

# **Ownership, Cash Flow, and Investment**

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## **Abstract**

For the reason why internal cash flow can influence investment there exist two alternative explanations, i.e., Free-Cash-Flow Hypothesis associated with overinvestment and Asymmetric-Information Theory indicating underinvestment. It is important to distinguish the two explanations. This paper takes ownership factor into account and empirically examines investment-cash flow sensitivity based on the data of listed companies in China from 1998 to 2001. We find that, in the companies controlled by local governments or local state-owned enterprises (SOEs), the investment-cash flow sensitivity decreases as the largest shareholder's holding increases; while in the companies controlled by central government, non-state-owned entities or natural persons, the sensitivity does not decline as the largest shareholder's holding increases. Our results suggest that there exist free cash flow problems in the companies controlled by local governments or local SOEs.

**JEL classification:** G32; G34

**Key words:** State Ownership, Investment-Cash flow Sensitivity, local government, SOE

## 1. Introduction

A vast literature on the relationship between firm investment and financing decision illustrates that corporate behavioral departures from the perfect-capital-market pattern indicate a role for internal funds. Excess liquidity generated from cash flow is the major source of internal funds for investment. Besides, firms conduct external financing by equity offerings, debt issues and mortgage loans. Ideally, in a perfect capital market, the internal financing cost and external financing cost should be equivalent and the investment is independent of internal capital and cash flow. The presumed independence provides scholars with an empirical hint to verify whether the capital market is perfect through the correlation between firm investment and financial proxy variables indicating firm's liquidity. Prior literature finds out that the free cash flow essentially influenced firm capital expenditure.<sup>1</sup> However, so far no articles can explicitly explain the hidden reasons for the sensitivity of investment to free cash flow.

There exist two competing explanations for the investment-cash flow sensitivity. One is Free-cash-flow Hypothesis proposed by Jensen (1986). It deems that because managers hold the incentives to maximize their own benefits (for example, they enlarge the company for the scale-based performance compensation), the actual investment amount may exceed the optimal scale. However, the managers do not have to pay for the mistaken investment decision or only pay a little for it. The large control ownership in China aligns the interest of managers closely with that of the large shareholders. The agency cost in firms now largely derives from the interest wedge between large shareholders and minority shareholders. The minority shareholders will suffer most of the risk and loss, namely the agency cost, which is stemmed from overinvestment. This directly harms the interests of minority shareholders who are deprived of cash flow rights. Furthermore, from a broader perspective, the agency problem results in waste of social economic resources by capital misallocation.

The other explanation, Asymmetric-information Theory, is initiated by Myers and Majluf (1984). According to their viewpoint, when the capital market is imperfect, there exist divergence between outside investors and insiders due to asymmetric information.

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<sup>1</sup> A partial list of studies in this area includes Fazzari, Hubbard and Peterson (1988), Hoshi, Kashyap and Scharfstein (1991) and Lamont (1997).

As a result, outside investors will require premium for the capital invested in and the external financing cost overrun the internal financing cost. Then, the increasing external financing cost compels managers to prefer funds internally generated. Under this situation, the investment scale will be heavily sensitive to free cash flow. Due to the high external financing cost, company will abandon some valuable projects with positive NPV in order to reduce the external financing and thus the underinvestment problems emerge. This not only negatively affects the firm value and shareholder's wealth maximization, but also to some extent lessens the allocation efficiency of social economic resources.

In a transition economy such as China, improving the efficiency of capital allocation is critical. This paper tries to distinguish whether asymmetric information or free cash flow problem is valid in the China's transition economy context.

In terms of the owner's nature, listed companies in China can be classified into two broad groups, one group of firms are owned by the state, and the other group of firms belong to the non-state sector. The companies in the former group share the common characteristics that they are state-owned with concentrated ownership and the controlling shareholders of them dominate in investment decisions. Among companies controlled by the state, some of them are controlled by central government and the remainders are labeled as companies controlled by local government or local SOEs. For the group of firms controlled by central government, their largest shareholders are central government ministries/ commissions, or national industrial companies which were either established by the state to develop major industries or restructured from former central government industry management institutions.<sup>2</sup> For the group of companies controlled by local government, their largest shareholders are provincial or municipal bureaus of finance, local state asset management bureaus which were set up to administer the state-owned assets, or local state assets operating companies. For the companies in the non-state sector, their largest shareholders are non-state legal persons including collectively owned enterprises, township and village enterprises, or private companies or natural persons<sup>3</sup>. Basing on the differences in their connection with government and incentive mechanism, we conduct our analysis of free cash flow problems according to the types of firms'

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<sup>2</sup> The shareholder types for state-owned companies and those in the private sector are in line with Chen and Wang (2004).

<sup>3</sup> Natural person means individual persons.

controllers.

The private benefits of managers, such as promotion and income, are tied up with large shareholders, especially with the largest shareholder. For example, in Chinese SOEs, because the human capital market for managers is not competitive, most of the top managers are appointed by the government or the parent companies. The private benefits of managers are closely tied with large shareholders. The fact that the large shareholders dominate in the decision-making makes it possible for them to expropriate the minority shareholders. With the sample companies from 27 countries, La Porta, Lopez-de-Silanes, and Shleifer (1998) find that, for the large companies all over the world, the agency problem is mainly stemmed from the expropriation of minority shareholders by large shareholders. When the largest shareholder's ownership percentage is relatively low, the large shareholders and managers together depart from the minority shareholders and seek for private benefits as many as possible. To illustrate, company expansion facilitates the expropriation and tunneling via related-party transactions, though it is not always an investment with positive NPV. When the ownership increases, large shareholders are more aligned with minority shareholders. If the ownership continuously increases, due to the entrenchment effect, the large shareholders take advantage of their control rights to expropriate the minority shareholders, and the alignment between large shareholders and minority shareholders may decrease after it peaks at certain level, presenting a non-monotonic pattern. By observing the economy of eight Asian countries, Claessens, Djankov, Fan and Lang (2002) conclude that the firm value increases in the largest shareholder's cash-flow ownership and thus the shareholdings have positive incentive effects. However, the firm value declines, when the largest shareholder's control rights overrun his cash-flow rights. This non-monotonic relationship is in line with our conjectures.

The analysis above provides a picture on the nature of firm controllers and the agency problems associated. We then demonstrate that the companies controlled by local government or local SOEs suffer from free cash flow problems, in that their investment-cash flow sensitivity decreases with the largest shareholder's holding (a proxy for interest alignment between large shareholders and minority shareholders) increasing. We find that in those companies controlled by central-government, the largest

shareholder's holding hardly predict the investment-cash flow sensitivity. This type of companies is large in size and operates in the key industries, such as petrochemical, telecommunication and natural resources. They are vital to the national economy and development and policy-oriented rather than profit-oriented. If the central government plans to protect or to encourage certain types of SOEs out of policy necessity, funding will go to them even if they are short of cash. Hence, the investment decisions of SOEs controlled by central government are conceivably not related much to the cash flow situation of the firms. Besides, we also find that in companies controlled by non-state legal persons or natural persons, there exist no free cash flow problems.

We analyze the financing and investment behavior of Chinese listed firms by contrast with prior research focus on U.S. companies with a diffuse ownership structure. This paper contributes to the literature by providing empirical evidence to support Free-Cash-Flow Hypothesis in the context of transition economy. Our results may be generalizable to other parts of the world because concentrated corporate ownership in China as compared to diffuse corporate ownership in the U.S. and the U.K. is a more representative corporate ownership structure throughout the world. Considering hierarchical political connections between controlling shareholders and associated government agencies as well as the agency problem, we further compare and contrast the potential effect of ownership on investment-cash flow sensitivity among firms with different types of firm controllers. To our knowledge, this is the first study to conduct such a comparison among Chinese firms, and we find important differences between firms with various types of firm controllers. From the perspective of practitioners, our research enhances the understanding of the two interpretations for the investment-cash flow sensitivity above against the background of various firm controller types in China. For policy makers, our research provides a decision aid for identification of underinvestment or overinvestment, and contributes to a better understanding of policy orientation with respect to the corporate ownership structure. Because firm investment decisions determine the allocation efficiency of economic resources and firm competitive edge, and furthermore, generally affect the industry competitive edge, our research may help the interest-related groups make correct decisions.

The remainder of this article proceeds as follows. In section 2, we review the existing

literature on theoretical and empirical research. In section 3, we follow previous theoretical models to discuss the asymmetric information problem and the free cash flow problem in an intuitive way. In section 4, the empirical model is specified and we present descriptive profile of the sample and variables in section 5. In section 6, the empirical results and analysis are reported. Then in the last section comes the conclusion part.

## **2. Literature review**

### **2.1. Literature review**

Hadlock (1998) argues that the free cash flow problem is directly associated with agency cost of management. Hadlock expands on the investment-cash flow sensitivity research by taking the insider ownership as a proxy of interest alignment between managers and shareholders. With 435 U.S. companies from 1973 to 1976, he demonstrates that firm investment-cash flow sensitivity first increases at the beginning and then decreases when insider ownership increases. The findings are consistent with the Asymmetric-information Theory. His conclusion is achieved against the background of U.S. capital market where corporate ownership is generally diffused. Given the different settings in transition capital market in China, i.e., concentrated ownership, large state-owned shares, lack of monitoring on large shareholders and absence of protection for minority shareholders, it is desirable to closely examine how the ownership structure influences firm investment-financing behavior.

From summary statistics, Zhou (2002) finds that the companies in wine industry had stable earnings in China during year 1998 to 2000. Those companies held sufficient cash flow and invested extensively into many other businesses. He then concludes that the free cash flow problem is severe in those companies. The evidence displayed in Zhou's study indicates that Chinese listed companies may be involved with overinvestment and economic resources waste. However, he does not provide convincing analysis for the phenomena observed.

Following the model developed by Fazzari et. al. (1988) and using data from 135 listed companies from 1995 to 1997, Feng (1999) finds out that for the companies that offered dividend per share less than 0.05 *yuan*, or belonged to non-government-supported industry, the cash flow played a significant role in investment decision. He concludes that

these companies were confronted with financial constrain as a result of asymmetric information. Fazzari et al (1988) categorize the companies according to the dividend payout ratio and their preposition is that those companies with low dividend payout ratio must possess good investment opportunities. By contrast, the companies would pay high dividend if they do not have or have few projects with positive NPV to invest in. However, the dividend payout of Chinese listed firms is very low on average. Large shareholders of China listed companies would not like to pay dividends because they can always get extra benefits from expropriation by transactions with related parties and thus transfer profit without dividend payout. Consequently the dividend payout ratio can hardly reflect the investment opportunities for Chinese firms. Therefore, the argument that the level of dividend payout suggests investment opportunities is not valid in China. Additionally, Vogt (1994) finds that, among the companies with low dividend payout ratio, those with huge tangible investment and in large size tend to suffer free cash flow problems, but other companies with low tangible investment and in small size are mostly involved with asymmetric-information problems. Thus in China capital market it is arbitrary to conclude that the companies have asymmetric-information problems if they offer little dividend and show heavy investment-cash flow sensitivity.

Sun and Tong (2003) evaluate the performance change of listed SOEs in China and find that share issuing privatization (SIP) is effective in improving SOEs' total income, sales, and productivity, but is not successful in improving profit returns. Sun and Tong also find state ownership having negative impacts on firm performance. Our findings imply that the free cash flow problem for local government owned SOEs could lead to low investment return and deteriorate of firm value though the enlarged investments bring growth. Wang and Xu (1999), Tian (2002) and Bai et. al. (2004) have similar results as Sun and Tong (2004). Bai et. al. (1997) use a model to show that when firms are not profit maximizers for whatever reason, higher productivity may actually lead to greater allocative distortion, lower profits, and lower economic efficiency. They argue that these conditions hold for Chinese SOEs. Their conclusion is theoretically in line with our findings and analysis. The overinvestment triggered by agency problem in local government controlled firms decreases allocation efficiency, even more severe for those seemingly well-operated firms with high investments.

Xu et. al. (2005) also find that ownership structure can influence firm performance. In addition, they find that the effect of operating autonomy on firm performance is negative, which suggests serious agency problems in the reformed enterprises in China. After ownership reform since 1980s in China, managers held more decision-making autonomy and thus had a strong incentive to use their newly acquired power to pursue their own self-benefit. As a result, it is possible to increase agency costs, especially when other monitoring mechanisms used to counter managerial moral hazard are weak or absent. The problem is so serious that it prompts Lin et. al. (1998) to argue that expanding managerial autonomy of SOEs will worsen the agency problems. Our paper shows the direct evidence of the agency problems leading to free cash problem in investment decisions in local government owned firms, thus supports Xu et. al. and Lin et. al.'s argument.

## **2.2 Relations to literature**

Referring to the ownership structure of Chinese listed companies, two unique characteristics stand out. First, state shareholders substantially influence business operation, including the investment and financial policies. Second, the state shareholders are discriminated according to their political association with hierarchy government agencies. The companies controlled by central government and those controlled by local government or local SOEs significantly differ in external financing channels and the monitoring of internal funds utilization. Consequently, the ownership structures in these two types of companies should influence the sensitivity of investment to cash flow in different ways. Basing on the analysis above, especially for the unique ownership structure in Chinese companies, we analyze the sensitivity of investment to cash flow according to various types of firm controllers, and provide explanations for the sensitivity.

In this paper we find that, in the companies controlled by local government or local SOEs, when the ownership of the largest shareholder rises, the sensitivity of investment to cash flow will cut down. However, in those companies controlled by central government or non-state-owned entities, the sensitivity does not decline as the largest shareholder's ownership increases. The findings suggest that there exists overinvestment

and free cash flow problem in companies controlled by local government or local SOEs. From the perspective of investment-cash flow sensitivity, we provide new empirical evidence to support Free-cash-flow hypothesis. The overinvestment and free cash flow problems may be symptoms of inefficient capital allocation due to ownership structure. Those problems reduce the corporate competitive edge, and also negatively affect the industry competitiveness of a country.

We also find that, for various types of controllers, the significance of agency problem is different, and consequently the pattern and magnitude of its influence on investment-cash-flow sensitivity are not the same either. It is necessary and valuable to investigate the corporate governance and investment-cash-flow sensitivity among companies with different type of controllers respectively. Based on the identification of the type of controller, our study demonstrates that state controlled firms are different from non-state controlled firms with respect to investment problems. Furthermore, among state controlled firms, local government controlled firms are different from central government controlled firms in free cash flow problems.

Allen et. al. (2004) argue that on aggregate, the State sector is not as productive as Private sector in China. The growth rate for investments in fixed assets in State sector, Listed Sector and Private sector are comparable, however, the Private sector grows at a much higher rate than the State sector and Listed Sector. While Allen et. al. study China 's economic growth at a aggregate level, our paper looks into the listed sector particularly. We find in listed sector, local government controlled firms have serious free cash flow problems, while there is no evidence that non-state controlled firms have free cash flow problems. Our findings can provide a reasonable explanation to Allen et. al.'s findings.

### **3. Theory and model on managerial incentive and investment**

#### **3.1 Asymmetric information problem and under-investment**

We follow the manager incentive-investment models developed by Myers and Majluf (1984), Daniel and Titman (1995) and Hadlock (1998). To efficiently clarify their conclusions, we only illustrate the main steps and simplify the rigorous proof procedure. We define  $\alpha$  as the proxy for interest alignment between large shareholders and minority shareholders. It also can be regarded as the internalized shareholder investment return by

managers. We delineate the timing of the model as follows. At date 0, the firm holds an asset with quantity of  $A$  and a realized operating cash flow  $c$ . At date 1, a quantity  $e$  of external funds raised from an equity issue is determined. After raising the external funds, the manager chooses an investment level  $i \leq c + e$ . At date 2, the firm realizes liquidity from the summation equal to the value of the date-0 asset in place, plus the returns from date-1 investment, plus any unused date-1 investment funds. Suppose no discounting, and the gross investment returns at a level  $i \leq i_e$  at date 1 are  $gi$ , where  $g > 1$ . We make following assumptions to simplify our model: (1) any investment above  $i_e$  can yield no additional returns above  $gi_e$ , (2) the efficient level  $i_e$  should be considered as investment-budget bundle for managers, (3)  $i_e$  is less than  $c$  so that external funds are needed for efficient investment.

The manager and large shareholders know the exact value of  $A$ , which is either  $A_h$  (a high-type firm) or  $A_l$  (a low-type firm), where  $A_h > A_l$ . However, the minority investors only know that the firm is a high type with probability  $p$ , and a low type with probability  $1 - p$ . Additionally, we assume the manager and large shareholders have a preference for size that can be represented by a utility payoff of  $\gamma i$  when they invest at a level  $i$ , where  $\gamma > 0$ .  $\mu(e)$  denotes the probability that the minority investors consider the firm as a high type after it announced an equity financing decision in quantity of  $e$ . Then we obtain the minority shareholders' expected value of the firm's asset following the announcement,  $A(e|\mu) = \mu(e)A_h + (1 - \mu(e))A_l$ . All of the external funds will be spent by manager and large shareholders on investment, thus  $i = e + c$ . Given a set of  $e$  and  $\mu$ , we have  $s(e|\mu) = e/[A(e|\mu) + g(c + e)]$ . Conditional on the preference of manager and large shareholders, the objective of them of a type  $j \in \{h, l\}$  is to maximize

$$\alpha [1 - s(i - c | \mu)] [A_j + gi] + \gamma i \quad (1)$$

To derive equilibrium investment level, it is useful to substitute  $i = e + c$  and the expression for  $s(e|\mu)$  into (1). The manager and large shareholders' payoff when they raises  $e$  in external funds from minority shareholders is then

$$[\alpha(g-1)+\gamma](e+c)+\alpha\frac{(A(e|\mu)-A_j)e}{A(e|\mu)+g(e+c)} \quad (2)$$

The investment –financing signaling game presented above is typical and similar to the project-scaling models of Daniel and Titman (1995). The unique equilibrium is a separating equilibrium, in that the low type will finance to invest at the efficient level  $i_e$ , and the high type invests at some level  $\bar{i} < i_e$  due to the high cost of external finance. In equilibrium status, the external funds raised by the high type are exactly equal to the amount where the low type is indifferent between following her equilibrium strategy and shrinking investment to sell overpriced shares. Using (2), this point is characterized by

$$[\alpha(g-1)+\gamma](i_e-\bar{i})=\alpha\frac{(A_h-A_l)(\bar{i}-c)}{A_h+g\bar{i}} \quad (3)$$

The left side of (3) is the utility loss of the low-type manager and large shareholders due to inefficient investment. The right side of (3) is the utility gain to the low-type manager and large shareholders from selling overpriced shares. Intuitively, when the  $\alpha$  increases and the investment level of high-type firm keep constant at  $\bar{i}$ , the right side of (3) will exceed the left. To maintain the equilibrium,  $\bar{i}$  must be reduced. If the internal cash flow is lower than the equilibrium investment level  $i_e$ , investment decision of firms with high  $\alpha$  will be influenced by cash flow more significantly. In sum, we have

**proposition 1:**  $\frac{\partial i}{\partial \alpha} < 0$ ,  $\frac{\partial i}{\partial c} > 0$ ,  $\frac{\partial^2 i}{\partial \alpha \partial c} > 0$ . As the theoretical model illustrates, when  $\alpha$  turn to be larger, the investment-cash flow sensitivity will increase simultaneously<sup>4</sup>.

### 3.2 Free cash flow problem and over-investment

The body of agency problem literature provides a general framework for analyzing its effects on financial decisions. The Free-cash-flow Hypothesis, initiated by Jensen(1986), suggests that because managers maximize private benefits derived from scale-based proceeds and do not have to afford all the risks in overinvestment, they are strongly motivated to spend free cash flow on projects with negative NPV when they can

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<sup>4</sup> The rigorous proof is available. Please refer to Daniel et al. (1995) and Hadlock (1998) for details.

charge internal funds more than the amount necessary for profitable opportunities. Due to the external constraints on managers, they will not finance externally when the internal funds are not sufficient. However, when the internal funds are ample, managers will exhaust them to invest as much as possible, and consequently investment is positively correlated with cash flow.

If the Free-cash-flow Hypothesis is reasonable, the agency problem is serious in low- $\alpha$  companies, and consequently the Free-cash-flow agency problem is exacerbated. The investment is rather sensitive to cash flow and overinvestment emerges because large shareholders maximize private benefits associated with investment scale. When the alignment between large shareholders and minority shareholders increases in  $\alpha$ , the agency problem is alleviated and the investment decision is more prudent. As a result, the sensitivity of investment to cash flow declines.

#### **4. Empirical model**

##### **4.1 Ownership of the largest shareholder as a proxy for $\alpha$**

In Chinese listed companies, the incumbency benefits of managers closely adhere to large shareholders, especially to the largest shareholder. Therefore, in the empirical tests, it is reasonable to let the ownership of the largest shareholder denote the alignment between large shareholders and minority shareholders. If the free cash flow problems are assumed to be important, i.e., the sensitivity of investment to cash flow is the result of manager's self-benefit motivation to enlarge investment, given the interest alignment between large shareholders and minority shareholders increasing in the largest shareholder's holding, the investment-cash flow sensitivity will slip. On the contrary, if the asymmetric-information problems dominate, when the ownership of the largest shareholder rises and the alignment between large shareholders and minority shareholders strengthens, underinvestment problem is deteriorated and the investment-cash flow sensitivity increases accordingly.

##### **4.2 Regression model**

Many factors will affect firm investment decisions.  $Q$  model argues that firm value is a determinant of capital expenditure and Tobin's  $Q$  is positively correlated with

investment. The Accelerator Model stresses that the output stimulates investment. We include both beginning-of-year Tobin's  $Q$  and revenues as control variables. Meanwhile, due to the friction in capital market, external financing cost overruns internal financing cost and the funds internally generated will influence the investment spending. Additionally, we capture the ownership structure effect with the interaction term of cash flow and the largest shareholdings. The baseline model is constructed as follows

$$\frac{I_{it}}{K_{i,t-1}} = (\text{controls}) + \beta_1 \frac{\text{Sales growth}_{i,t-1}}{K_{i,t-1}} + \beta_2 Q_{i,t-1} + \beta_3 \frac{\text{Cashflow}_{i,t-1}}{K_{i,t-1}} + \beta_4 \frac{\text{Cashflow}_{i,t-1}}{K_{i,t-1}} \times \text{Sshr}_{it} + \varepsilon_{it} \quad (4)$$

Where  $i$  refers to the firm  $i$ .  $I_{it}$  is the capital investment at date  $t$ .  $K_{i,t-1}$  is the book value of total assets at date  $t-1$ .  $\text{Sales growth}_{i,t-1}$  is the growth of revenues in year  $t-1$ .  $Q_{i,t-1}$  is the Tobin's  $Q$  at date  $t-1$ , equal to the ratio of the market value of assets divided by the book value of assets.<sup>5</sup>  $\text{Cashflow}_{i,t-1}$  is the free cash flow at date  $t-1$ , equal to net income minus preferred dividends plus depreciation for current year plus annual change in deferred tax.  $\text{Sshr}_{it}$  is the ownership of the largest shareholder. *Controls* include other control variables.

According to the analysis above, when the Free-cash-flow Hypothesis in line with overinvestment is true, the coefficient  $\beta_4$  must be negative. In contrast, if the Asymmetric-Information Theory is true, we expected positive  $\beta_4$ .

## 5. Sample and data

### 5.1 Data

Our initial sample consists of the listed companies from year 1998 to 2001. Financial statement data and trading data are from the Sinofin Database. To identify the types of firm controllers, we manually search companies' annual reports. We classify the firm controllers into several groups, including central government, local government, local

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<sup>5</sup> The detailed calculation formula is (total market value of stocks including non-tradable shares + book value of long-term debt) / (book value of total assets), where total market value of stocks including non-tradable shares is available in Sinofin Database. The total market value of stocks is equal to market value of tradable A shares + book value of non-tradable A shares + B-share year-end price in foreign currency  $\times$  total B shares  $\times$  exchange rate + H-share year-end price in foreign currency  $\times$  total H shares  $\times$  exchange rate.

SOEs, non-state legal person, natural persons, employee committees and foreigners.

First of all, considering the occasional shock of merger and consolidation on firm investment and cash flow status, we eliminate the companies that experienced assets restructuring and substantially changed primary business during 1998 to 2001. Second, because of the special nature of financial and insurance firms, these firms are excluded. Third, a firm-year observation is included in our final sample only if all of the variables are available. Fourth, to ensure the consistent explanation of regression results, the final sample only includes those companies with positive investment and cash flow from 1998 to 2001. Because few companies are ultimately controlled by foreigners or employee committees, we did not run regression on the two groups. Finally, our data selection procedure yields 1767 firm-year observations for firms controlled by local government or local SOEs, 299 firm-year observations for firms controlled by central government, 197 firm-year observations for firms controlled by non-state legal persons, and 182 firm-year observations for firms controlled by natural persons. We utilize unbalanced panel data in order to keep the sample size large enough in each group.

## **5.2 Summary statistics**

Table 1A and 1B illustrate the ownership distribution of the largest shareholder for local government and local SOEs controlled firms in the whole sample period from 1998 to 2001 and in a single year 2000 respectively. Table 1A reports ownership of firms controlled by local government or local SOEs and Table 1B reports ownership of firms controlled by central government. In Table 1A, among 1,767 firm-year observations of companies controlled by local government or local SOEs from year 1998 to 2001, mean ownership of the largest shareholder is 45.39%, and standard error is 17.07%. The distribution is relatively scattered. The cross-sectional distribution of ownership in 2000 is similar to the distribution of the panel data within entire sample.

Table 2 and Table 3 provide medians of relevant variables for firms controlled by central government and local government or local SOEs in year 2000. With increase in the ownership of the largest shareholders, investment and cash flow both present non-monotonic properties. Meanwhile, Tobin's  $Q$  decreases monotonically and the

dividend payout increases. However, it is arbitrary to judge the existence of free cash flow problem or asymmetric information problem from the summary statistics. Kaplan and Zingales (1997) argued that the high cash balance does not surely indicate financial constraints. Calomiris and Himmelberg(1995), Calomiris, Himmelberg and Wachtel (1995), and Houston and James (1996) all found that those companies facing financial constraints held a huge amount of cash in stock and working capitals. Thus, the conjecture derived from summary statistics may be misleading.

## **6. Empirical results and analysis**

### **6.1 Baseline model**

Because of the large sample of local government or local SOEs controlled companies, we run regression with this group first. We control for the firm-specific and time-specific fixed effects. In the first column of table 4, we report the regression results of the baseline investment-cash flow model for local government or local SOEs controlled companies from 1998 to 2001. The investment is sensitive to cash flow and the coefficient is 0.246. Tobin's  $Q$  is significant at 1% level. This indicates that the better the company's market performance, the more it invests. The coefficient of cash flow is positively significant at 1% level, which shows that firm investment is influenced by internal funds and is substantially sensitive to cash flow. In the second column, we take the trigger effect of output on investment into account. The coefficient of the sales growth is negative but insignificant. Both the cash flow and Tobin's  $Q$  are significant at 1% level. However, we can not conclude that the sample companies are financially constrained, because at this situation, the Free-cash-flow Hypothesis and Asymmetric-Information Theory both can explain the empirical results. On one hand, firms may have difficulties in external financing for investment because of asymmetric information. On the other hand, the sensitivity can be explained by manager's opportunistic behavior, i.e. they seek private benefit by investing on projects with negative NPV to obtain returns on investment scale. Consequently, the alignment between large shareholders and minority shareholders should be considered to determine which explanation is valid.

We include the largest shareholdings as the proxy variable for the alignment between large shareholders and minority shareholders and add the interaction term of cash flow

and the largest shareholder's holdings into regression model. In the third column of Table 4, the coefficient of the interaction term is -0.755, which is significant at 1% level. This illustrates that when the interest alignment between largest shareholders and minority shareholders increases in the largest shareholder's ownership, the investment-cash flow sensitivity decreases. These results are consistent with the Free-cash-flow Hypothesis.

## **6.2 Robustness check**

### **◆ Supplementary control variables**

To further check the robustness of the baseline model, we additionally consider other factors that may affect investment-cash flow sensitivities and take their interactions with cash flow as control variables. Vogt (1994) proposed that, for low-dividend firms, if the Free-cash-flow Hypothesis is assumed to be true, Tobin's  $Q$  should be a contrarian signal of investment-cash flow sensitivity. By contrast, if the asymmetric-information theory is reasonable, these two things increase simultaneously. In the column 4 of Table 4, we include the interaction between cash flow and  $Q$ . The coefficient is -0.014 and is significant at 10% level, which are similar to Hadlock's findings and evidence the existence of free cash flow problem in our sample. In the column 5, the coefficient of interaction term between cash flow and firm age is significantly negative. It shows that as firm grows, more financing channels are available and then the investment-cash flow sensitivity declines. In column 6, we include the interaction between cash flow and firm size, the coefficient is negative and insignificant. This suggests that investments of large companies are not more sensitive to cash flow than those of small companies, similar to the results of Hadlock (1998).

The effect of the largest shareholder's ownership on investment-cash flow sensitivity is significant after we include several control variables such as firm age, firm size and Tobin's  $Q$ . The robustness checks provide solid evidences to support our argument that the free cash flow problems play a substantial role on investment-cash flow sensitivity.

### **◆ Alternative sample periods**

We also run the same regression with observations from year 1998-2002, 1997-2000, and 1999-2001. The results are similar to those we obtained above and all of them

support Free-cash-flow Hypothesis.<sup>6</sup> Our empirical evidence is broadly consistent with the predictions of Free-cash-flow Hypothesis.

#### ◆ Comparing subsamples based on shareholdings

With the data in a single year 2000, we run the regression by grouping firms according to the largest-shareholdings quartiles. The results are shown in Table 5. The coefficient of the cash flow term in each group is significantly positive and shows that the investment is sensitive to cash flow. When the shareholdings go upward from left to right, the cash flow coefficient decreases from 0.977 in group (1) to 0.239 in group (3). The alignment between largest shareholder and minority shareholders increases as the largest shareholder's holdings increases and the investment-cash flow sensitivity falls. These results support the Free-cash-flow Hypothesis. Furthermore, if the shareholdings keep increasing, cash flow coefficient rebound to 0.623 in group (4). Consistent with entrenchment effect<sup>7</sup>, when the largest shareholder's holding reaches certain level, the alignment between large shareholders and minority shareholders declines and investment-cash flow sensitivity increases.

### 6.3 Regressions with other types of controllers

Table 6 presents the regression results of investment-cash flow model with observations from companies controlled by central government. In the column 1 to column 4, the cash flow coefficients are not significant, which demonstrate that in this kind of companies investment is not sensitive to cash flow. Taking into account the effect of ownership structure, we find that the interaction term of the largest shareholder's ownership and cash flow is positive in column 3 to column 5. No evidence supports that the companies owned by central government face the free cash flow problems. These companies differ from those controlled by local government or local SOEs in financing, investment and monitoring as they are in vital industries and are more tightly monitored by central government. Given different external financing channels and internal governance, the investment-cash flow sensitivity shows different patterns.

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<sup>6</sup> The results of the robustness check with alternative sample periods are not reported here but are available upon request.

<sup>7</sup> Refer to Morck, Shleifer and Vishny (1988), McConnell and Servaes (1990), Hadlock (1998), Claessens et al (2002), and Fan and Wong (2002).

The first three columns of Table 7 report the results when we run the investment-cash flow model on non-state legal persons controlled companies. The coefficient on cash flow interacted with shareholdings is positive but not significant. The results are similar when we include interaction terms of cash flow with Tobin's Q, age and size. The last three columns of Table 8 show the regression results for companies controlled by natural persons. The interaction term of cash flow with shareholdings is positive but not significant. As a result, it is impossible to identify whether the free cash flow problem or asymmetric-information problem these companies face.

The empirical results above show that firms with various types of firm controllers face different financing and investment problems, and the sensitivities of investment to cash flow have different patterns. Therefore, it is necessary to classify companies into groups according to their controller types when we investigate the investment-cash flow sensitivity.

#### **6.4 Discussions**

One may cast doubt on our conclusion that companies controlled by local government or local SOEs suffer free cash flow problems by arguing that the increasing largest shareholder's ownership broadens the financing channels, enhances the financing capacity with debt, and reduces the reliance on internal funds. Although the investment-cash flow sensitivity will decrease under this situation, it is irrelevant to free cash flow problems. However, assuming the doubt is true, i.e., the observed decrease in sensitivity of investment to cash flow is caused by less financial constrain stemmed from large shareholdings, we would expect the investment-cash flow sensitivity to decline monotonically. Table 5 exhibits that the sensitivity slips downward with rise in shareholdings and rebounds when the shareholdings exceed certain level. In another word, the investment-cash flow sensitivity displays a non-monotonic pattern. This refuses the argument that investment-cash flow sensitivity may be caused by less financial constrain associated with high shareholdings.

Additionally, if the pattern that investment-cash flow sensitivity declines as largest shareholder's holding increases results from more access to external financing given high ownership, we would expect that in the companies controlled by central government, the

investment-cash flow sensitivity decreases as the largest shareholding increases as well. However, our empirical results show the opposite. Meanwhile, if the above argument is valid, the investment-cash flow sensitivity should also decline as the largest shareholder's holding increases in non-state-controlled companies. However, we did not find similar pattern in the non-state-controlled companies.

At last, the exogeneity of ownership may not be taken for granted. Companies can choose optimal ownership structure based on the problems they face, i.e., underinvestment related to asymmetric information problem or overinvestment associated with free cash flow problem. For example, the companies with severe free cash flow problems are intended to adjust the largest shareholder's ownership to relatively higher level. If this is true, these companies with high Free-cash-flow agency cost would be likely to show up in the data with high investment-cash flow sensitivities and high largest shareholder's ownership. However this is not consistent with the empirical findings in Table 5.

Slovin and Sushka (1993) documents that the corporate ownership structure and incentive mechanism may not keep at the optimal level, i.e. ownership can not reflect the simultaneous changes in the degree of free-cash-flow problem or asymmetric-information problem. In addition the concern on ownership being endogenously determined may not be serious in our case particularly. In China, state and legal person ownership are most likely exogenous because they are created based on government policy, ideology, and quota system, which are not endogenous to the SOEs. In Chinese listed firms, there exist large amount of non-tradable state shares and transfers of state shares must get approval from government. Consequently, the frequency of ownership structure change is low. Therefore it would appear unlikely that ownership is chosen and adjusted to mitigate the free cash flow problems or asymmetric information problems.

## **7. Conclusions**

Prior studies on firm financing and investment policies find out that the internal funds are preferred. However existing literature has not clearly shown whether the Asymmetric-information theory or the Free-cash-flow Hypothesis is valid in explaining the investment sensitivity to cash flow.

Based on the investment signal model and theoretical analysis, we propose that, when Free-cash-flow Hypothesis related to overinvestment is true, the investment-cash flow sensitivity will fall when the largest shareholder's holding rises; when Asymmetric-information Hypothesis associated with underinvestment is relevant, the investment-cash flow sensitivity will increase as the largest shareholder's holding increases.

With data from Chinese listed companies from 1998 to 2001, we examine the empirical models on investment-cash flow sensitivity. We document the existence of free cash flow problems in companies controlled by local government or local SOEs. However, there is no evidence that the companies controlled by central government, non-state legal persons or natural persons have free cash flow problems. Our findings that SOEs have free cash problems are in line with prior studies that found SOE reforms in China are not successful in improving SOE performance and value. We argue that the main problem lies with the ownership structure that prevents the corporate governance to be effective. Essentially the local government still keeps a major control on a large number of partially privatized SOEs so that free cash flow problem decrease the investment efficiency and thus the capital allocation is not efficient. The implications of our findings are clear. State shares should be further reduced especially for local government controlled firms. Chinese government and financial industry have been discussing the plan that makes the state-owned shares tradable thus state share could be reduced<sup>8</sup>. The China Security Regulation Commission (CSRC) announced the guideline for the plan and the experimental has begun early this year. The process is expected to last for a couple of years according to CSRC. When the process completes we will be able to study whether pushing privatization forward will mitigate the agency costs and increase the investment efficiency and improve capital allocation efficiency of China financial markets.

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<sup>8</sup> The state shares are not tradable. The plan is to make the state shares to be tradable, thus all shares are equal in terms of liquidity. Then the state shares could be sold, consequently state ownership will be reduced. This is called *Quantong* in Chinese.

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**Table 1 A: The ownership distribution of the largest shareholder for companies ultimately controlled by local government or local SOEs**

Ownership (%)	No. of observations (1998–2001)	No. of observations (2000)
$Sshr \leq 20$	103	26
$20 < Sshr \leq 30$	314	87
$30 < Sshr \leq 40$	320	89
$40 < Sshr \leq 50$	282	77
$50 < Sshr \leq 60$	340	99
$60 < Sshr \leq 70$	264	78
$70 < Sshr$	144	45
Total	1767	501

**Table 1 B: The ownership distribution of the largest shareholder for companies ultimately controlled by central government**

Ownership (%)	No. of observations (1998–2001)	No. of observations (2000)
$Sshr \leq 20$	5	2
$20 < Sshr \leq 30$	30	7
$30 < Sshr \leq 40$	50	16
$40 < Sshr \leq 50$	48	15
$50 < Sshr \leq 60$	88	24
$60 < Sshr \leq 70$	44	12
$70 < Sshr$	34	9
Total	299	85

Notes:  $Sshr$  is the ownership of the largest shareholder. The second column gives the number of observations in each portfolio of ownership from 1998 to 2001. The third column gives the number of observations in each portfolio of ownership in 2000. The ownership distributions appear homogenous between year 2000-sample and the entire sample.

**Table 2: Summary Statistics for firms controlled by local government or local SOEs in year 2000**  
(categorized according to the largest shareholdings)

Median		(1)	(2)	(3)	(4)
Number of firms	501	125	125	125	126
$I / K_{t-1}$	0.0404	0.0477	0.0371	0.0309	0.0487
$Cashflow_{t-1} / K_{t-1}$	0.0761	0.0748	0.0763	0.0662**	0.0853**
$Q_{t-1}$	2.0677	2.3039*	2.1047	1.9993	1.834***
$Sales\ growth_{t-1} / K_{t-1}$	0.0409	0.0681***	0.0268	0.0347	0.0447**
$LD / K$	0.0311	0.0280	0.0416	0.0245	0.0316
$CashSec_{t-1} / K_{t-1}$	0.1629	0.1694	0.1525	0.1671	0.1383*
$K (\times 10^8)$	10.4	9.46	8.81**	10.7	13.2***
$Dividends_{t-1} / K_{t-1}$	.0069	0.0049	0.0061	0.0100	0.0129

Note:  $I$  is the capital expenditure at year  $t$ .  $K_{t-1}$  is the book value of total assets at the beginning of year  $t$ .  $Q_{t-1}$  is the year-beginning Tobin's  $Q$ .  $LD$  equals to the book value of long-term debt at the end of year  $t$ .  $K$  is the book value of total assets at year  $t$ .  $CashSec_{t-1}$  is the sum of cash and short-term investment at the beginning of year  $t$ .  $Dividends_{t-1}$  is the cash dividend paid out or earnings distributed last year.

In the first column, we report the median of each variable for the 501 companies. Then the right four columns show the summary profile in subsamples based on the largest shareholdings. From left to right, the largest shareholdings are orderly at or below the 25<sup>th</sup> percentile, above the 25<sup>th</sup> percentile and at or below the 50<sup>th</sup> percentile, above the 50<sup>th</sup> percentile and at or below the 75<sup>th</sup> percentile, as well as above the 75<sup>th</sup> percentile.

\*, \*\*, \*\*\* denote that the median differs at the 10%, 5%, 1% level from the median of the next-larger shareholdings quartile using a Wilcoxon Rank-Sum test. In the column (4), this notation denotes a difference between column (4) to column (1).

**Table3 Summary Statistics for 85 firms controlled by central government in year 2000**  
**(Categorized according to the largest shareholdings)**

Median		(1)	(2)	(3)	(4)
Number of firms	85	21	22	21	21
$I / K_{t-1}$	0.042	0.030***	0.063*	0.033	0.042
$Cashflow_{t-1} / K_{t-1}$	0.084	0.071	0.115**	0.072	0.101
$Q_{t-1}$	2.084	2.220	2.090	2.085	2.068
$Sales\ growth_{t-1} / K_{t-1}$	0.074	0.0620	0.084	0.074	0.100
$LD / K$	0.021	0.009	0.029	0.000**	0.035
$CashSec_{t-1} / K_{t-1}$	0.176	0.176	0.190	0.177	0.114
$K (\times 10^8)$	11.2	10.8	10.0	12.4	11.2
$Dividents_{t-1} / K_{t-1}$	0.001	0.009	0.0004	0.0009	0.000*

Note: the variables are denoted and the subsample is obtained in the same way as those in Table 2.

**Table4: Investment Regression with firms controlled by local government or local SOEs**

	(1)	(2)	(3)	(4)	(5)	(6)
$Q_{t-1}$	0.005*** (0.001)	0.0052*** (0.001)	0.005*** (0.001)	0.007*** (0.001)	0.007*** (0.001)	0.007*** (0.001)
$Cashflow_{t-1} / K_{t-1}$	0.246*** (0.035)	0.246*** (0.035)	0.602*** (0.106)	0.694*** (0.119)	0.917*** (0.156)	1.569* (0.870)
$Sales\ growth_{t-1} / K_{t-1}$		-0.006 (0.012)	-0.007 (0.012)	-0.006 (0.011)	-0.005 (0.011)	-0.004 (0.011)
$(Cashflow_{t-1} / K_{t-1}) \times Sshr$			-0.755*** (0.213)	-0.840*** (0.218)	-1.052*** (0.238)	-1.012*** (0.244)
$(Cashflow_{t-1} / K_{t-1}) \times Q_{t-1}$				-0.014* (0.008)	-0.013* (0.008)	-0.014* (0.008)
$(Cashflow_{t-1} / K_{t-1}) \times Age_{t-1}$					-0.025** (0.011)	-0.023** (-0.023)
$(Cashflow_{t-1} / K_{t-1}) \times Size_{t-1}$						-0.033 (0.044)
Adjusted $R^2$	0.0561	0.0562	0.0667	0.069	0.073	0.074
Number of observations	1767	1767	1767	1767	1767	1767

Notes: The regression results are derived from 1767 firm-year observations of the companies controlled by local government or local SOEs from year 1998 to 2001. The dependent variable is  $I / K_{t-1}$ . The firm-specific and year-specific fixed effects are controlled.  $Age_{t-1}$  equals to the number of years from company establishment to current observation year.  $Size_{t-1}$  is the logarithm of the book value of total assets in the beginning of the year. Other variables are defined in the same way as those in Table 2. The standard errors of parameters are shown in the parentheses.

\*, \*\*, \*\*\*Significant at the 10%, 5%, 1% levels respectively.

**Table 5 Investment Regressions based on the shareholdings  
(Firms controlled by local government or local SOEs)**

	(1)	(2)	(3)	(4)
$Sales\ growth_{t-1} / K_{t-1}$	-0.012 (0.021)	0.012 (0.038)	0.018 (0.045)	0.011 (0.070)
$Q_{t-1}$	-0.004* (0.002)	-0.002 (0.002)	-0.008** (0.004)	0.001 (0.003)
$Cashflow_{t-1} / K_{t-1}$	0.977*** (0.225)	0.344*** (0.1100)	0.239** (0.095)	0.623*** (0.136)
Adjusted $R^2$	0.371	0.101	0.061	0.135
Number of firms	125	125	125	126
Which firms	<i>Ownership</i> = 1	<i>Ownership</i> = 2	<i>Ownership</i> = 3	<i>Ownership</i> = 4

Note: We run regressions on data from 501 firms in year 2000.  $I / K_{t-1}$  is the dependent variable. The variable *Ownership* is set equal to 1 if the largest shareholdings are at or below the 25<sup>th</sup> percentile, equal to 2 if above the 25<sup>th</sup> percentile and at or below the 50<sup>th</sup> percentile, equal to 3 if above the 50<sup>th</sup> percentile and at or below the 75<sup>th</sup> percentile, and equal to 4 if above the 75<sup>th</sup> percentile. The standard errors of parameters are shown in the parentheses.

\*, \*\*, \*\*\*Significant at the 10%, 5%, 1% levels respectively.

**Table 6 Investment Regression with firms controlled by central government**

	(1)	(2)	(3)	(4)	(5)
$Q_{t-1}$	0.006** (0.003)	0.006** (0.003)	0.006** (0.003)	-0.005 (0.005)	0.003 (0.005)
$Cashflow_{t-1} / K_{t-1}$	0.004 (0.021)	0.004 (0.021)	-0.078 (0.069)	-0.203 (0.191)	6.133*** (1.097)
$Sales\ growth_{t-1} / K_{t-1}$		-0.009 (0.026)	-0.007 (0.026)	-0.004 (0.026)	-0.002 (0.024)
$(Cashflow_{t-1} / K_{t-1}) \times Sshr$			0.168 (0.135)	0.284 (0.213)	0.664*** (0.206)
$(Cashflow_{t-1} / K_{t-1}) \times Q_{t-1}$				0.038** (0.017)	-0.003 (0.017)
$(Cashflow_{t-1} / K_{t-1}) \times Age_{t-1}$				-0.002 (0.015)	-0.007 (0.014)
$(Cashflow_{t-1} / K_{t-1}) \times Size_{t-1}$					-0.308*** (0.052)
Adjusted $R^2$	0.028	0.029	0.037	0.062	0.217
Number of observations	299	299	299	299	299

Note: The sample consists 299 firm-year observations from firms ultimately controlled by central government over 1998-2001. The definition of variables and estimation procedures are the same as in Table 4. The standard errors of parameters are shown in the parentheses.

\*, \*\*, \*\*\*Significant at the 10%, 5%, 1% levels respectively.

**Table 7 Investment Regression for firms controlled by non-state legal persons and natural persons**

	controlled by legal persons			controlled by natural persons		
	(1)	(2)	(3)	(4)	(5)	(6)
$Q_{t-1}$	0.006* (0.004)	0.006* (0.004)	0.007* (0.004)	0.008* (0.005)	0.008* (0.005)	0.008* (0.005)
$Cashflow_{t-1} / K_{t-1}$	0.189* (0.105)	0.172 (0.107)	-0.149 (0.259)	0.286*** (0.103)	0.286*** (0.104)	0.227 (0.258)
$Sales\ growth_{t-1} / K_{t-1}$		0.026 (0.032)	0.032 (0.32)		-0.003 (0.029)	-0.004 (0.029)
$(Cashflow_{t-1} / K_{t-1}) \times Sshr$			0.885 (0.650)			0.188 (0.743)
Adjusted $R^2$	0.055	0.061	0.077	0.085	0.085	0.085
Number of observations	197	197	197	182	182	182

Note: the variables are denoted as those in Table 4. The standard errors of parameters are shown in the parentheses.

\*, \*\*, \*\*\*Significant at the 10%, 5%, 1% levels respectively.