REMEDIAL ROLE OF FINANCIAL DEVELOPMENT IN CORPORATE INVESTMENT AMID FINANCING CONSTRAINTS AND AGENCY COSTS

Muhammad Kaleem KHAN[1*], Ying HE[2], Ahmad KALEEM[3], Umair AKRAM[4], Zahid HUSSAIN[5]

[1, 2, 4]*School of Economics and Management, Beijing University of Posts and Telecommunications, Beijing, China*
[3]*Faculty of Business and Law, Central Queensland University, Melbourne Campus, Australia*
[5] *School of International Trade and Economics, University of International Business and Economics, Beijing, China*

Abstract. The study investigates the role of financial development in boosting the investment efficiency of firms' investments in China. Using a large sample of firm-level financial data and country level economic data over the period 2004–2015, present study creates a link between financial and real economy. Firms are priori classified into under- or over-invested and effect of financial development is analyzed individually on each classification by using panel data estimations. The research concludes that firms suffering from under- (over-) investment problem due to financing constraints (agency problem), are more likely to increase (decrease) their investment` in the response of underlying financial development in the economy. This study has demonstrated a novel approach by concurrently incorporating the monitoring and financing issues that disturb the optimal level of investments. Moreover, the findings give strong implications by suggesting and empirically proving the remedy that has the potential to balance the investment distortions by rectifying monitoring and financing deficiencies.

Keywords: financial constraints, agency problem, under investment, over investment, financial development, information asymmetry, China.

JEL Classification: G10, G20, G30, G31, G32, O16.

Introduction

There is enough evidence suggesting the existence of cyclical effect of financial variables over real variables. Love and Zicchino (2006) advocates the prophecy that classical dichotomy of real and financial variables should no longer exist after emergence of information asymmetry

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theory. Economic development is the outcome of entrepreneurial activity, which is boosted by investments. Likewise, corporate decisions affect the growth path of the economy or vice versa. Unlike the neoclassical theory of investment, literature based on asymmetric information and agency conflicts, emphasizes the role played by moral hazard and adverse selection problems in a firm's investment decisions (Love 2003; Love, Zicchino 2006; Guariglia, Yang 2016; Guariglia, Liu 2014). In a perfect capital environment, investments remain unaffected of financing decisions (Modigliani, Miller 1958). But in reality, investments are adversely affected by distortions, which includes both under- and over-investments (Hubbard 1998). There are two reasons behind investment distortions: one is agency issue and the other is asymmetric information. Since economists started to look at real phenomena abstracting from M-M model, a vast literature has been developed on the discussion of distortions in investment decisions in relation with real information asymmetry and agency cost; the former is likely to produce financing constraints and the latter is likely to produce monitoring issues. Here comes the role of development in financial system, which is expected to help the firms in investment decisions by providing needed capital flow and monitoring.

Economic growth is dependent upon investing and financing activity which cannot be very successful without active role of financial institutions and financial markets. Financial development is identified by the ability of financial system (financial institutions, instruments and markets) to provide a mechanism to strengthen economic activity in an economy. It is also identified by an increase in the number of financial institutions and the enhancement of market capitalization and liquidity (Gurley, Shaw 1955). It helps the firms to boost their financial performance by strengthening their investment activity, which is achieved by making the flow of capital smooth and providing vigorous monitoring and corporate governance system. The present study aims to explore this notion by identifying the impact of financial development on corporate level investment efficiency. We conduct it by priori classifying the firms on the basis of their under- or over-investment status because we do believe that financial development affects these two states differently.

We are taking Chinese economy as a case study because literature has demonstrated Chinese financial system as unique one (Lin, Su 2009). A lot of criticism reported is that its financial and legal system is weak and that its reliance is more on internal finance, trade credit and bank than on equity financing. And the inefficiency of state-owned banks mainly results from plenty of non-performing loans, mostly granted to massive unprofitable state-owned enterprises. Even though Chinese stock market has grown tremendously beyond expectation, it is still relatively small compared with Chinese banking sector (Chen *et al.* 2001). Due to these and other political economic issues, Chinese financial markets are not acting as an efficient platform for Chinese firms to reduce financing constraints and causing under-investment resultantly. Concurrently, given that the weak legal system and underdeveloped corporate governance mechanisms are prevailing in the economy, Chinese firms demonstrate severe agency problems leading to over-investment (Allen *et al.* 2005). For instance, government nominees who look after the firms, may exploit their powers to over-invest in order to achieve their political objectives (Chen *et al.* 2001; Firth *et al.* 2012). The presence of financing constraints and agency issue at the same time in our sample economy makes our study more significant and fit to provide empirical evidence of our hypotheses.

Our paper is related to as well as different from prior researches. We apply Richardson's accounting-based constructs of over-investment and free cash flow to a large sample of Chinese listed firms. We study both over-investment and under-investment, while Richardson (2006) focuses mainly on over-investment. (Guariglia, Yang 2016) and (Chen *et al.* 2016) also employed Richardson's framework to measure over- and under-investment, but their concern remained towards the explanation of investment inefficiency in the combination of FCF and financing constraints. We go one step ahead by recommending remedy of investment inefficiency by development in financial system. Our work is related to (Love, Zicchino 2006). But our paper is also different from Love's paper in three aspects: First, Love studies 36 economies simultaneously, while we study only one economy, Chinese economy that is missing in Love's sample countries. By this we have avoided cross-country heterogeneity. Secondly, Love did not address over- and under-investment. Thirdly, Love studied only information asymmetry. A recent study (Khan *et al.* 2017) has shown how overall investment efficiency is affected by financial development and sturucture in China. But this study did not consider the fact that investment behaviour of under-invested firms is likely to be different than that of over-invested firms. Our study also fills this theoretical gap by providing empirical evidence.

1. Hypothesis development

Richardson (2006) confirms agency cost explanation of over-investment. Agency issue results in the situation of over-investment in which firm's controlling managers tend to invest FCF in negative NPV projects (Stulz 1990). Firms suffering form agency problem are more likely to do overinvestment (Guariglia, Yang 2016) due to overutilization of managerial discretion (Jensen 1986). In such circumstances, the more free cash flow they have, the more they prefer to invest, which could lead to over-investment. This scenario is mostly created when the monitoring to management is weak, facilitates the management to do investment activities in projects, which serve management prospective rather than owners'.

Asymmetric information between managers and fund providers results in credit rationing and ultimately financing constraints and then under-investments (Jensen 1986; Jensen, Meckling 1976; Myers, Majluf 1984). When firms try to get external financing by considering debt or equity, capital market imperfections are expected to create information asymmetries that make it difficult for firms to raise external finance, due to widening of cost premium. Financing constraints induce the firm to overlook promising investment opportunities due to higher cost of capital, or make the feasible investments sensitive to internally generated cash flow due to its lower expected cost (Fazzari *et al.* 1988; Whited, Wu 2006; Hubbard 1998).

Recently, (Guariglia, Yang 2016) and (Chen *et al.* 2016) have studied the under- and over-investment behavior of Chinese firms, where they adopted the framework proposed by (Richardson 2006) to construct under- and over-investment as well as FCF firm-level measures. Their empirical results were consistent with the classical notions of (Jensen, Meckling 1976; Myers, Majluf 1984) that managers will over-invest when they have abundant internal funds, but curtail investment when they require external financing (Jensen, Meckling 1976; Myers, Majluf 1984; Malmendier, Tate 2005).

Our study presents the notion that financial development in an economy helps to reach towards optimal investments by reducing the likelihood of investment distortions. Development of financial institutions, instruments, and markets benefits the economy by enhancing the financial system, thereby increasing the flow of capital as well as a monitoring mechanism. This manuscript holds the view that financial development can help the firms to achieve optimal level of investments in two ways: (i) reducing agency cost by efficient monitoring, (ii) lowering financing constraints by increasing flow of capital. Literature related to financial development portrays that financial development can have an impact on the efficiency and effectiveness of financial institutions, instruments and markets, which further affects corporate investments behavior. Financial development increases market efficiency and deepens market segmentation. By this, more flow of information becomes possible and facilitates investors to be more selective when they choose firms in which they would like to invest. Moreover, financial and legal system becomes mature and monitoring mechanisms are strengthened by strong corporate governance mechanism and developed legal system.

As is illustrated above, financial development diverts the growth path of under- and over-investment towards optimal investment by different mechanisms. Under-investment is revoked by softening financing constraints and over-investment is repealed by efficient monitoring. A recent study conducted by (Castro *et al.* 2015) holds the view that financial development is a significant determinant of firm investments. The study presents the conclusion that higher finance development generates opportunities for finance availability for firms, thus enabling the financially constrained firms to increase their investments. Additionally, financial development increases market efficiency and allows investors to choose the firms more wisely for investing their funds. Therefore, firms, within the economy of less developed credit and capital markets, have fewer opportunities to expand due to unavailability of required finances (Xie, Mo 2015).

As (Levine 1996) argues, development of financial system results in lowering the cost of monitoring because financial intermediaries apply enhanced techniques for gathering and processing information on potential borrowers and develop improved mechanisms for monitoring firm and managers' performance. Financial development strengthens financial institutions and rating agencies emerge. Rating agencies also lower monitoring costs for the borrowers because rating firms can certify borrowers at a lower cost than financial intermediaries. We link the proposition of Levine with Agency theory presented by (Jensen, Meckling
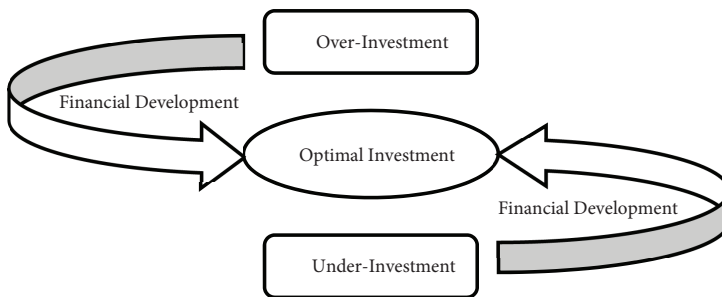

Figure 1. Summary of hypotheses

1976) which illustrates that when managers have excessive funds at their discretion, they will invest them irrationally, thus creating overinvestment problem.

This debate has inspired us to formulate the following hypotheses:

– *Under-investment hypothesis*: Financial development is likely to turn under-investments towards optimal by mitigating financing constraints.
– *Over-investment hypothesis*: Financial development is likely to turn over-investments towards optimal by mitigating agency problem.

2. Methodology

2.1. Priori classification of firms on the basis of under- and over-investment

If I_{New} is expenditures on new projects, it can be determined as:

$$I_{New} = I_{Total} - I_{Maintenance},$$

where

$$I_{Total} = CAPEX_t + R\&D_t - SalePPE_t,$$

$$I_{Maintenance} = Ammortization_{i,t} + Depreciation_{i,t},$$

whereas I_{Total} is total investment and is measured as sum of all outlays on capital expenditure and research & development expenditures less receipt from sales of property, plant and equipment[1]; $I_{Maintenance}$ is maintenance investment defined as the expenditures to maintain assets in place; $CAPEX_t$ are capital expenditures measured as cash paid to acquire and construct fixed assets, intangible assets and other long-term assets.; $R\&D_t$ is cash outflow for research and development purposes; $SalePPE_t$ is cash inflow due to sales of property, plant and equipment.

I_{New} can be further split into expected investment expenditures in new positive net present value (NPV) projects that is optimal investment (I_{New}^{op}) and unwanted or abnormal investment expenditures (I_{New}^{ab}) that are investment distortions or under- and over-investment, the two types of investments that is below or above optimal investment level respectively. We use a dynamic investment expenditures model proposed by (Richardson 2006). That is an accounting based framework to predict optimal investment and abnormal investments. The predicted value from the expectation model is I_{New}^{op} and the residual value from expectation model is I_{New}^{ab}. Specifically, firm's new investment expenditure ($I_{New_{i.t}}$) is function of Tobin's Q, Size[2], Age[3], Stockreturns[4] and Leverage[5].

$$I_{New_{i,t}} = \partial_i + \alpha_1 I_{New_{i,t-1}} + \alpha_2 Cash_{i,t-1} + \alpha_3 Q_{i,t-1} +$$
$$\alpha_4 Size_{i,t} + \alpha_5 Age_{i,t-1} + \alpha_6 Stockreturns_{i,t-1} + \qquad (1)$$
$$\alpha_7 Leverage_{i,t-1} + \sum_i ind + \sum_t year + \varepsilon_{it}.$$

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[1] Richardson (2006) also included acquisition to calculate I_{Total}. But Guariglia, Yang (2016) has excluded it while calculating I_{Total} for Chinese firms because acquisitions expenses are already included in capital expenditures.

[2] Natural logarithm of total assets.

[3] Number of years since listing

[4] Measured as change in market value of firm over that in prior year.

[5] Ratio of the sum of short-term and long-term debt to total assets.

Table 1. Estimations of dynamic model of investment expenditures

Dependent Variable: $I_{New_{it}}$	Estimates by Fixed Effect	Estimates by GMM-system
$l.I_{New_{it}}$	0.230***	0.780***
	(0.007)	(0.079)
$l.Cash_{i,t}$	0.004***	0.266***
	(0.001)	(0.023)
$Size_{i,t}$	0.010***	0.043***
	(0.001)	(0.008)
$l.Stockreturns_{i,t}$	0.005***	0.036***
	(0.001)	(0.008)
$l.lev_{i,t}$	−0.005***	0.032***
	(0.001)	(0.005)
$l.lQ_{i,t}$	0.005***	0.013***
	(0.000)	(0.003)
$l.Age_{i,t}$	−0.003***	−0.006***
	(0.000)	(0.001)
Year-fixed effect	No	yes
Industry fixed effect	yes	yes
R-sq	0.283	
Observations	19259	19767
Sargan Test (p-value)		0.861
Serial Correlation		
First order		0.035
Second order		0.616

Notes: Dependent variable is new investment expenditures. $\left(I_{New_{i,t}}\right)$. Column 2 presents the estimates by fixed effect panel data model while column 3 presents estimates by system-GMM. Standard errors are reported in parenthesis below their respective estimated parameter. ***,** and * represents significance at 1%, 5% and 10% respectively.

where the subscript *i* indexes firms and *t* indexes years (*t* = 2004–2015). We have taken lagged form of all our independent variables (except Age) to alleviate the simultaneity issue (Guariglia, Yang 2016; Duchin *et al.* 2010; Polk, Sapienza 2008). $\sum_i ind$ and $\sum_t year$ are vectors for industry and year dummies to capture the fixed effect of respective indicators. Table 1 represents the estimates of dynamic expectation model of investment expenditures. We use fixed-effect panel data estimator (FE) and GMM-system estimator to obtain estimates form Eq. (1). Then we use the residuals and fitted values obtained from dynamic expectation model as abnormal investments ($I_{New_{i,t}}^{ab}$) and optimal investments ($I_{New_{i,t}}^{op}$) respectively. For this purpose, we use the estimates obtained from GMM-system (Blundell, Bond 1998) estimator because this estimator helps us to control potential endogeneity of endogenous variables by using lagged levels of endogenous variables as instruments and eliminates firm specific effect. We have got almost same results as (Guariglia, Yang 2016) got for Chinese sample of firms. The only difference between our models is that we use stock returns at place of ROA[6]. Values

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[6] Chen, X. *et al.* (2016) and Richardson, S. (2006) used stock returns in model of investment expenditures.

of I_{New}^{ab} may be positive or negative. These values are used to priori classify the firm-year observations into under- and over-investment. Over-investing (under-investing) firms are those who have positive (negative) abnormal investment ($I_{New_{it}}^{ab}$).

2.2. Main specification

To analyze the sensitivities of under- or over-investment to financial development, we experiment the following regression model.

$$I_{New_{i,t}}^{ab} = \partial_i + \alpha_1 I_{New_{i,t-1}}^{ab} + \alpha_2 CF_{i,t} + \alpha_3 FD_t +$$
$$\alpha_4 CF_{it-1} \times FD_{t-1} + \alpha_5 GDPg_t + \sum_i ind + \sum_t year + \varepsilon_{i,t}, \tag{2}$$

where $I_{New_{it}}^{ab}$ is abnormal investments. Its derivations and estimation have already been discussed in section 3.1. The $CF_{i,t}$ may indicate the effect of possible liquidity constraints on investment behavior; however it may also work as a proxy for potential future profitability. We measure $CF\_optimal_{it}$ by the following approach:

$$CF_{it} = I_{Maintenance} + I_{New_{i,t}}^{op}. \tag{3}$$

Additionally, its interaction of financial development with cash flow variable ($CF_{it-1} \cdot FD_{t-1}$) targets to explore whether the increase in level of FD is related with the decrease in the level of dependence on internal funds. The reason behind this notion is that if a firm's access to financial markets is restricted, it will rely on internal funds to support its investments. This helps us to identify that financial development in China facilitates the firms to lower their dependency on internally generated cash flows to cater future investment opportunities, which means our desired outcome is $\alpha_4 < 0$. Among the country level economic variables in Eq. (2), we have also included GDP_g, a measure to seize the impacts of economic growth on investment. Presence of GDP_g growth in model is meaningful to make it sure that financial development (FD) measures are capturing their own effects on sensitivity of under- and over-investments.

FD may merely reflect the effect of economic growth on under- or over-investment if we don't use GDP_g as control variable. The FD intends to determine the role of financial development in controlling under- as well as over-investments. We use the following measures of financial development proposed by (Beck *et al.* 2001); who used them to find its relationship of FD with economic growth. Lately, Castro *et al.* (2015); Khan *et al.* (2017) used the same measures to find out the relationship between financial development and corporate investment decisions.

The first variable of financial development is commonly identified in the literature as Financial Development Activity (FDa) and it represents a measure of the overall activity or liquidity of financial sector. It is defined as:

$$FDa_t = \log[BA_t \cdot VT_t], \tag{4}$$

where BA_t & VT_t represent bank advances and Value traded respectively. Bank advances

present not only an efficient flow of capital, but also a robust measure of monitoring over corporates[7]. Value traded is a robust indicator of stock market development as it indicates the degree of liquidity that stock market provides to corporates.

To check the robustness of our results, we use two more alternative measures of financial development. To check the overall size of the development of financial system we employ a measure of Financial Development Size (FDs). It is defined as:

$$FDs_t = \log[BA_t + MC_t], \tag{5}$$

where BA_t is bank advances and MC_t is market capitalization, defined as ratio of the value of listed shares to GDP. To check the overall efficiency of financial development, we employ Financial Development Efficiency ratio (FDe), which measures the efficiency with which the financial sector channels funds in Chinese economy. It is defined as:

$$FDe_t = \log[VT_t / OC_t], \tag{6}$$

where VT_t is the value traded and OC_t is overhead costs and is defined as the accounting value of banks' overhead costs as a share of banking system assets . Large overhead costs indicate the inefficiency of banking system and conveys the good proxy to measure the inefficiency of banking system (Beck *et al.* 2001).

2.3. Main features of data and descriptive statistics

The data used in this paper are drawn from the China Stock Market and Accounting Research (CSMAR) Database and China Center for Economics Research (RESSET) Database. They cover Chinese companies that issue A-share stocks on either the Shanghai Stock Exchange (SHSE) or the Shenzhen Stock Exchange (SZSE), during the period 1994–2015[8]. We exclude financial institutions since the operating, investing and financing activities of these firms are distinct from others. We further winsorize observations in the one percent tails for the main regression variables to minimize the potential influence of outliers. Finally, we drop all firms with less than three years of consecutive observations. All variables are deflated using the gross domestic product (GDP) deflator (derived from National Bureau of Statistics of China). Our final panel consists of 2486 listed firms, which corresponds to 22,713 firm–year observations. The number of firm–year observations of each firm varies from two to twelve, with number of observations varying from a minimum of 1271 in 2004 to a maximum of 2462 in 2014.

Table 2 presents the mean values of variables. When we compare the statistics of under-invested firms with those of over-invested firms, we find interesting facts. Relative to total assets, the average total investment of over-invested firms is more than that of under-invested firms. Relative to total investment expenditures, new investments of over-invested firms are

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[7] It should be noted that Beck *et al.* 2001 uses private credit (credit allocated to the private sector). We have replaced private credit with bank advances for two reasons. The first is that data for credit allocated by non-bank financial institutions were not available. Second is that private sector contributes a negligible portion of the total corporate sector to the Chinese economy.

[8] Our sample period is 2004 to 2015 as data for R&D expenditures prior to 2004 were unavailable.

Table 2. Analysis of mean values of under- and over-invested firm-year observations

	Under-invested firms	Over-invested firms	All firms
$I_{Total_{it}}$	.055	.058	.057
$I_{New_{it}}$	.028	.033	.032
$Cash_{i,t}$	.168	.183	.179
$Size_{i,t}$	22.17	21.61	21.76
$Stockreturns_{i,t}$	.567	.537	.546
$lev_{i,t}$	.505	.479	.486
$Age_{i,t}$	9.91	8.07	8.56
$lQ_{i,t}$	2.09	2.03	2.05
Observations	5969	16743	22712

Notes: It should be noted that a given firm that is suffering form under-investment in given year, may fall into over-investment in next year or vice versa, or it may maintain its under- or over-invested condition for many years with any change.
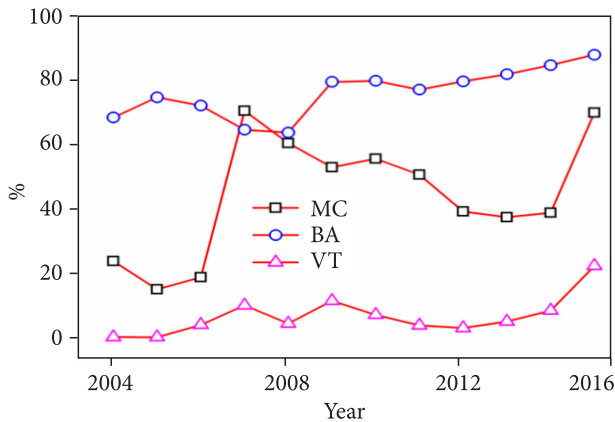

Figure 2. Graph representing the year trend of VT, BA & MC as share of GDP

4.17% more than the new investments of under invested firms. Interestingly, new investment shows up the 52.73% in under-invested firms and 56.9% in over-invested firms.

Figure 2 represents the graphical trend of market capitalization (MC), bank advances (BA) and value traded (VT) from year 2004 to 2015. MC is showing ups and downs throughout our sample period. Overall trend shows the growth in market capitalization that started from 30% and reached up to 70% in 2015. The figure shows the drastic trend of bank advances. Starting from around 70% in 2004, it goes as lower as 65% and then shows the increasing

trend to reach about 90% in 2015. The graph shows the meander trend of value traded. It remained modest till 2012 and then becomes steep upward after 2012.

3. Empirical results

Table 3 presents the estimated results of relationship between under- and over-investment and financial development measures. Our overlying hypothesis is that under-invested (over-invested) firms are likely to move towards optimal investment level by increasing (decreasing) investment expenditures in response to financial development in economy. For this, we expect positive (negative) direction of α_3 in case of under-invested (over-invested) firms. As we expected, we have got the same results. FDa is significantly positive with under-invested firms, whereas it is significantly negative with over-invested firms. For robustness check, we also employ measures of FDs and FDe. These measures also support the results that we have already got with FDa. We do our estimation with both fixed effect panel data model and system-GMM. We do not find any significantly different results from both panel data estimations.

Table 3. Estimates of under- and over-investment with financial development

Panel 1of Table 2	Dependent Variable: Under-investment ($l.I^{Ab}_{New_{it}}$)					
	Financial Development Activity (FDa)		Financial Development Size (FDs)		Financial Development Efficiency (FDe)	
	FE	GMM-sys	FE	GMM-sys	FE	GMM-sys
$l.I^{Ab}_{New_{it}}$	−0.016***	0.753***	−0.016***	0.778***	−0.016***	0.773***
	(0.005)	0.050	(0.005)	0.051	(0.005)	0.051
$CF_{i,t}$	0.745***	6.156***	0.746***	5.539***	0.746***	1.773
	(0.131)	1.742	(0.131)	2.052	(0.131)	1.137
$FD_{i,t}$	0.026*	0.140***	0.003	0.053	0.000	0.000
	(0.015)	0.056	(0.009)	0.041	(0.000)	0.000
$GDPg_t$	−0.035	−0.079	−0.080***	−0.093**	−0.078***	−0.116
	(0.035)	0.059	(0.024)	0.041	(0.027)	0.058
$FD_{i,t} * CF_{i,t}$		−4.979		−2.903		−0.089
		1.866		1.517		1.249
Observations	5000	5000	5000	5000	5000	5000
R-sq	0.110	0.000		0.000	0.114	0.000
Rhu	0.925				0.925	
Sargan test (p-value)		0.673		0.364		0.265
Serial Corr.						

	FE (FDa)	GMM-sys (FDa)	FE (FDs)	GMM-sys (FDs)	FE (FDe)	GMM-sys (FDe)
First-order		0.043		0.086		0.099
Second-order		0.753		0.778		0.773
Panel 2 of Table 2	Dependent Variable: Over-investment $(l.I^{Ab}_{New_{it}})$					
	Financial Development Activity (FDa)		Financial Development Size (FDs)		Financial Development Efficiency (FDe)	
	FE	GMM-sys	FE	GMM-sys	FE	GMM-sys
$l.I^{Ab}_{New_{it}}$	−0.002	0.508***	−0.002	0.497***	−0.001	0.522***
	0.005	0.047	0.005	0.046	0.005	0.048
$CF_{i,t}$	1.047***	−2.064***	1.049***	−1.679**	1.048***	−0.449
	0.060	0.780	0.06	0.840	0.060	0.575
$FD_{i,t}$	−0.022***	−0.107***	−0.000**	−0.065***	−0.011***	−0.001***
	0.008	0.024	0.000	0.017	0.005	0.000
$GDPg_t$	−0.048***	−0.017***	−0.024*	−0.014	−0.014	0.042***
	0.018	0.031	0.013	0.022	0.012	0.029
$FD_{i,t} * CF_{i,t}$		4.063		2.508***		2.408
		0.836		0.624		0.628
Observations	9129	9129	9129	9129	9129	9129
R-sq	0.041		0.040		0.040	
Rhu						
Sargan test (p-value)		0.365		0.873		0.365
Serial Corr.						
First-order		0.087		0.063		0.034
Second-order		0.837		0.632		0.837

Notes: Dependent variable is new investment expenditures $(I^{ab}_{New_{i,t}})$. Firms are priori classified into under- and over invested firms on the basis of values of $I^{ab}_{New_{it}}$ (calculated by Richardson 2006 accounting framework). Estimates were taken by fixed effect panel model and system-GMM. Standard errors are reported in parenthesis below their respective estimated parameter. ***,** and * represents significance at 1%, 5%and 10% respectively.

Accordingly, these findings signalize that financial development is a cure to treat investment distortions, whether it is due to financing constraints or agency problem. It affects under- and over-invested phenomenon differently. Under-investments require smooth flow of capital that can only be obtained by resolving information asymmetry problem and thereby financing constraints. With the increase in the value of stock market trading volume (Value traded), market capitalization of equity market and credit allocated by credit markets, firms get financing comparatively more easily to cater their investment opportunities. For under-invested firms, effect of financial development on investment comes from policies to increase credit level, market capitalization and stock market value traded, which improves financial environment and stimulates investment possibilities by reducing the cost of financing. It is plausible to consider that the more developed the financial system becomes, the greater the

credit availability and the possibility of new financing will be, thus reducing the reliance of investment on internal cash flow for financially constrained firms. Over-investment that is more likely to be caused by agency issue is a result of under developed financial and legal system. With the development of financial institutions and markets, firms go under strict monitoring of investors and creditors. Increase in bank advances signal the credit worthiness of firms in economy. The increased market capitalization and value of trading not only give confidence to the investors but also make the firms frequently exposed to equity markets.

4. Robustness tests

4.1. Estimations by alternative panel data technique

Some researchers have argued about dynamic setting of models, as in our case ex-post abnormal investments ($I_{New_{i,t}}^{ab}$) may follow ex-ante abnormal investment ($l.I_{New_{i,t}}^{ab}$). To take this problem into account, as a further robustness test, predicted abnormal investment is obtained using the fitted values from the model in Eq. (1) estimated in each year using OLS. Results reported in Table 4 are consistent with our prior findings: under invested (over-invested) firms are likely to increase (decrease) their investment expenditures in response to financial development. From now onwards, we represent only the coefficients of variables which are of our main interest now, for the sake of brevity and space problem[9]. Moreover, please note in all subsequent test results, ***,** and * represent significance at 1%, 5% and 10% respectively.

Table 4. OLS estimates of under- and over-investment with financial development: robustness tests

Dep Variable	FDa	FDs	FDe	FDa	FDs	FDe
	Under-ols	Under-ols	Under-ols	Over-ols	Over-ols	Over-ols
$CF_{i,t}$	–.545***	–.546***	–.547***	.155***	.155***	.157***
$FD_{i,t}$	.0170***	.006***	.0002***	–.031***	–.012***	–.000***
$FD_{i,t} * CF_{i,t}$	.024	.023	.032	–1.344	–2.34	–.278

Notes: Dependent variable is new investment expenditures ($I_{New_{i,t}}^{ab}$). Firms are priori classified into under- and over invested firms on the basis of values of $I_{New_{it}}^{ab}$.

4.2. Estimation by using alternative ways of identifying under- and over-invested firms

The distinction between under-investment and over-investment based on (Richardson 2006) may also have some flaws (Bergstresser 2006). Alternatively, we priori classify the firms into under- and over-investment based upon industry median value of new investment expenditures ($I_{New_{i,t}}$). We rank the values of firms' $I_{New_{i,t}}$ by magnitude in each industry, and categorize the firms as under-invested (over-invested) when the value of $I_{New_{i,t}}$ lies below (above) the median $I_{New_{i,t}}$ of relevant industry. We hypothesize that the firms, which are

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[9] Complete results are available upon request.

over-invested, will increase the amount of investment expenditures in response to financial development and over-invested firms will react in the opposite direction. Results of sys-GMM estimates given in Table 5 support our hypothesis.

Table 5. GMM-system estimates of new investment expenditures with financial development: robustness tests

	FDa	FDs	FDe	FDa	FDs	FDe
	Under-inv	Under-inv	Under-inv	Over-inv	Over-inv	Over-inv
$CF_{i,t}$	.707***	(.099)	−.219***	−2.48***	−2.88***	−.587***
$FD_{i,t}$	.016***	.001	.000*	−.066***	−.048***	−.000***
$FD_{i,t} * CF_{i,t}$	−1.191*	−.362*	−.013***	2.59***	2.097***	.039***

Notes: Same as of Table 4.

Lastly, we use the approach proposed by (Bates 2005*)* to priori classify the firms on the basis of values of under- and over-investment and free cash flow. Following this approach, we estimate the abnormal investment ($I_{New_{i,t}}^{ab\star}$) by taking the difference between firm's $I_{New_{i.t}}$ and industry median $I_{New_{i.t}}$ in respective year. Negative (positive) values of $I_{New_{i,t}}^{ab\star}$ correspond to under- (over-) investments. Consistent with notions of our hypotheses, we find same results that we got from our baseline model. Results are reported in Table 6.

Table 6. Estimates of H1 and H2 using Bates (2005) definitions of abnormal investment

	FDa	FDs	FDe	FDa	FDs	FDe
	Under-inv	Under-inv	Under-inv	Over-inv	Over-inv	Over-inv
$CF_{i,t}$	10.27***	3.29***	.682***	−.661***	.221	−.016
$FD_{i,t}$	.290***	.048***	.000***	−.025***	−.000	−.000*
$FD_{i,t} * CF_{i,t}$	−8.85***	−2.406***	−.046***	.787***	−.127	.005

Notes: Dependent variable is abnormal investment expenditures ($I_{New_{i,t}}^{ab}$). Firms are priori classified into under- and over invested firms on the basis of values of $I_{New_{it}}^{ab}$. Vales of $l.I_{New_{it}}^{ab}$ are computed by approach propsed by Bates (2005).

4.3. Estimation by using alternative ways of identifying financial development

We also use the alternative measures of financial development to check the robustness of financial development measures. For this purpose, we follow the approach used by (Kim *et al.* 2015), who adopt measures of stock market development and credit market development separately. The average of MKTCAP (ratio of total market value of all shares listed on SHSE and SZSE at the end of a year to GDP in the same year) and MKTLIQ (the ratio of the total

market value of all shares traded in a year to GDP in the same year), denoted by FINAVG is used to capture the effect of stock market development and CREDIT (ratio of annual total bank loans to GDP) is used to capture credit market development. Results presented in Table 7 support our prior results.

Table 7. (under- or over-) investment with financial development: using Kim's approach of determining FD

	AVGFIN		CREDIT	
	under	over	under	over
$CF_{i,t}$	1.17*	.002	17.33***	−7.11***
$FD_{i,t}$	.037	−.037*	.562***	−.300***
$FD_{i,t} * CF_{i,t}$	−2.06	.751	−20.6***	9.014***

Notes: Dependent variable is abnormal investment expenditures ($I^{ab}_{New_{i,t}}$). Firms are priori classified into under- and over invested firms on the basis of values of $I^{ab}_{New_{it}}$. Vales of $l.I^{Ab}_{New_{it}}$ are computed by approach propsed by Richardson (2006). AVGFIN and CREDIT are proxies for financial development (FD), that were computed by approach proposed by (Kim *et al.* 2015).

Conclusions

The study draws the conclusion that financial development is capable of creating a balance between under- and over-investment by rectifying financial constraints and agency problems. We note that issues of constrained flow of finances and weak controlling mechanisms can be overcome by the development of financial system in the economy, which could help the firms to move towards optimal investments. Findings implicitly urge the regulators to bring the development of the financial systems. The study contributes significantly to incorporating the monitoring and financing issues concurrently as reasons for investment distortions and recommending a balancing mechanism as implications. Governments should focus more on the development of the financial system, which is characterized by capacity building of financial institutions and markets in terms of activity, size and efficiency. Taking steps in improving the monitoring and financing ability of country's financial institutions and markets will result in the betterment of economy of businesses and smoothing the management. Achievement of this goal would also need the development of the legal system. Although the study was conducted on the Chinese economy, its conclusion can serve a guide to all the developing economies. Results can be made more generalized by comparing the corporate investment with the financial development of a number of countries. Moreover, how does financial structure impact the investment distortions of firms in economies? We leave this question for future researchers.

References

Allen, F.; Qian, J.; Qian, M. 2005. Law, finance, and economic growth in China, *Journal of Financial Economics* 77(1): 57–116. https://doi.org/10.1016/j.jfineco.2004.06.010

Bates, T. W. 2005. Asset sales, investment opportunities, and the use of proceeds, *The Journal of Finance* 60(1): 105–135. https://doi.org/10.1111/j.1540-6261.2005.00726.x

Beck, T.; Demirgüç-Kunt, A.; Levine, R.; Maksimovic, V. 2001. Financial structure and economic development: firm, industry, and country evidence, in A. Demirgüç-Kunt; R. Levine (Eds.). *Financial structure and economic growth: a cross-country comparison of banks, markets, and development.* Cambridge: The MIT Press, 189–242.

Bergstresser, D. 2006. Discussion of "Overinvestment of free cash flow", *Review of Accounting Studies* 11(2–3): 191–202. https://doi.org/10.1007/s11142-006-9002-3

Blundell, R.; Bond, S. 1998. Initial conditions and moment restrictions in dynamic panel data models, *Journal of Econometrics* 87(1): 115–143. https://doi.org/10.1016/S0304-4076(98)00009-8

Castro, F.; Kalatzis, A. E.; Martins-Filho, C. 2015. Financing in an emerging economy: does financial development or financial structure matter?, *Emerging Markets Review* 23: 96–123. https://doi.org/10.1016/j.ememar.2015.04.012

Chen, S. S.; Chung, T. Y.; Chung, L. I. 2001. Investment opportunities, free cash flow and stock valuation effects of corporate investments: the case of Taiwanese investments in China, *Review of Quantitative Finance and Accounting* 16(4): 299–310. https://doi.org/10.1023/A:1011270824166

Chen, X.; Sun, Y.; Xu, X. 2016. Free cash flow, over-investment and corporate governance in China, *Pacific-Basin Finance Journal* 37: 81–103. https://doi.org/10.1016/j.pacfin.2015.06.003

Duchin, R.; Ozbas, O.; Sensoy, B. A. 2010. Costly external finance, corporate investment, and the subprime mortgage credit crisis, *Journal of Financial Economics* 97(3): 418–435. https://doi.org/10.1016/j.jfineco.2009.12.008

Fazzari, S. M.; Hubbard, R. G.; Petersen, B. C.; Blinder, A. S.; Poterba, J. M. 1988. Financing constraints and corporate investment, *Brookings Papers on Economic Activity* 1: 141–206. https://doi.org/10.2307/2534426

Firth, M.; Malatesta, P. H.; Xin, Q.; Xu, L. 2012. Corporate investment, government control, and financing channels: evidence from China's listed companies, *Journal of Corporate Finance* 18(3): 433–450. https://doi.org/10.1016/j.jcorpfin.2012.01.004

Guariglia, A.; Liu, P. 2014. To what extent do financing constraints affect Chinese firms' innovation activities?, *International Review of Financial Analysis* 36: 223–240. https://doi.org/10.1016/j.irfa.2014.01.005

Guariglia, A.; Yang, J. 2016. A balancing act: managing financial constraints and agency costs to minimize investment inefficiency in the Chinese market, *Journal of Corporate Finance* 36: 111–130. https://doi.org/10.1016/j.jcorpfin.2015.10.006

Gurley, J. G.; Shaw, E. S. 1955. Financial aspects of economic development, *The American Economic Review* 45(4): 515–538.

Hubbard, R. 1998. Capital-market imperfections and investment, *Journal of Economic Literature* 36(1): 193–239.

Jensen, M. C. 1986. Agency costs of free cash flow, corporate finance, and takeovers, *The American Economic Review* 76(2): 323–329.

Jensen, M. C.; Meckling, W. H. 1976. Theory of the firm: managerial behavior, agency costs and ownership structure, *Journal of Financial Economics* 3(4): 305–360. https://doi.org/10.1016/0304-405X(76)90026-X

Khan, M. K.; He, Y.; Akram, U.; Sarwar, S. 2017. Financing and monitoring in an emerging economy: can investment efficiency be increased?, *China Economic Review* 45: 62–77. https://doi.org/10.1016/j.chieco.2017.05.012

Kim, J. B.; Ma, M. L.; Wang, H. 2015. Financial development and the cost of equity capital: evidence from China, *China Journal of Accounting Research* 8(4): 243–277. https://doi.org/10.1016/j.cjar.2015.04.001

Levine, R. 1996. Foreign banks, financial development, and economic growth, in C. E. Barfield (Ed.). *International financial markets: harmonization versus competition.* Washington, DC: AEI Press, 7: 224–254.

Levine, R. 2005. Finance and growth: theory and evidence. Chapter 12, in A. Philippe, N. D. Steven (Eds.). *Handbook of economic growth.* Amsterdam: Elsevier BV 1, p. 865–934. https://doi.org/10.1016/S1574-0684(05)01012-9

Lin, C.; Su, D. 2009. Does state control affect managerial incentives? Evidence from China's publicly listed firms, *Journal of Business Economics and Management* 10(4): 291–311. https://doi.org/10.3846/1611-1699.2009.10.291-311

Love, I. 2003. Financial development and financing constraints: international evidence from the structural investment model, *Review of Financial Studies* 16(3): 765–765. https://doi.org/10.1093/rfs/hhg013

Love, I.; Zicchino, L. 2006. Financial development and dynamic investment behavior: evidence from panel VAR, *The Quarterly Review of Economics and Finance* 46(2): 190–210. https://doi.org/10.1016/j.qref.2005.11.007

Malmendier, U.; Tate, G. 2005. CEO overconfidence and corporate investment, *The Journal of Finance* 60(6): 2661–2700. https://doi.org/10.1111/j.1540-6261.2005.00813.x

Modigliani, F.; Miller, M. H. 1958. The cost of capital, corporation finance and the theory of investment, *The American Economic Review* 48(3): 261–297.

Myers, S. C.; Majluf, N. S. 1984. Corporate financing and investment decisions when firms have information that investors do not have, *Journal of Financial Economics* 13(2): 187–221. https://doi.org/10.1016/0304-405X(84)90023-0

Polk, C.; Sapienza, P. 2008. The stock market and corporate investment: a test of catering theory, *The Review of Financial Studies* 22(1): 187–217. https://doi.org/10.1093/rfs/hhn030

Richardson, S. 2006. Over-investment of free cash flow, *Review of Accounting Studies* 11(2–3): 159–189. https://doi.org/10.1007/s11142-006-9012-1

Stulz, R. 1990. Managerial discretion and optimal financing policies, *Journal of Financial Economics* 26(1): 3–27. https://doi.org/10.1016/0304-405X(90)90011-N

Whited, T. M.; Wu, G. 2006. Financial constraints risk, *The Review of Financial Studies* 19(2): 531–559. https://doi.org/10.1093/rfs/hhj012

Xie, S.; Mo, T. 2015. Differences in corporate saving rates in China: ownership, monopoly, and financial development, *China Economic Review* 33: 25–34. https://doi.org/10.1016/j.chieco.2015.01.007