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The Influence of the Combination of "Industrial and Financial" on the Investment Efficiency and Financial Constraints of Listed Companies

—A Research Based on Holding Non-Listed Financial Institution of Listing Corporations in China

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Abstract

This paper conducts an empirical analysis based on the unbalanced panel data of China's A-share non-financial listed companies in 2011-2016, and uses Richarson's residual error measurement model to study the influence of the integration of industrial and financial on investment efficiency. To explore the mechanism of the integration of industrial and financial on investment efficiency, this paper further uses a cash-cash flow sensitivity model to study the influence of the integration of industrial and financial on financing constraints. Results show that the integration of industrial and financial can improve the investment efficiency of listed companies. The integration of industrial and financial can mitigate underinvestment by mitigating financing constraints.

Keywords

Underinvestment, Overinvestment, Financial Constraints

1. Introduction

Modiglinai and Miller [1] assumed that in a perfect market without the influence of transaction costs, income tax and other factors, the company's internal financing and external financing can be mutually replaced, and in this perfect market, the company's financing behavior will not affect the investment behavior. However, in real life, the above-mentioned perfect market does not exist. Myers and Majluf [2] found that the existence of information asymmetry makes

the external financing cost of the enterprise greater than the internal financing cost. The internal and external financing of the enterprise cannot be completely replaced due to the difference in financing costs, resulting in financing constraints. The investment behavior of enterprises will be restricted by financing constraints. When enterprises face good investment opportunities, due to higher external financing costs and limited internal funds, companies do not have enough funds to invest in projects with NPV greater than 0, resulting in a loss of investment efficiency.

In the context of financing difficulties, more and more Chinese enterprises attach importance to the rather fashionable development path of integration of industrial and financial and put it into practice. The regulatory attitude of the national supervisory authorities on the integration of industrial and financial has changed from the earliest prohibition to explicit encouraging and supporting.

The integration of industrial and financial means the combination of industrial capital and financial capital with equity relations, through the shareholding, controlling and personnel relations, etc. The integration of industrial and financial can be divided into two forms: "from industrial to financial" and "from financial to industrial". In China, the Law of the People's Republic of China on Commercial Banks explicitly prohibits commercial banks from investing in industries; it is difficult for bank capital to integrate industrial capital. Therefore, the most popular method of the integration of industrial and financial at present is that industrial capital invests in financial institutions through equity participation, controlling, etc. With the relaxation of policy, the behavior of listed companies holding equity in financial institutions becomes increasingly common. By the end of 2011, there were 437 A-list non-financial listed companies holding equity in unlisted financial companies. By the end of 2016, this number has increased to 581. The purpose of this paper is to explore the impact of holding equity in non-listed financial institutions to listed companies' investment efficiency and financing constraints, so as to reveal the mechanism by which the integration of industrial and financial affects corporate value.

The contributions of this article are as follows: Theoretically, this paper examines the effect of shareholding in financial institutions on under/over investment and financing constraints by the industrial companies from a brand-new and practical significance perspective, which enriches the theoretical knowledge of corporate investment efficiency. Practically, the results of this study indicate that shareholding in financial institutions reduces financial constraints for companies and reduce underinvestment and improves investment efficiency of the companies, which has certain reference significance for industrial enterprises about how to make better use of the combination of industrial and financial to improve the allocation efficiency of funds.

The following parts of this paper are organized as follows: The second part is the theoretical analysis and literature review; the third part is the research design; the fourth part is the regression results and analysis; the fifth part is the re-

search conclusions.

2. Theoretical Analysis and Literature Review

The financing constraint theory and agency theory of investment efficiency mainly use capital as a carrier to examine the investment behavior of enterprises. The financing constraint theory mainly focuses on the availability of funds, and examines the impact of factors such as information asymmetry on the underinvestment of enterprises. The agency theory mainly focuses on the use of funds, to examine the influence of agency problems between managers and shareholders on the excessive investment of the company. At present, credit funds are still an important source of external financing for Chinese enterprises. The convenience of enterprises in obtaining credit funds has an important impact on investment efficiency. Based on the existing research, the theoretical analysis of this paper focuses on the mechanism by which the behavior of the listed company holding financial institution facilitates corporate credit financing, and the effect of this mechanism on corporate investment efficiency.

2.1. The Integration of Industrial and Financial and the Financing Constraints

Why do companies choose to hold financial institutions? It may be related to the widespread financing constraints of Chinese companies. Compared with developed countries, China's capital market still needs to be improved and the financing channels and tools are relatively monotonous, leading to widespread external financing constraints of Chinese enterprises, it also causes credit financing of financial institutions to become the main source of external financing for enterprises. The existing researches generally believe that corporates shareholding in financial institutions can mitigate the financing constraints they face.

Deng Jianping & Zeng Yong [3] found that financial correlation can effectively alleviate the financing constraints of enterprises, especially private enterprises, and found that in areas with low level of financial marketization, the mitigation effect of such financing constraints is more significant. Chen Dong & Chen Yunsen [4] studied the influence of the behavior of listed companies holding banks on their financing constraints from the perspective of cash management and found that establishing equity linkages with banks can reduce information asymmetry between banks and enterprises and reduce the impact of uncertainty in the external macroeconomic environment on liquidity of companies. Guo Mu xuan & Liao Hui [5] took the listed private enterprises in 2006-2010 as the research object and studied whether the level of financing constraints of the companies before and after holding equity in banks found significant changes, they found that the financing constraints of private enterprises been effectively mitigated after holding banks equity. Zhang Xiaomei et al. [6] took the small and medium-sized listed companies in China as the research object, and studied the mitigation effect of intimate bank-enterprise relations on financing constraints

of small and medium-sized listed companies, the empirical results show that the close relationships between bank and enterprise can effectively reduce the degree of financing constraints of small and medium-sized listed companies. Zeng Haijian & Lin Ling [7] used the data of listed company holding banks to investigate how Chinese companies seek financing convenience, and found that holding non-listed banks enables companies to obtain more external debt financing, and their financing constraints have been effectively mitigated while holding listed banks do not have similar effects. Wan Liangyong *et al.* [8] found that companies holding equity in banks have less financing constraints than companies that do not hold equity in banks, they also found that compared with state-controlled enterprises, large-scale enterprises, and companies with low levels of industry competition, the mitigation effect of financing constraints is even more pronounced in privately controlled enterprises, small-scale enterprises, and enterprises with higher industry competition. Guo Gaodi [9] used the cash-cash flow sensitivity model to examine the effects of the combination of production and finance by holding financial companies on the financing constraints of listed companies, they found that holding equity in financial institutions can alleviate the financing constraints of listed companies.

Information asymmetry is an important reason why it is difficult for Chinese enterprises to obtain credit financing. Enterprises that have poor operating prospects may disguise themselves as high-quality enterprises with better prospects when applying for credit financing from financial institutions. In mature financial markets, sophisticated rating and audit institutions can assess the quality and operating prospects of companies to provide information for fund providers and reduce information asymmetry between them. However, the infrastructure of the Chinese financial system is still not perfect, and the credit system still needs to be improved. Although China's credit rating agencies have made preliminary development, they have a large gap in terms of personnel, technology, and business scope with global rating agencies. As a result, the information asymmetry between financial institutions and enterprises is more serious in China, and it is more difficult for enterprises to obtain credit funds. Under this background, holding financial institutions' equity will undoubtedly ensure the stable supply of corporate credit funds and reduce the uncertainty caused by the company's capital dependence, which is of great significance for the development of the company. The mechanisms of mitigating companies' financing constraints by holding financial institutions's equity are as follows.

1) Information effect

The information effect of holding shares of financial institutions will act on the financing constraints of the enterprise from the following three aspects:

a) Communication effect of information

Companies can establish formal financial relationships with financial institutions by holding shares in financial institutions, which can help companies broaden the channels of information exchange between enterprises and financial

institutions, enabling financial institutions to understand the situation of enterprises timely, thereby reducing information asymmetry. Wren & Storey [10] studied the causes of the combination of industry and finance in Europe from the perspective of information asymmetry; they found that the underdeveloped capital markets and the information asymmetry between financial institutions and potential borrowers are the causes of the combination of industry and finance. After the combination of industry and finance, financial institutions such as banks can more quickly and effectively understand the business status of the company, which can prevent the adverse selection problem and the moral hazard problem, making banks more willing to provide funds to these companies, thereby alleviating companies' financing constraints.

b) The cost effect of information

In order to prevent the moral hazard of enterprises after lending, banks usually need to pay high costs to monitor the use of the loan funds by enterprises and monitor their credit risks. After the combination of industrial and financial, the strengthening of information exchange between banks and enterprises will greatly save the supervision costs of banks [11], which will help strengthen the banks' willingness to issue loans to enterprises and lower the bank's credit interest rate, thus alleviating corporate financing constraints.

c) The transmission effect of information

Enterprises can enter into the financial sector through holding shares of financial institutions, which can help companies establish a good image in the capital market, pass a positive signal of good corporate development to other financial institutions, and enhance their reputation in the credit market. Huang Xiaolin *et al.* [12] established a signal transmission model for credit markets and believed that enterprises can pass the signals of strong funds capital and strong solvency through shareholding in banks to obtain more funds. Furthermore, the related banks can provide implicit guarantees for companies and strengthen their credit ratings, so that the enterprises can reduce the financing costs and increase the availability of funds when competing for other external financing [3].

2) Decision effect

When an enterprise holds a certain proportion of the equity of a financial institution, the enterprise may send a director to the board of directors of the financial institution. The directors from the company can influence the credit decisions of the financial institution, making it easier for the company to obtain related loans, thereby alleviating the financing constraints of the company.

Based on the above analysis, this paper proposes the following assumptions:

Hypothesis 1: The listed companies can mitigate their financing constraints by holding financial institutions' equity.

2.2. Integration of Industrial and Financial and Investment Efficiency of Enterprises

So far, few scholars have studied the effect of holding financial institutions' eq-

uity on corporate investment efficiency. Zhai Shengbao *et al.* [13] studied the impact of bank-enterprise associations on corporate investment efficiency; they found that bank-enterprise associations help to increase the investment efficiency of private listed companies. Li Weian & Ma Chao [14] studied the non-financial listed companies in China from 2006 to 2010, and examined the impact of the combination of industrial and financial on corporate investment efficiency, they found that the combination of industrial and financial has the dual effect of reducing underinvestment and aggravating overinvestment. Luo Fuyan [15] found that close bank-enterprise relationships can increase the amount of loans that companies can obtain, which can significantly reduce corporate underinvestment, but cannot significantly affect corporate overinvestment. Qu Jin & Gao Shenghao [16] also reached the same conclusion, arguing that financial relatedness will not increase the overinvestment of enterprises, but it can reduce underinvestment of enterprises, thus improve the investment efficiency of enterprises.

Referring to existing studies [17] [18] [19], this paper examines the investment efficiency of companies from the perspective of underinvestment and overinvestment.

In the area of underinvestment, the Financing Constraints Theory argues that the lack of funds due to asymmetric information is an important reason for underinvestment [2] [20]. Many studies have found that the lack of financial resources will lead to underinvestment. The combination of industrial and financial by holding financial institutions provides enterprises with the convenience of obtaining credit funds and can reduce the underinvestment caused by the shortage of funds.

In terms of overinvestment, holding financial institutions may lead to corporate overinvestment. On the one hand, companies generally have the impulse of overinvestment. In recent years, China's economy has developed rapidly. Enterprises often accelerate their own expansion when the economy is good. When companies are more likely to obtain credit funds, the more resources that are used to expand investment, the easier it will be for corporate overinvestment [21]. On the other hand, good financing expectation of companies holding financial institutions is expected to promote overinvestment. As mentioned earlier, holding financial institutions' equity provides enterprises with the convenience of obtaining credit funds, and it can be reasonably inferred that as long as the company still holds financial institutions' equity, this convenience will last in the foreseeable period of time. Therefore, the company will have good expectations for obtaining credit funds during this period. There is no need to worry about the lack of credit funds due to the large scale of investment, or the lack of follow-up funding to encourage companies to continue to expand the scale, resulting in overinvestment.

Based on the above analysis, this paper proposes the following assumptions:

Hypothesis 2a: Through holding financial institutions, the listed companies

can mitigate their underinvestment;

Hypothesis 2b: Through holding financial institutions, the listed companies also increase their overinvestment.

3. Research Design

3.1. The Model of Holding Financial Institutions and Enterprises' Financing Constraints

Almeida, Campello, and Weisbach proposed cash-cash flow sensitivity model in 2004 to study corporate financing constraints. This model has been widely used by many Chinese scholars to explain the financing constraints of Chinese companies [22]-[27], confirming its applicability in China. Therefore, this paper selects the cash-cash flow sensitivity model proposed by Almeida *et al.* [28] as the model for examining the financing constraints in this paper. The specific model is as follows:

$$\Delta Cash_{i,t} = \beta_0 + \beta_1 CF_{i,t} + \beta_2 Size_{i,t} + \beta_3 Q_{i,t} + \beta_4 Exp_{i,t} + \beta_5 Nwc_{i,t} \\ + \beta_6 SDebt_{i,t} + \sum Year\_D + \sum Industry\_D + \varepsilon_{i,t} \tag{1}$$

where $\Delta Cash$ represents the change in cash holdings, which is equal to the increase in cash and cash equivalents of the company for the year divided by the total assets at the beginning of the period; CF is the ratio of net cash flow generated from operating activities to total assets at the beginning of the period; $Size$ is the size of the company, which is equal to the natural logarithm of the total assets of the company at the end of the period; Q is an investment opportunity, measured by the growth rate of operating income; Exp represents capital expenditure, which is the ratio of the company's expenditure on the purchase of fixed assets, intangible assets and other long-term assets to the total assets at the beginning of the year; Nwc represents the change in net working capital, which is equal to the ratio of the increase in net working capital for the year to the total assets at the beginning of the year, net working capital equals liquid assets minus current liabilities; $Sdebt$ is the amount of current liabilities, which is equal to the ratio of current liabilities of the company to the total assets at the beginning of the period; $Year\_D$ is the time effect and $Industry\_D$ is the industry effect.

In model (1), the coefficient β_1 before the operating cash flow CF is called the cash-cash flow sensitivity coefficient, which is used to measure the level of financing constraints of enterprises. Almeida *et al.* [28] believed that the more financing constraints companies faced, the higher external financing costs due to information asymmetry, and in order to meet the needs of future investment, companies are more inclined to accumulate cash through internal financing and retain a greater proportion of cash assets in cash flow from operating activities, as a result, the change in cash holdings is more dependent on the source of internal financing—the cash flow from operating activities. Therefore, for companies facing financing constraints, the cash-flow sensitivity coefficient before the operating cash flow CF is expected to be positive, and the greater the cash-flow-cost

sensitivity coefficient, the more serious the financing constraints.

This paper firstly uses the model (1) to test whether China's enterprises are facing financing constraints and then examines the impact of holding unlisted financial institutions on their financing constraints, and builds a model (2), that is, adding the interaction item of the cash flow *CF* and the shareholding financial institution *Fin* to model (1), this variable represents the effect of holding unlisted financial institutions on the increase of cash-cash flow sensitivity, that is, the increment of financing constraints. If the coefficient of the interaction item β_2 is significantly negative, holding nonlisted financial institutions may have a mitigation effect on the financing constraints of the company. The specific model is as follows:

$$
\begin{aligned}
\Delta Cash_{i,t} = \beta_0 &+ \beta_1 CF_{i,t} + \beta_2 Fin_{i,t} * CF_{i,t} + \beta_3 Size_{i,t} + \beta_4 Q_{i,t} + B_5 Exp_{i,t} \\
&+ \beta_6 Nwc_{i,t} + \beta_7 SDebt_{i,t} + \sum Year\_D + \sum Industry\_D + \varepsilon_{i,t}
\end{aligned}
\tag{2}
$$

where *Fin* is the dummy variable, when the ratio of the listed company holds an unlisted financial institution's shares greater than 5%, it is 1, otherwise it is 0. *Fin*CF* is the interaction term of the variable *CF* and the dummy variable Fin.

3.2. The Model of Holding Financial Institutions and Enterprises' Investment Efficiency

In order to study the influence of holding financial institutions' equity on enterprises investment efficiency, this paper uses the Richardson residual measurement model. Firstly using model (3) to calculate the expected investment level of companies:

$$
\begin{aligned}
I_{i,t} = \alpha_0 &+ \alpha_1 Growth_{i,t-1} + \alpha_2 Lev_{i,t-1} + \alpha_3 Cash_{i,t-1} + \alpha_4 Age_{i,t-1} + \alpha_5 Size_{i,t-1} \\
&+ \alpha_6 Ret_{i,t-1} + \alpha_7 I_{i,t-i} + \sum Year\_D + \sum Industry\_D + \varepsilon_{i,t}
\end{aligned}
\tag{3}
$$

where *I* represents the company's new investment, which is equal to (Cash purchased from fixed assets, intangible assets and other long-term assets in year *t* + Net cash paid by subsidiaries and other operating units in year *t* − The disposal of fixed assets, intangible assets and other long-term assets in *t* Net cash − Net cash received from disposal of subsidiaries and other business units in year *t*)/Total assets at the beginning of year t; *Growth* is the investment opportunity, measured by the growth rate of operating income ; *Lev* is the asset-liability ratio; *Cash* is the cash the company holding, which equals to beginning currency funds divided by beginning total assets; *Age* is the company's years listing, *Size* is the size of the company, which is equal to the natural logarithm of the ending total assets of the company; *Ret* is the previous year's stock yield; *Year_D* represents time effects and *Industry_D* represents industry effects.

The first step of the Richardson residual measurement model is to calculate the expected new investment amount for company i in year t based on the estimation results of the above models, and then calculate the model's residual value, which is the actual amount of new investment of the company minus the expected new investment amount. The difference is used as a proxy variable to

measure the efficiency of corporate investment. The residual is positive for over-investment, expressed by $OI_{i,t}$; the residual is negative for underinvestment, expressed by $UI_{i,t}$, and the absolute value of $OI_{i,t}$ is taken in the regression test; while the absolute value of the residual is used to represent the investment efficiency of the company, denoted by $AI_{i,t}$.

Then models (4)-(6) are used to test the effect of shareholding in financial institutions on the investment efficiency of enterprises. The specific models are as follows:

$$UI_{i,t} = \alpha_0 + \alpha_1 Fin_{i,t} + \alpha_2 Control_{i,t-1} + \sum Year\_D + \sum Industry\_D + \varepsilon_{i,t} \quad (4)$$

$$OI_{i,t} = \alpha_0 + \alpha_1 Fin_{i,t} + \alpha_2 Control_{i,t-1} + \sum Year\_D + \sum Industry\_D + \varepsilon_{i,t} \quad (5)$$

$$AI_{i,t} = \alpha_0 + \alpha_1 Fin_{i,t} + \alpha_2 Control_{i,t-1} + \sum Year\_D + \sum Industry\_D + \varepsilon_{i,t} \quad (6)$$

where *Fin* is the dummy variable, when the ratio of the listed company holds an unlisted financial institution's shares greater than 5%, it is 1, otherwise it is 0; *Control* represents control variables.

3.3. The Data

The sample selected in this paper includes the Shanghai and Shenzhen A-share non-financial listed companies during 2011-2016, the reason why I chose to start the study from 2011 is that China issued the "State Council's Opinions on Encouraging and Guiding the Healthy Development of Private Investment" in May 2010. It explicitly states that private capital is encouraged to participate in the financial industry. The data will be screened as follows: 1) companies that have been listed less than one year, because we need to use the previous year's financial data and market transaction data; 2) Excluding companies in the financial industry; 3) Excluding companies with incomplete data; 4) Winsorize processing of up and down 1% of the major continuous variables.

The financial data of listed companies used in this paper is obtained from the Guo Tai'an database "CSMAR China Listed Companies Financial Statement Database" and "China Listed Company Financial Index Analysis Database"; stock return rate data is obtained from China Tai'an database "CSMAR China Stock Market Trading Database"; listed companies holding unlisted financial institutions data is obtained from Wind.

4. Empirical Results and Analysis

4.1. Empirical Results of Financing Constraints

4.1.1. Descriptive Statistics

Table 1 is a descriptive statistic of the main variables in model (1). From Table 1, it can be seen that among the 12,551 observations, on average 10.33% of the observations are classified as holding more than 5% of shares in financial institutions, which indicates that the phenomenon that the listed companies hold stake in unlisted financial institutions is common.

Table 2 shows the correlation coefficient matrix of the main variables in

Table 1. Descriptive statistics in model (1).

Variables	Obs	Mean	Std.Dev	Min	Max
$\Delta Cash$	12,551	0.0135	0.1066	−0.2429	0.4945
CF	12,551	0.0453	0.0849	−0.2356	0.2961
$Size$	12,551	22.1468	1.2758	19.5232	25.9504
Q	12,551	0.1900	0.5538	−0.5853	3.9360
$SDebt$	12,551	0.0566	0.1385	−0.2770	0.6525
Nwc	12,551	0.0251	0.1503	−0.3318	0.6959
Exp	12,551	0.0590	0.0618	0.0002	0.3235
Fin	12,551	0.1033	0.3044	0.0000	1.0000
$Fin*CF$	12,551	0.0051	0.0227	−0.0337	0.1357

Table 2. The Pearson correlation coefficient matrix for the main variables in model (1).

Variables	$\Delta Cash$	CF	$Size$	Q	$SDebt$	Nwc	Exp
$\Delta Cash$	1						
CF	0.2104***	1					
	(0.0000)						
$Size$	0.0901***	0.0591***	1				
	(0.0000)	(0.0000)					
Q	0.1559***	0.0239***	0.0374***	1			
	(0.0000)	(0.0074)	(0.0000)				
$SDebt$	0.2005***	−0.0711***	0.1007***	0.2630***	1		
	(0.0000)	(0.0000)	(0.0000)	(0.0000)			
Nwc	0.6047***	−0.0054	0.0262***	0.1727***	−0.1624***	1	
	(0.0000)	(0.5442)	(0.0033)	(0.0000)	(0.0000)		
Exp	0.003***	0.1841***	0.0039	0.0862***	0.2087***	−0.0914***	1
	(0.0000)	(0.0000)	(0.6643)	(0.0000)	(0.0000)	(0.0000)	

Note: *, **, and *** indicate two-tailed statistical significant at 10, 5 and 1 percent level, respectively.

model (1). This paper uses Pearson correlation coefficient method to test the correlation between variables to ensure the rationality of the model. From Table 2, we can see that there is a significant correlation between the variable $\Delta Cash$ and other variables, and the absolute value of the correlation coefficient between the explanatory variable and each control variable is less than 0.5, indicating that there is no serious multicollinearity between variables and the model is feasible. There is a significant positive correlation between the explained variable $\Delta Cash$ and the explanatory variables CF, which shows that Chinese companies generally face serious financing constraints.

4.1.2. Analysis of Regression Results

This paper uses a fixed-effects model and uses robust standard errors to regress models (1) and (2). The regression results are shown in Table 3.

In Table 3, column (1) lists the benchmark regression results of model (1) and tests whether listed companies in China are generally faced financing constraints. From the regression results, it can be seen that the coefficient before the operational cash flow *CF* is significantly positive at the level of 1%, indicating that listed companies in China are generally faced serious financing constraints, which is consistent with the reality in China. Column (2) is the regression result after adding *Fin*CF* to model (1) to test whether listed companies holding stake in financial institutions can alleviate the financing constraints they face. According to theoretical analysis, if the coefficient of *Fin*CF* is significantly negative; it means that holding the shares of a financial institution can alleviate the financing constraints the company faces. From the regression results, it can be seen that the coefficient of the interaction item *Fin*CF* is significantly negative at the level of 1%, which indicates that holding stake in financial institutions can

Table 3. Regression results of model (1) and model (2).

Variables	(1)	(2)
	$\Delta Cash$	$\Delta Cash$
CF	0.4287***	0.4312***
	(0.0000)	(0.0000)
Fin* CF		−0.2291**
		(0.0440)
Growth	−0.0124***	−0.0124***
	(0.0010)	(0.0010)
Exp	−0.0844***	−0.0841***
	(0.0000)	(0.0000)
Nwc	0.4958***	0.4959***
	(0.0000)	(0.0000)
SDebt	0.2960***	0.2960***
	(0.0000)	(0.0000)
Size	0.0117***	0.0116***
	(0.0010)	(0.0010)
Constant	−0.2867***	−0.2849***
	(0.0000)	(0.0000)
Observations	12,551	12,551
Adj-R^2	0.5516	0.5474
Year	Yes	Yes
Industry	Yes	Yes

Note: *, **, and *** indicate two-tailed statistical significant at 10, 5 and 1 percent level, respectively.

significantly alleviate the financing constraints companies face. The regression results support hypothesis 1.

4.2. Empirical Results of Investment Efficiency

4.2.1. Regression Results of Expected Investment Model

Table 4 shows the regression results of the expected investment model in the Richardson residual measurement model. From the regression results, it can be seen that the amount of companies' new investment shows a significant positive correlation with the amount of new investment, growth opportunities, stock returns, and cash holdings in the previous period. And there is a significant negative correlation between asset-liability ratio, company size, and years of listing.

4.2.2. Regression Results of the Effect of Holding Stake in Financial Institutions on Enterprises' Investment Efficiency

1) Descriptive statistics

Table 5 is a descriptive statistic of the main variables in model (4), model (5), and model (6). Among the 12,551 observations, there are 6863 observations classified as underinvestment and 5688 observations classified as overinvestment. The mean of investment residual in the underinvestment sample equals 0.0434 with a range from 0.0007 to 0.1275 and the standard deviation equals 0.0304. The mean of investment residual in the overinvestment sample equals 0.0527 with a range from 0.0006 to 0.3107 and the standard deviation equals 0.0552. The mean of investment residual in the full sample equals 0.0474 with a range from 0.0006 to 0.2404 and the standard deviation equals 0.0420. It can be seen that there is a large difference in the degree of inefficient investment among enterprises.

2) Analysis of Empirical Results

This paper uses fixed effects and uses robust standard error to estimate models (4), (5), and (6). The regression results are shown in Table 6.

Table 4. Regression results of model (3).

Variables	Coefficient	t value	P value
$I_{i,t-1}$	0.2253***	17.8400	0.0000
$Growth_{i,t-1}$	0.0014*	1.9700	0.0660
$Lev_{i,t-1}$	−0.0387***	−3.4900	0.0030
$Cash_{i,t-1}$	0.0421***	10.5300	0.0000
$Size_{i,t-1}$	−0.0151***	−7.6000	0.0000
$Ret_{i,t-1}$	0.0072***	12.8100	0.0000
$Age_{i,t-1}$	−0.0036***	−5.5900	0.0000
Constant	0.4163***	8.6800	0.0000
Year			
Industry		Yes	
Adj-R^2		0.1569	
Observations		12,551	

Note: *, **, and *** indicate two-tailed statistical significant at 10, 5 and 1 percent level, respectively.

Table 5. Descriptive statistics of inefficient investments.

Variables	Obs	Mean	Std.Dev	Min	Max
AI	12,551	0.0474	0.0420	0.0006	0.2404
$Fin_{i,t}$	12,551	0.1033	0.3044	0	1
UI	6863	0.0434	0.0304	0.0007	0.1275
$Fin_{i,t}$	6863	0.0607	0.2389	0	1
OI	5688	0.0527	0.0552	0.0006	0.3107
$Fin_{i,t}$	5688	0.1547	0.3617	0	1
$Lev_{i,t-1}$	12,551	0.4515	0.2201	0.0474	0.9468
$Size_{i,t-1}$	12,551	21.9903	1.2735	19.3714	25.8301
$ROA_{i,t-1}$	12,551	0.0378	0.0531	−0.1758	0.1969
$Growth_{i,t-1}$	12,551	0.2106	0.5811	−0.5724	4.3448
$FCF_{i,t-1}$	12,551	0.0212	0.1160	−0.4055	0.4238
$Age_{i,t-1}$	12,551	9.8064	6.2864	1.0000	25.0000

Table 6. Regression results of model (4), model (5) and model (6).

Variables	UI		OI		AI
	(1)	(2)	(3)	(4)	(5)
Fin	−0.0158***	−0.0055***	−0.0017	0.0034	−0.0027***
	(0.0000)	(0.0000)	(0.6720)	(0.1870)	(0.0000)
Lev		−0.0283***		−0.0179	−0.0232***
		(0.0010)		(0.1750)	(0.0010)
$Size$		−0.0039**		−0.0226***	−0.0087***
		(0.0150)		(0.0000)	(0.0000)
ROA		0.0086***		0.1160	0.0330***
		(0.0030)		(0.0000)	(0.0010)
$Growth$		0.0037***		0.0016	0.0048***
		(0.0000)		(0. 2290)	(0.0000)
FCF		0.0081***		0.0138	0.0105***
		(0.0020)		(0.3520)	(0.0020)
Age		−0.0014**		0.0012**	−0.0003**
		(0.0216)		(0.0060)	(0.0216)
$Constant$	0.0426***	0.1498***	0.0526***	0.5587***	0.2553***
	(0.0000)	(0.0000)	(0.0000)	(0.0000)	(0.0000)
Year		Yes		Yes	Yes
Industry		Yes		Yes	Yes
Observation	6,863	6,863	5687	5687	12,551

Note: *, **, and *** indicate two-tailed statistical significant at 10, 5 and 1 percent level, respectively.

Columns (1) and (2) are the regression results of the effect of holding a stake in financial institutions on underinvestment *UI*. Column (1) is the regression results of the effect of holding stake in financial institutions on underinvestment without control variables. The coefficient of *Fin* is −0.0158, and is significant at 1 percent level, which shows that companies that hold stake in financial institutions have lower levels of underinvestment than those who do not hold stake in financial institutions. Column (2) is the regression result after adding the control variables based on (1). The coefficient of *Fin* is −0.0055, and is still significant at 1 percent level, which shows that holding stake in financial institutions have the effect of reducing the underinvestment of enterprises, and the regression results support the hypothesis 2a.

Columns (3) and (4) are the regression results of the effect of holding stake in financial institutions on overinvestment *OI*. Column (3) is the regression results of the effect of holding stake in financial institutions on overinvestment without control variables. The coefficient of Fin is −0.0017, but it is not significant. Column (4) is the regression result after adding the control variables based on (3). The coefficient of Fin is 0.0034, but it is still not significant. The regression results do not support hypothesis 2b.

The above regression results indicate that holding stake in financial institutions has the effect of reducing the underinvestment of enterprises and thus improving investment efficiency, but holding stake in financial institutions has not significantly aggravated the overinvestment of enterprises. Column (5) is a regression result of the effect of holding stake in financial institutions on the overall investment efficiency. The coefficient of Fin is −0.0027, and is significant at 1 percent level, which shows that holding stake in financial institutions have the effect of reducing the inefficient investment of enterprises, that is improving the investment efficiency.

4.3. Robustness Check

In the robustness test, this paper uses shareholding in non-listed banks as an alternative variable of shareholding in unlisted financial institutions, and repeats the previous regression analysis. The analysis results are shown in Table 7 and Table 8, respectively. Table 7 is the regression result of the effect of shareholding in non-listed banks on companies' financing constraints. Table 8 is the regression result of the effect of shareholding in non-listed banks on companies' under-investment/over-investment. From Table 7 and Table 8, it can be seen that the results of the robustness test also support the main conclusions of the paper.

5. Conclusion

The main objective of the study was to determine whether industrial companies could reduce their financial constraints by having a shareholding in financial institutions. The study was also seeking to determine whether the shareholding in

Table 7. Robustness test of financing constraints.

Variables	(1)	(2)
	ΔCash	ΔCash
CF	0.3203***	0.3112***
	(0.0000)	(0.0000)
Fin*CF		−0.1348**
		(0.0000)
Growth	−0.0104***	−0.0102***
	(0.0000)	(0.0000)
Exp	−0.0889***	−0.08592***
	(0.0000)	(0.0000)
Nwc	0.4754***	0.4725***
	(0.0000)	(0.0000)
SDebt	0.2716***	0.2679***
	(0.0000)	(0.0000)
Size	0.0024***	0.0021***
	(0.0000)	(0.0000)
Constant	−0.0709***	−0.0673***
	(0.0000)	(0.0000)
Observations	12,551	12,551
Adj-R^2	0.5472	0.5186
Year	Yes	Yes
Industry	Yes	Yes

Note: *, **, and *** indicate two-tailed statistical significant at 10, 5 and 1 percent level, respectively.

Table 8. Robustness test of investment efficiency.

Variables	UI	OI	AI
Fin	−0.0021***	−0.0030	−0.0033***
	(0.0000)	(0.3870)	(0.0000)
Lev	−0.0354***	−0.0195	−0.0228***
	(0.0000)	(0.1380)	(0.0010)
Size	−0.0114**	−0.0228***	−0.0090***
	(0.0000)	(0.0000)	(0.0000)
ROA	−0.0322***	0.1188	0.0339***
	(0.0000)	(0.0000)	(0.0000)
Growth	0.0076***	0.0025*	0.0052***
	(0.0000)	(0.0940)	(0.0000)
FCF	0.0069***	0.0143	0.0107***

Continued

	(0.0030)	(0.3210)	(0.0010)
Age	−0.0021**	0.0017***	−0.0001
	(0.0216)	(0.0000)	(0.6040)
Constant	0.3163***	0.5539***	0.2479***
	(0.0000)	(0.0000)	(0.0000)
Year	Yes	Yes	Yes
Industry	Yes	Yes	Yes
Observation	6863	5687	12,551

Note: *, **, and *** indicate two-tailed statistical significant at 10, 5 and 1 percent level, respectively.

financial institutions will result in under/over investment by the industrial companies. Using cash-cash flow sensitivity model and Richardson measurement model on the data of non-financial listed companies on the Shanghai and Shenzhen during 2011-2016 the study concludes that shareholding in financial institutions reduces financial constraints and improves investment efficiency of companies.

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