

Investment Cash Flow Sensitivity and Effect of Managers' Ownership: Difference between Central Owned and Private Owned Companies in China

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ABSTRACT: Based on panel data of the listed companies in China's stock market A during a period of year 2007-2010, we made an empirical study on what drives the investment cash flow sensitivity and the effect of management's ownership and both their differences between the central state owned companies and the non-state owned companies as well. The sensitivity of investment to internal cash flow in China's central state-owned companies can be explained by "hypothesis of free cash flow". It is the cost of agency that causes over-investment behaviors, and the management's ownership appears significant enhancement effect rather than entrenchment effect. However, the sensitivity of investment to internal cash flow in China's non-state owned companies supports the explanation of "hypothesis of financial constraints". Asymmetrical information causes under-investment behaviors of the firms. In the mean while, the entrenchment effect of manages' ownership dominates the enhancement effect in non-state owned companies.

Keywords: Internal Cash Flow; External Financial Constraints; Entrenchment Effect.

JEL Classifications: G01; G31; G32

1. Introduction

According to the MM theorem (Modigliani and Miller, 1958), a firm's capital investment would be irrelevant to its internally generated cash flow in a perfect market. But subsequent studies have shown that the real markets are imperfect, and thus the capital investment of a firm is associated with internal cash flow. About the reasons, there are two outstanding opinions. The "hypothesis of free cash flow" based on the theory of agency costs (Jensen and Meckling, 1976) shows that managers with free cash flow has a tendency to overspend their free cash flow on unprofitable projects, so that the actual investment level is excess of its optimal investment level (Jensen, 1986). Positive investment-cash-flow (ICF) sensitivity is thought as a symptom of over-investment. Lots of studies provide evidence out of different countries to support this explanation (see Lang, Stulz, and Walkling, 1991; Mark and Clifford, 1995; Harford, 1999; Shin and Kim, 2002; Richardson, 2006; Yang and Hu, 2007; Wei and Zhang, 2008). The "Hypothesis of Financial Constraints" based on the asymmetric information theory (Myers and Majluf, 1984) shows that external financing spends more transaction costs than internal financing because of asymmetric information. Financially constrained firms tend to have higher ICF sensitivities. Positive ICF sensitivity is typically thought as a symptom of under-investment. Researchers also have provided evidences out of different countries to support such an explanation (see Fazzari, Hubbard and Petersen (FHP), 1988; Devereux and Schiantarelli, 1990; Hoshi, Kashyap and Scharfstein, 1991; Lamont, 1997). However, Kaplan and Zingales (1997) and Cleary (1999) argue that the relationship between financial constraints and ICF sensitivity is not linear. By using different qualitative criteria to categorize financially constrained and unconstrained firms, they find conflict relations from FHP (1988). Moyen (2004) has shown that different criteria used to differentiate between financially constrained and unconstrained firms can lead to

conflict results. Empirical studies by Cleary, et al. (2007) and Asciglu, et al. (2008) also provide evidence supporting both FHP (1988) and Cleary (1999). Since it is difficult to differentiate, especially by means of continuous variables, between financially constrained and financially unconstrained firms, the main argument is focused on the methods of empirical studies, which is still a controversial issue up today.

Chinese economy is a mixed economy. The natures of ownership in China's listed corporations are different, especially between state owned firms and non-state owned firms, between central government controlling and local government controlling. Chinese market is also an emerging market. Until the end of year 2006 when the share reform of ownership was completed, the new accounting system began to be implemented from year 2007 by all the listed companies. Lots of papers have provided their empirical studies on ICF sensitivity in the background of Chinese market up to 2007, examples are Zhang and Li (2005), Yang and Hu (2007), Ma, et al (2008) and Qu, et al (2011). But the existing studies seldom use data after 2007 when the new accounting system is applied, and seldom consider the effects of management's ownership on the ICF sensitivity. Zhang and Li (2005) use the similar methodology suggested by Hadlock (1998) to make an empirical analysis based on data from 1998 to 2001; separate the firms into local state-owned, central owned and non-state-owned firms by nature of controlling rights; and finally find that over-investment and free cash flow problem exists among the local state-owned firms other than the central or non-state-owned firms. Yang and Hu (2007) use data from 2000 to 2004 of non financial listed companies to examine their hypothesis that the overinvestment of free cash flow is much more serious among state owned companies controlled by local state government than among other companies, but the method to estimate the overinvestment quantity is not well defined since expected investment should be different between state owned company and non-state owned company. Ma, et al (2008) use the same approach as Kaplan and Zingales (1997) and data from China's listed corporations during 1996-2006 to find that the state-owned firms tend to face overinvestment problems but non-state owned firms tend to face underinvestment problems, where the state owned companies are not separated into central owned and local state owned companies. Qu, et al (2011) take the probability of informed trade (PIN) as a measurement of financial constraint and find that higher financial constraint would bring higher investment-cash flow sensitivity and there is nonlinear relationship between financial constraint and investment-cash flow sensitivity by using the data from 2004 to 2007, but the companies are only grouped into state owned and non-state owned.

In our study, we shall group the listed companies in China's A stock market into three classes which are central owned company, local state owned company and non-state or private owned company. The central owned company and the private owned company have distinctly different natures of ownership. And among each of these two groups, the individual firms are much less heterogeneity than that among the group of Chinese local state owned company. Therefore, we can avoid some of the econometrical problems that are in fact not solved in the above literature. And the differences in aspects of ICF sensitivity and the effect of management's ownership can be found more easily. We shall use the data in current fiscal system after 2006 from a sample of China's listed companies to make a new inspection on China's emerging market, especially the differences of the relations between ICF sensitivity and managers' ownership, and the effects of managerial ownership among the listed firms with different natures of ownership by taking into account the enhancement and entrenchment effects of manager's shareholders.

The rest of this paper is organized as follows. Section 2 describes our model specification. Section 3 reports the model estimation. Model 4 interprets the estimation results. Section 5 summarizes the paper.

2. Model Specification

A key assumption of the agency cost theory is that the managers are not the owners of the firm, and a key assumption of the asymmetrical information theory is that the managers act in the interests of existing shareholders when making decisions. Therefore, if the positive investment-cash flow relation is caused by a managerial preference to overinvest internal funds, then the positive investment-cash flow sensitivity should decrease as the alignment of interests between managers and shareholders increases. On the other hand, if the positive investment-cash flow relation is caused by a managerial preference for underinvestment, the positive investment-cash flow sensitivity should increase as the alignment of interests between managers and shareholders increases (refer to Hadlock, 1998; Wei and Zhang, 2008). Hadlock

(1998) extends the work of FHP (1988) to take into account the ownership structure and uses managers' ownership stake (percentage of equity held by insiders) to measure the alignment of interests between managers and shareholders. A lot of studies such as Morck et al. (1988), McConnell and Servaes (1990) argued that managerial shareholdings have not only enhancement effect but also entrenchment to the managers. With the increasing of managers' ownership stakes, the alignment of interests between managers and shareholders increases so that firm's valuation increases due to the decrease of agency cost. On the other hand, such a phenomenon weakens the monitor ability of outer shareholders so that firm's valuation decreases due to the increase of agency cost. While managers' ownership stakes exceed some special level, the entrenchment effect appears important and dominates the enhancement effect. Jensen (1986) argues that the tendency to overinvest is derived from the fact that the manager is not the owner of the firm. Hadlock (1998) follows to expect that ICF sensitivities will decrease while managers' ownership stakes increase. Based on work of Myers and Majluf (1984), Hadlock (1998) argues that ICF sensitivities are increasing in managers' ownership stakes. However, the relationship between ICF sensitivities and managers' ownership might be nonlinear. Hence, the relationships between ICF sensitivities and managers' ownership will change directions while the entrenchment effect appears important and managers' ownership exceed one point.

Based on the above analysis, we follow the general framework of FHP (1988) and Hadlock (1998) to specify the following econometric models, where ε_{it} is error term.

$$\text{Model 1: } I_{i,t} = (\text{controls}) + \alpha_0 Q_{i,t} + \alpha_1 F_{i,t} + \varepsilon_{i,t}$$

$$\text{Model 2: } I_{i,t} = (\text{controls}) + \beta_0 Q_{i,t} + \beta_1 F_{i,t} + \beta_2 F_{i,t} MR_{i,t} + \varepsilon_{i,t}$$

$$\text{Model 3: } I_{i,t} = (\text{controls}) + \gamma_0 Q_{i,t} + \gamma_1 F_{i,t} + \gamma_2 F_{i,t} MR_{i,t} + \gamma_3 F_{i,t} MR_{i,t}^2 + \varepsilon_{i,t}$$

Table 1 provides the definitions or calculations of the variables being used in the models. In Table 1, one period lagged of the last four variables will be used in the above models as control variables.

Table 1. Definitions or Calculation of the Variables

Variables	Definitions	Cited Literature
I_{it}	Investment=net investment expenditure scaled by beginning of period capital stock	FHP (1988) Hadlock (1998)
$Q_{i,t}$	Q value= Tobin's q value at the beginning of period	FHP (1988) Hadlock (1998)
$CF_{i,t}$	Internal cash flow=internal cash flow scaled by beginning of period capital stock	FHP (1988) Hadlock (1998)
$MR_{i,t}$	Managers' ownership=total percentage of equity held by managers (general insiders)	Hadlock (1998)
$CASH_{i,t}$	Cash stock=Cash on hand scaled by beginning of period capital stock	Ascioglu, et al. (2008) FHP (1988)
$LNTS_{i,t}$	Log firm size=Natural log of the total assets	Ascioglu, et al. (2008) Ma, et al.(2008)
$MGR_{i,t}$	Sales growth=(current sales-lagged current sales)/lagged current sales \times 100%	Cleary, et al. (2007) Qu, et al (2011)
$DBAT_{i,t}$	Debt ratio=Total debt scaled by beginning of period total assets \times 100%	Ma, et al.(2008) Qu, et al (2011)

Model 1 is used as a baseline. Model 2 and model 3 are used to test the derivation of ICF sensitivities and effects of managers' ownership. If firms have free cash flow problem, we expect $\beta_2 < 0$, and if entrenchment effect dominates enhancement effect, $\gamma_3 > 0$. If firms face problem of financial constraints,

we expect $\beta_2 > 0$, and if entrenchment effect dominates enhancement effect, $\gamma_3 < 0$. Therefore, Table 2 becomes to be the base of our empirical analysis to distinguish the derivations of ICF sensitivities and effects of managerial ownership.

Table 2. Expected Signs of Intersection Terms

Derivation	Effects of Managers' Ownership	Signs
Hypothesis of Free Cash Flow	Entrenchment effect does not appear or not important	$\beta_2 < 0$
	Entrenchment effect dominates Enhancement effect	$\gamma_2 < 0, \gamma_3 > 0$
Hypothesis of Financial Constraints	Entrenchment effect does not appear or not important	$\beta_2 > 0$
	Entrenchment effect dominates Enhancement effect	$\gamma_2 > 0, \gamma_3 < 0$

3. Model Estimation

3.1 Sample Selection

We choose our sample of non-financial listed companies in China's stock market A during a period from 2007-2010. All the financial data are provided by RESSET/DB. The firms are selected to satisfy the following rules. (1) They are non-financial firms listed before December 31, 2003. (2) They issue only A shares in the stock markets. (3) They have positive net capital assets and all the financial data over the period 2007 to 2010 can be found in the RESSET/DB. The final selected 634 listed corporations include 354 state owned listed corporations, 182 non-state owned or private listed firms (simplified as P-firms). Among them, the state owned listed companies include 93 enterprises directly controlled by the central government (refer to as central owned companies, simplified as C-firms), 261 enterprises controlled by local governments or other state-owned corporations (refer to be as local state owned companies, simplified as L-firms).

In China, the group of L-firms is a mixed economy. And there is larger heterogeneity among the L-firms. It might have characteristics of both C-firms and P-firms. At least, the C-firms and the P-firms have distinctive difference in nature of ownership, and each of them can be thought as a homogeneity population. Therefore, we drop off the L-firms from our sample and focus on comparing the C-firms and the P-firms.

3.2 Data Summarization

Table 3 presents overall descriptions for data of the 93 central owned firms and 182 private firms during period of 2007 to 2010. At average, the investment level of C-firms is higher than that of P-firms. The average cash flow, cash stock, and firm size among C-firms are all larger than that among P-Firms. It might indicate that C-Firms have relatively better conditions for external financing than P-Firms. On the other hand, not only short term investment opportunities (MGR) but also prospects of long-term investment facing to C-firms are worse than that facing to P-Firms. It might demonstrate that P-Firms have relatively more growth opportunities than C-Firms. The managers' ownership stakes among C-Firms are much lower than that among P-Firms, the former is about one fifth of the latter. It might show that enhancement effect is stronger than entrenchment effect among C-Firms.

3.3 Estimation Results

Based on the panel data from 2007 to 2010, we estimate the specified regression equations for C-firm group and P-firm group separately.

At first, we use F test to test the fixed effects. Given a significance level of 1%, we reject the null hypothesis that there is only a common intercept and the null hypothesis that there is no cross-section fixed effect subsequently. But we cannot reject the null hypothesis that there is no period effect at 10% significant level.

Table 3. Overall Description of the Sample Data

C-Firms	I	CF	Q	MR(%)	CASH	MGR	DBAT	LNTS
Mean	0.0741	0.0610	2.8026	0.0198	0.1645	0.3054	0.5114	21.7570
Median	0.0439	0.0479	2.2122	0.0040	0.1284	0.1497	0.5378	21.6143
Max	1.3117	1.8144	16.6238	0.9820	0.7487	8.7890	0.8753	25.0580
Min	-0.9120	-0.5774	0.8600	0	0.0033	-0.9758	0.0372	14.4797
S.Dev	0.1394	0.1607	1.8616	0.0827	0.1376	0.9049	0.1497	1.2378
Obs.	372	372	372	372	372	372	372	372
P-Firms	I	CF	Q	MR(%)	CASH	MGR	DBAT	LNTS
Mean	0.0494	0.0572	3.0873	0.0999	0.1623	0.4828	0.4991	21.5547
Median	0.0244	0.0499	2.4007	0.0031	0.1377	0.1296	0.5119	21.5828
Max	1.9890	0.5900	23.6057	5.1380	0.7368	43.6071	0.9452	24.7154
Min	-0.2953	-1.3759	0.8242	0.0000	0.0012	-0.9861	0.0108	14.1082
S.Dev	0.1043	0.1440	2.3104	0.4477	0.1151	2.6417	0.1800	1.2244
Obs.	728	728	728	728	728	728	728	728

Secondly, we follow Hausman (1978) to test the cross-section random effects. We reject the null hypothesis that there is cross-section random effect at a significant level of 1%.

Lastly, we estimate the models with cross-section random effects. In case of heteroskedasticity between individuals, we choose feasible GLS method with cross-section weights. Table 4 reports the pooled regression results for C-Firms and P-Firms separately.

4. Results Interpretation

Let's first look at the results in Table 4 for group of C-Firms.

The estimated model 1 indicates that there is a significant linear relationship between investment and internal cash flow. The positive coefficient of CF is significant at level of 1% so that ICF sensitivities exist among central owned firms. The coefficient of Tobin's Q is estimated positive significantly at level of 1%. It reflects a positive relationship between investment level and Tobin's Q value. Lang, Ofek and Stulz (1996) use Tobin's Q as proxy of growth opportunities. Thus the estimated result reflects that central owned firms facing better growth opportunities will increase their investment. It is consistent to Tobin's Q Theory and Hennessy (2004) but contradict with Qu, et al (2011). Positive coefficients, which are significant at level 1%, of current cash stock and firm size reflect the positive impacts of current cash stock and firm size on investment decision, which is consistent to Tong and Lu (2005). Highly significant negative coefficient of the sale growth rate indicates that short-term investment opportunities have control effect to investment among central owned firms, which is different from both Cleary, et al. (2007) and that of Qu, et al (2011).

While we add the intersection term of CF and MR into Model 1, the coefficient of debt ratio becomes not significant at level 5% in Model 2. The estimated coefficient of the intersection term is negative and significant at level 1%. But while we further add the intersection of CF and squared MR into Model 2, Model 3 is estimated and tested to have redundant variable. The quadratic term is not significant even at level of 10%. It reflects that the ICF sensitivity is negatively and linearly associated with the managerial ownership among C-Firms. Therefore, Central owned firms face overinvestment problems. And the enhancement effect of managerial ownership dominates the entrenchment effect, or the entrenchment effect does not appear in central owned firms.

Now let's interpret the results in Table 4 for P-Firms. From the estimated Model 1, we have the similar economic interpretation for P-Firms. ICF sensitivity exists in private firms. Coefficients of Tobin's Q, cash stock, and firm size are statistically significant at level 1%, and make the reasonable economic senses as that for C-Firms. But the debt ratio and sale growth rate do not appear significant impact on the investment of private firms. While we add the intersection of CF and MR into Model 1, the estimated model 2 shows that there is no significant linear relationship between ICF sensitivity and managers'

ownership among P-Firms. However, the estimated Model 3 shows that ICF sensitivity, significantly at 1%, has an inverse U-shaped quadratic form of relationship with managers' ownership. According to the last row of Table 2 and the last column of Table 4, we say P-firms face problem of financial constraints, and entrenchment effect of managerial ownership dominates enhancement effect in private firms.

Table 4. Estimation Results for C-Firms and P-Firms Separately

Variables	C-Firms			P-firms		
	Model 1	Model 2	Model 3	Model 1	Model 2	Model 3
C	-1.5825*** (-6.7816)	-1.3001*** (-8.0771)	-1.3311*** (-9.7458)	-1.0846*** (-13.951)	-1.1309*** (-14.739)	-1.1199*** (-15.866)
$Q_{i,t}$	0.0064*** (5.8978)	0.0063*** (5.4869)	0.0060*** (5.1685)	0.0727*** (13.6116)	0.0788*** (14.0381)	0.0500*** (8.8725)
$CF_{i,t}$	0.2741*** (9.4770)	0.2809*** (8.3054)	0.3009*** (7.9241)	0.0074*** (12.7454)	0.0068*** (11.1843)	0.0065*** (10.9503)
$CASH_{i,t-1}$	0.3969*** (10.6780)	0.3831*** (10.0401)	0.3636*** (9.2663)	0.0344*** (3.5866)	0.0308*** (3.1223)	0.0233** (2.5511)
$DBAT_{i,t-1}$	0.0619** (2.3769)	0.0464* (1.7171)	0.0343 (1.2467)	0.0092 (0.9415)	0.0184** (2.0057)	-0.0159* (-1.6803)
$MGR_{i,t-1}$	-0.0064*** (-2.1248)	-0.0075*** (-2.8549)	-0.0072*** (-2.7873)	-0.0008 (-0.8338)	-0.0006 (-0.6950)	-0.0002 (-0.1927)
$LNTS_{i,-1t}$	0.0070*** (6.6151)	0.0575*** (8.0591)	0.0593*** (9.8491)	0.0508*** (14.3772)	0.0529*** (15.1345)	0.0533*** (16.6471)
$CF_{i,t} MR_{i,t}$		-15.8717*** (-2.8130)	-109.4037* (-1.6585)		-10.8570 (-1.5360)	90.3924*** (4.5619)
$CF_{i,t} MR_{i,t}^2$			13813.70 (1.4320)			-4637.5*** (-5.2168)
Adj.R ²	0.8302	0.8903	0.9382	0.8427	0.8272	0.8127

When comparing the results for C-Firms and P-Firms, we find that ICF sensitivities appear in both central owned firms and private firms; managers' ownership affects ICF sensitivities in different patterns; ICF sensitivities among C-firms depend on managerial ownership linearly because of the dominant enhancement effect of managerial ownership on managers, but ICF sensitivities among P-firms depend on managerial ownership nonlinearly because of the dominant entrenchment effect of managerial ownership on managers; Central owned firms face problem of overinvestment derived by agency cost, but private firms face problem of underinvestment due to financing constraints; Facing better future prospect or long term investment opportunity, both C-firms and P-Firms prefer to increase their investment level; Short-term opportunities have control effect in central firms but not in private firms, the possible reason is that private firms pay more attention on short term investment opportunities than central firms do; Either internal cash flow or cash stock has much higher effect on investment in central firms than in private firms.

5. Conclusion

The share reform of ownership inside listed companies in China had been finished until the end of 2006, and a new fiscal system began to implement in China's stock market since the beginning of 2007. Chinese economy is a mixed economy and central owned enterprises have distinctly different nature of ownership with private or non-state owned enterprises. Therefore, we investigate investment behaviors of

Chinese listed companies during a period from 2007 to 2010, and study differences between central owned firms and private or non-state owned firms in aspect of investment sensitivity to internal cash flow and the effect of managers' ownership on ICF sensitivities. We find that ICF sensitivities among C-Firms are much higher than that among P-Firms, managerial ownership appears dominant enhancement effect among C-Firms but entrenchment effect among P-Firms, and C-Firms face problem overinvestment but P-Firms face problem of underinvestment. Some other meaningful differences are also demonstrated.

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