2.1. Dependent variable

Most existing studies chose between Tobin' Q and return on assets (ROA) to measure a firm's performance. Tobin' Q uses a company's market value to represent performance, while ROA uses profit. Since the volatility of Chinese stock market is high while its efficiency is relatively low, the market value of Chinese firms may be turbulent; thus, it may cause bias if use Tobin' Q as the measurement of Chinese firms' performance. Hence, this study chooses ROA to determine the firm performance, which is consistent with Huang and Hilary [18] and Chen et al. [19]

4.2.2. Independent variable

Financial leverage is the measurement of a firm's financing decision between debt and equity [20]. This study uses the ratio of total debts to total assets to measure financial leverage, which follows the study of Franco et al. [21], Khurana and Wang [22], Weber and Yang [20], and Huang et al. [23].

4.2.3. Moderating variable

Operating leverage is used to measure the fixed costs level of a company. This study applies the ratio of sales, general and administrative expenses (SG&A) scaled by total assets, following the method used by Bustamante and Donangelo [24]. Selling and general expenses are two important items

influencing decision making; therefore, they are commonly used in calculating operating leverage. However, according to Wang et al., administrative costs account for a significant proportion in the total expenditure of a firm and might be omitted in decision making, which explains why this paper takes this factor into account when calculating operating leverage.

All variables mentioned above are shown in Table 1.

Table 1 Various variables and instructions

Variable type	Variable name	Variable definitions	Variable description
Dependent variable	ROA	Return on assets	Net income / ending total assets
Independent variable	FLEV	Financial leverage	(short-term debts + long-term debts) / ending total assets
Moderating variable	OLEV	Operating leverage	SG&A / ending total assets
Control variable	ASSET_GR	Asset growth	(ending total assets – beginning total assets) / beginning total assets
	CASH	Cash	Ending cash / ending total assets
	RET	Annual stock return	Net income / number of ordinary shares
	MVE	Market capitalization	The natural logarithm of market value of equity
	ACCRUAL	Accrual	Accruals / ending total assets
	BM	Book-to-market ratio	Ending total assets / market value
	SALE_GR	Sales growth	the percentage changes of sales form year t-1 to year t
	AGE	Firm age	Current year – the year of IPO+1
	YEAR	Year of data	2010-2019 are numbered as 0-9 respectively
	INDUSTRY	Industry of company	According to the China Securities Regulatory Commission's guidelines on corporate industry, the 18 industries are numbered as 1-18 respectively

4.2.4. Control variable

Following the studies of Chen et al. [19], Akbas et al. [25], Cohen and Li [26] and Dasgupta et al. [27], this study chooses eight control variables. They are asset growth, cash, return, market capitalization, accrual, book-to-market ratio, sales growth and age.

4.3. Model

In order to test the relationship between firm performance and financial leverage, this research uses the same model as the study of Kim and Lee [28]:

$$\begin{aligned}
 ROA_{it} = & \alpha_0 + \alpha_1 FLEV_{it} + \alpha_2 OLEV_{it} + \\
 & \alpha_3 ASSET_GR_{it} + \alpha_4 CASH_{it} + \alpha_5 RET_{it} \\
 & + \alpha_6 MVE_{it} + \alpha_7 ACCRUAL_{it} + \alpha_8 BM_{it} \\
 & + \alpha_9 SALE_GR_{it} + \alpha_{10} AGE_{it} + \alpha_{11} YEAR_t \\
 & + \alpha_{12} INDUSTRY_{it} + \varepsilon_{it}
 \end{aligned}
 \tag{1}$$

To test the moderating role of operating leverage on the relationship of firm performance and financial leverage, based on model 1, this research constructs model 2. To verify the moderating effect in hypothesis 2, there are mainly three conditions that should be met. Firstly, the coefficient on the interaction term FLEV*OLEV is negative. Secondly, the coefficient on the interaction term FLEV*OLEV is significant. Thirdly, the change in R-square is evident.

$$\begin{aligned}
 ROA_{it} = & \beta_0 + \beta_1 FLEV_{it} + \beta_2 OLEV_{it} \\
 & + \beta_3 FLEV_{it} * OLEV_{it} + \beta_4 ASSET_GR_{it} \\
 & + \beta_5 CASH_{it} + \beta_6 RET_{it} + \beta_7 MVE_{it} \\
 & + \beta_8 ACCRUAL_{it} + \beta_9 BM_{it} \\
 & + \beta_{10} SALE_GR_{it} + \beta_{11} AGE_{it} \\
 & + \beta_{12} YEAR_t + \beta_{13} INDUSTRY_{it} + \varepsilon_{it}
 \end{aligned}
 \tag{2}$$

In these models, ROA represents firm performance, FLEV represents financial leverage, and OLEV represents operating leverage. In addition, the other variables, which are ASSET_GR, CASH, RET, MVE, ACCRUAL, BM, SALE_GR, and AGE, all represents control variables.

There are three main reasons of using OLS and 2SLS models. Firstly, these linear regression models is more interpretable. If the experimental procedure is standard, the conclusion could be unique. Secondly, some models might be too costly to implement [29]. Using linear regression models could be more efficient. Thirdly, linear regression models are quite easy for understanding; accordingly, this paper takes these models as the main models to make it more attractive and accessible to decision makers.

5. EMPIRICAL RESULTS

5.1. Descriptive Statistics

Table 2 is a summary of the variables used in the research. ROA has a mean value of 0.0389 and a standard deviation of 0.0523. This means the profitability of Chinese firms is relatively good and stable. FLEV is ranged from 0.07 to 0.91, with a standard deviation of 0.2031, indicating the Chinese firms' financial leverage has significant differences. However, the mean value of FLEV is 0.4825, which means Chinese firms tend to have no obvious bias in the choice of debt and equity. The range of OLEV is 0.41 and it has a standard deviation of 0.0780. This shows that there is a distinct volatility in Chinese firms' fixed cost level. When it comes to control variables, the mean value of RET is 0.37, which is relatively high, showing Chinese listed companies have substantial returns. In addition, the range of AGE is only 17, since the China's market economy hasn't developed for too long. Therefore, the span of the company's founding time is relatively short. Other control variables, which are ASSET_GR, CASH, MVE, ACCRUAL and BM, are consistent with existing literature, and will not be restated.

Table 2 Summary of descriptive statistics

	N		Mean	Median	Std. Dev.	Min	Max
	Valid	Missing					
ROA	10790	0	0.0389	0.0300	0.0523	-0.1600	0.2000
FLEV	10790	0	0.4825	0.4900	0.2031	0.0700	0.9100
OLEV	10790	0	0.0884	0.0700	0.0780	0.0000	0.4100
ASSET_GR	10790	0	0.1167	0.0800	0.1916	-0.2600	0.9700
CASH	10790	0	0.1486	0.1200	0.1125	0.0100	0.5600
RET	10790	0	0.3704	0.2600	0.5150	-1.0000	2.6200
MVE	10790	0	15.8033	15.6800	1.0125	13.9100	18.8400
ACCRUAL	10790	0	0.0014	0.0000	0.0057	0.0000	0.0400
BM	10790	0	0.6405	0.6400	0.2638	0.1200	1.1700
SALE_GR	10790	0	0.1645	0.1000	0.4194	-0.5200	2.9100
AGE	10790	0	19.5978	20.0000	4.9530	11.0000	28.0000
YEAR	10790	0	4.50	4.50	2.87	0.00	9.00
INDUSTRY	10790	0	4.85	3.00	3.19	1.00	17.00

5.2. Empirical Results

5.2.1. Correlation analysis

This research uses Pearson correlation analysis to show the coefficients among each variables. The results of Pearson correlation analysis are illustrated in Table 3.

The Pearson coefficient between financial leverage (FLEV) and firm performance (ROA) is -0.392, and this relationship is significant at 1% level. This indicates that there is a significant negative relationship between financial leverage and firm performance, which verifies hypothesis 1 preliminarily. This verifies that the financial risks and agency costs caused by debt could be a significant problem for Chinese listed firms.

The Pearson coefficient between operating leverage (OLEV) and firm performance (ROA) is 0.221, and is significant at 1% level. This indicates that there is a positive relationship between operating leverage and firm performance. More specifically, Chinese firms could benefit from investing in selling and administration. These expenses could promote efficiency in daily operation.

The Pearson coefficient between operating leverage (OLEV) and financial leverage (FLEV) is -0.252, and is significant at 1% level. This indicates that there is a significant positive relationship between operating leverage and financial leverage. This result indicates that firms should balance between SG&A expenses and debt level, since both these two factors connect with financial risks. A firm could not have high operating leverage and high financial leverage at the same time.

5.2.2. Multicollinearity tests

Multicollinearity can lead to some bias, so that the regression models may be invalid. In order to avoid these bias, this research implements multicollinearity tests. The result of the multicollinearity tests is shown in Table 4. It can be seen that all VIF values are lower than 5, which indicates that the variables selection is good, since there is no multicollinearity.

5.2.3. Autocorrelation tests:

The autocorrelation problem would cause deviation to the least square method; thus affect the linear regression model. This paper takes autocorrelation tests on the selected sample. The D-W value on this paper's sample is 2.01, which indicates that there is not an autocorrelation problem.

5.2.4. Heteroscedasticity tests:

This paper uses White tests to examine the existence of heteroscedasticity. Since the p-values of all independent and control variables are less than 0.1, there is heteroscedasticity in the model; accordingly, the coefficients of regression model should be revised. The revised coefficients are shown in Table 4.

5.3. Regression Analysis

5.3.1. Financial leverage and firm performance

In order to test the impact of financial leverage on firm performance, this research takes financial leverage as the independent variable and ROA as the dependent variable to implement regression analysis. The regression result can be seen in Table 5.

The regression coefficient of FLEV and ROA is -0.264. In addition, the p-value is far less than 0.01, which means FLEV and ROA is significantly relevant at 1% level. This indicates that the impact of financial leverage on firm performance is negative and significant, which supports hypothesis 1. This suggests that the extra financial risks and agency problems caused by excess debt level could overweigh the low costs of debt, which might lead to poor financial performance. From the view of control variables, almost all of them are significant at 5% level. Thereinto, assets growth (ASSET_GR), cash (CASH), annual stock return (RET), market capitalization (MVE), sales growth (SALE_GR) are positively correlated with firm performance, while accrual (ACCRUAL), book-to-market ratio (BM), firm age (AGE) are negatively correlated.

Table 3 Correlation analysis

	ROA	FLEV	OLEV	ASSET_GR	CASH	RET	MVE	ACCRUAL	BM	SALE_GR	AGE	YEAR	INDUSTRY
ROA	1.00												
FLEV	-.392**	1.00											
OLEV	.221**	-.252**	1.00										
ASSET_GR	.256**	.046**	-.038**	1.00									
CASH	.295**	-.369**	.234**	.121**	1.00								
RET	.736**	-.122**	.131**	.283**	.184**	1.00							
MVE	.288**	.065**	-.047**	.183**	-.010	.440**	1.00						
ACCRUAL	-.053**	.065**	.042**	-.046**	-.010	-.020	.052**	1.00					
BM	-.247**	.457**	-.378**	-.040**	-.287**	-.033**	.042**	.021*	1.00				
SALE_GR	.185**	.052**	-.020*	.295**	.034**	.175**	.085**	-.010	-.010	1.00			
AGE	-.081**	.158**	-.078**	-.107**	-.053**	-.010	-.060**	.010	.108**	-.025*	1.00		
YEAR	-.077**	-.034**	-.010	-.152**	-.085**	.000	.190**	.027**	.158**	-.107**	.000	1.00	
INDUSTRY	-.010	.079**	-.126**	.058**	.094**	.000	-.020	-.053**	.055**	.048**	.158**	.000	1.00

Note: *, and ** denote 5%, and less than 1% significance levels, respectively

Table 4 Multicollinearity tests

Model	Coefficient	T-value	P-value	VIF
(Constants)		7.270	0.000	
FLEV	-0.264	-38.456	0.000	1.491
OLEV	0.038	6.061	0.000	1.257
ASSET_GR	0.042	6.716	0.000	1.245
CASH	0.034	5.277	0.000	1.275
RET	0.659	97.474	0.000	1.443
MVE	0.019	2.900	0.004	1.369
ACCRUAL	-0.021	-3.728	0.000	1.018
BM	-0.068	-9.909	0.000	1.483
SALE_GR	0.060	10.153	0.000	1.117
AGE	-0.014	-2.348	0.019	1.076
YEAR	-0.062	-10.323	0.000	1.136
INDUSTRY	0.009	1.560	0.119	1.073

Note: ROA is dependent variable

5.3.2. The moderating role of operating leverage on the relationship between financial leverage and firm performance

The previous paragraph has verified that α_1 is significant, while this paragraph will try to verify the significance of β_3 in model 2. The regression result can also be seen in Table 5. Model 2 represents the result of including operating leverage in the regression equation, which is the key step to verify the moderating role of operating leverage. The results show that the regression coefficient of the interactive item (FO) is -0.067, which satisfies the first condition of the moderating effect. Since the p-value is far less than 0.01, this relationship is significant at 1%. This supports the second condition of moderating effect. In addition, the p-value of R-square change of model 2 is far less than 0.01, which indicates that the moderating role exists, which satisfies the third condition of moderating effect. It can be seen that α_1 in model 1 is -0.264, while being -0.272 in model 2. This indicates that operating leverage positively moderates the negative correlation between financial leverage and firm

performance, which supports hypothesis 2. This suggests the idea that high level of costs and expenses could accentuate the negative correlation between debt level and financial performance. This could be explained since high expenses would introduce financial risks for enterprise, and could cause more pressure when dealing with the financial risk caused by high debt; therefore, the negative effect of financial leverage on firm performance could be more serious.

6. ROBUSTNESS TESTS AND ENDOGENOUS TESTS

In order to ensure the reliability of the regression result, this paper uses two approaches for robustness tests: (1) instrumental variable approach to take endogenous tests. (2) an alternative variable to take regression analysis to see whether the result is the same.

6.1. Instrumental Variable Approach

This paper uses Stata to take Hausman test, which aims at verifying whether there is an endogenous. The result shows that the p-value is below 0.01, which indicates that there exists an endogenous. Hence, further research should be taken to solve this problem. This research uses the instrumental variable approach. It uses the average industrial financial leverage as an instrument for financial leverage [30], and takes 2SLS.

Table 6 shows the results. After using the average industry financial leverage (AFLEV) as the instrumental variable of firm performance, the research finds that the negative relationship between firm performance and financial leverage is still significant. This suggests that the result has robustness.

Table 5 Regression analysis

Model	1				2			
	Coefficient	T-value	P-value	VIF	Coefficient	T-value	P-value	VIF
(Constants)		7.270	0.000			8.010	0.000	
FLEV	-0.264	-38.456	0.000	1.491	-0.272	-39.651	0.000	1.506
OLEV	0.038	6.061	0.000	1.257	0.022	3.488	0.000	1.317
ASSET_GR	0.042	6.716	0.000	1.245	0.041	6.546	0.000	1.245
CASH	0.034	5.277	0.000	1.275	0.034	5.363	0.000	1.275
RET	0.659	97.474	0.000	1.443	0.658	97.972	0.000	1.443
MVE	0.019	2.900	0.004	1.369	0.015	2.363	0.018	1.372
ACCRUAL	-0.021	-3.728	0.000	1.018	-0.014	-2.473	0.013	1.030
BM	-0.068	-9.909	0.000	1.483	-0.072	-10.610	0.000	1.488
SALE_GR	0.060	10.153	0.000	1.117	0.059	10.011	0.000	1.117
AGE	-0.014	-2.348	0.019	1.076	-0.009	-1.498	0.134	1.082
YEAR	-0.062	-10.323	0.000	1.136	-0.063	-10.543	0.000	1.137
INDUSTRY	0.009	1.560	0.119	1.073	0.005	0.788	0.431	1.078
FO					-0.067	-11.517	0.000	1.081

Note: ROA is dependent variable

Table 6 Instrumental variable approach

Dep. Var	First Stage	Second Stage	Second Stage
Instrument	0.6342** (30.5848)		
FLEV		-0.0479** (-7.7197)	
OLEV			0.0151** (3.4694)
FO			-0.2200** (-10.6021)
ASSET_GR	0.0903** (10.1652)	0.0096** (5.2688)	0.0104** (5.7522)
CASH	-0.4246** (-28.7780)	0.0248** (6.1612)	0.0196** (4.8444)
RET	-0.0609** (-17.3932)	0.0681** (88.5002)	0.0674** (87.8307)
MVE	0.0228** (12.9527)	0.0005 (1.3814)	0.0006 (1.6674)
ACCRUAL	2.3280** (8.5491)	-0.2342** (-4.3473)	-0.1482** (-2.7408)
BM	0.2374** (36.7145)	-0.0193** (-8.7673)	-0.0168** (-7.5743)
SALE_GR	0.0188** (4.8559)	0.0071** (9.4537)	0.0072** (9.6681)
AGE	0.0038** (11.8781)	-0.0002** (-3.4831)	-0.0001 (-1.9395)
Constant	-0.3201** (-10.9192)	0.0417** (7.4628)	0.0445** (8.0429)
R-squared	0.3828	0.6544	0.6618

Note1: *, and ** denote 5%, and less than 1% significance levels, respectively. Note2: the figures in brackets are t-value.

6.2. Robustness Tests With Alternative Measures

This research uses ROE instead of ROA as a measurement of firm performance, and uses debt to equity ratio to represent financial leverage [31]. ROE is defined as: net income / ending total equity. Debt to equity ratio is defined as: long-term debt / ending total equity. Using these two new variables, this research takes regression analysis again. The results are shown in Table 7. The results have not changed after replacing the variables; accordingly, the results of this paper are robust.

7. ADDITIONAL ANALYSIS

This study has led to some consequential findings; furthermore, this study will take some further researches to find whether there are any differences by dividing the sample into different industries.

Different industries should have different abilities and preferences to debt finance; therefore, their sensitivities to debt should also be different. Since manufacturing, real estate, and retail industries are three largest industries in China, this research will divide the origin samples based on these three industries and take regression analysis. The results can be found in Table 8. The results of manufacturing industry and retail industry is still significant, while that of real estate industry is slightly different. For real estate industry, the negative relationship between financial leverage and firm performance is still significant, while the moderating role of operating leverage is not. Since the assets of real estate industry is absolutely expensive, the demand for capital is high. Equity financing is limited for expansion; accordingly, real estate industries need to borrow to keep expanding and growing. Thus, the benefits of debt in real estate industries could be larger than other industries. Hence, it could not be so meaningful to control the negative effects of debt financing by adjusting operating leverage.

Table 7 Robustness tests with alternative measures of firm performance

Model	1				2			
	Coefficient	T-value	P-value	VIF	Coefficient	T-value	P-value	VIF
(Constants)		3.165	0.002			3.692	0.000	
FLEV	-0.058	-7.716	0.000	1.346	-0.150	-12.420	0.000	3.484
OLEV	0.000	-0.051	0.959	1.295	-0.053	-5.816	0.000	2.004
ASSET_GR	0.058	8.016	0.000	1.237	0.058	8.106	0.000	1.237
CASH	0.012	1.727	0.084	1.209	0.009	1.287	0.198	1.212
RET	0.688	88.245	0.000	1.436	0.682	87.602	0.000	1.444
MVE	-0.010	-1.251	0.211	1.379	-0.009	-1.121	0.262	1.379
ACCRUAL	-0.011	-1.674	0.094	1.015	-0.001	-0.224	0.823	1.038
BM	-0.038	-5.033	0.000	1.371	-0.039	-5.131	0.000	1.371
SALE_GR	0.064	9.247	0.000	1.115	0.062	9.127	0.000	1.115
AGE	-0.001	-0.156	0.876	1.060	0.003	0.476	0.634	1.064
YEAR	-0.055	-8.051	0.000	1.120	-0.056	-8.152	0.000	1.120
INDUSTRY	0.042	6.155	0.000	1.083	0.036	5.288	0.000	1.092
FO					-0.109	-9.706	0.000	2.996

8. CONCLUSION

This research conducts analysis on a sample of 1079 Chinese listed companies for the period of 2010-2019, to test the impact of financial leverage on firm performance, and the moderating role of operating leverage on this relationship. The results indicate that higher financial leverage could adversely impact firm performance. By using different measurements of firm performance, and average industrial financial leverage as an instrument variable for financial leverage to take robustness tests, this study establishes a plausible relationship between financial leverage and firm performance. These results are compiled

with those of most scholars, that financial leverage and firm performance are negatively correlated. Besides, there are also many scholars arguing that there exists an optimal debt level, and the relationship could be U-rate. This is quite different from this paper’s findings, since no such optimal debt level was found in the sample of this paper, because the financing strategies of most Chinese firms tend to be conservative, which might influence the decision-making; therefore, the negative impacts of more debts could be higher for Chinese firms. In addition, by distinguishing the industries, this study produces further results that, in real estate industry, the moderating role of operating leverage might be insignificant. This is a result of high demand of funds and high return on assets, which could offset the extra costs of debts.

Table 8 Regression analysis of dividing into manufacturing, real estate, and retail industry

Model	Manufacturing industry				Real estate industry				Retail industry			
	Coefficient	T-value	P-value	VIF	Coefficient	T-value	P-value	VIF	Coefficient	T-value	P-value	VIF
1 (Constants)		3.407	0.001			7.070	0.000			4.044	0.000	
FLEV	-0.217	-24.450	0.000	1.552	-0.343	-10.528	0.000	1.664	-0.343	-12.006	0.000	1.428
OLEV	0.077	10.041	0.000	1.173	-0.114	-3.799	0.000	1.419	-0.062	-2.359	0.019	1.197
ASSET_GR	0.048	5.945	0.000	1.309	-0.031	-1.113	0.266	1.223	0.027	1.024	0.306	1.237
CASH	0.049	6.059	0.000	1.288	0.228	8.179	0.000	1.212	0.098	3.818	0.000	1.160
RET	0.660	73.594	0.000	1.586	0.599	18.483	0.000	1.646	0.612	22.427	0.000	1.304
MVE	0.026	2.987	0.003	1.486	-0.153	-4.628	0.000	1.720	-0.019	-0.707	0.480	1.328
ACCRUAL	-0.041	-5.619	0.000	1.037	-0.067	-2.556	0.011	1.074	0.032	1.284	0.200	1.067
BM	-0.051	-6.095	0.000	1.384	-0.031	-0.928	0.354	1.706	-0.087	-3.065	0.002	1.402
SALE_GR	0.062	8.094	0.000	1.156	0.075	2.899	0.004	1.058	0.040	1.562	0.119	1.124
AGE	-0.034	-4.531	0.000	1.096	0.000	0.008	0.993	1.078	-0.040	-1.600	0.110	1.111
YEAR	-0.045	-5.820	0.000	1.163	-0.106	-3.887	0.000	1.167	-0.113	-4.196	0.000	1.264
N		6040				820				780		
2 (Constants)		4.078	0.000			7.233	0.000			4.165	0.000	
FLEV	-0.219	-24.886	0.000	1.553	-0.328	-9.619	0.000	1.818	-0.363	-12.478	0.000	1.497
OLEV	0.060	7.642	0.000	1.249	-0.170	-3.674	0.000	3.339	-0.058	-2.212	0.027	1.200
ASSET_GR	0.049	6.107	0.000	1.309	-0.034	-1.227	0.220	1.230	0.023	0.858	0.391	1.240
CASH	0.049	6.157	0.000	1.288	0.234	8.327	0.000	1.237	0.101	3.956	0.000	1.162
RET	0.662	74.300	0.000	1.588	0.601	18.542	0.000	1.648	0.612	22.538	0.000	1.304
MVE	0.021	2.462	0.014	1.492	-0.162	-4.822	0.000	1.763	-0.019	-0.695	0.487	1.328
ACCRUAL	-0.033	-4.603	0.000	1.051	-0.065	-2.494	0.013	1.075	0.040	1.624	0.105	1.079
BM	-0.055	-6.651	0.000	1.389	-0.043	-1.272	0.204	1.805	-0.088	-3.110	0.002	1.402
SALE_GR	0.061	8.003	0.000	1.156	0.074	2.857	0.004	1.059	0.040	1.578	0.115	1.124
AGE	-0.032	-4.375	0.000	1.097	0.002	0.090	0.929	1.081	-0.042	-1.671	0.095	1.112
YEAR	-0.044	-5.821	0.000	1.163	-0.108	-3.953	0.000	1.169	-0.115	-4.299	0.000	1.265
FO	-0.064	-8.720	0.000	1.079	-0.067	-1.577	0.115	2.823	-0.079	-3.177	0.002	1.093
N		6040				820				780		

This paper contributes to the literatures that suggest the preference of debt finance could have an impact on firm performance. The above research results could have at least the following policy implications. Firstly, a firm should maintain appropriate financial leverage, which could not only reduce the financial risks that the firm should bear, but also promote a firm's performance. Secondly, for listed companies that does not have easy access to equity finance, they could reduce the level of operating leverage to promote firm performance indirectly. Thirdly, for real estate enterprise, since they could get more benefits from high debt finance, it might be costly to control the drawbacks of debt just by adjusting operating leverage.

However, the results are subject to some limitations. Firstly, since this paper is a relatively frontier literature that studies the moderating role of operating leverage on the relationship between financial leverage and firm performance, it uses a sample of the whole industries in China to take analysis. Nevertheless, firm with different size should have different properties. It might be biased to study the whole industries. Therefore, future studies could make more specific distinct according to firm size to take further researches. Secondly, this research does not consider the impact of macroeconomic events on the results. Some macroeconomic events could influence a firm's financing decision, which may further influence the results of this study. For example, in 2013, China stepped up efforts to fight corruption. In 2018, trade frictions between China and America began. Future researches could consider and try to exclude these effects.

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