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Internal corporate governance and the use of IPO over-financing: Evidence from China

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ABSTRACT

In this paper, we describe how Shenzhen A-share listed companies used funds raised in over-financed IPOs during the 2006–2010 period. In exploring the relationship between internal corporate governance and the use of funds raised in over-financed IPOs, we find that the use of such funds to engage in severe over-investment behavior is prevalent among listed companies. Reasonable internal corporate governance mechanisms can effectively alleviate over-investment problems listed companies encounter in using funds raised in over-financed IPOs. However, the same individual serving as both chairman and CEO leads to funds raised in over-financed IPOs being over-invested. Moreover, executives driven by high levels of monetary compensation are more likely to use funds raised in such IPOs to engage in over-investment. We find that improving the balance of power between shareholders will help alleviate the over-investment of excess IPO funds. In addition, the over-investment problem is less severe in state-controlled listed companies than in their non-state-controlled listed counterparts. This study provides policy recommendations for Chinese securities regulators to ensure listed companies use funds raised in over-financed IPOs both rationally and effectively.

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1. Introduction

Each year since its establishment in 1991, the Chinese capital market has hosted a considerable number of newly listed companies with over-financed IPOs, i.e. those where the amount of funds actually raised is greater than the size of the planned financing. As a phenomenon unique to China's capital market, IPO over-financing has become an important concern for the China Securities Regulatory Commission, China's domestic financial media and scholars alike. In addition, the frequent occurrence of over-financed IPOs in the newly established Growth Enterprises Market indicates that studying and resolving the IPO over-financing problem to enhance resource allocation efficiency in the Chinese capital market and maintain the healthy development of this new market is both important and urgent. Supervising and ensuring the rational use of funds listed companies raise in IPOs to protect the interests of general investors has recently become the focus of Chinese securities regulatory authorities.¹ Existing research fails to provide a clear explanation of how listed companies use funds raised in over-financed IPOs after meeting their established financing needs, whether listed companies misuse or waste such funds and whether they engage in over-investment and other types of behavior against the interests of investors when using the proceeds of over-subscribed IPOs. We consider these issues important and address them in this paper.

The question of how to use funds raised in over-subscribed IPOs in a reasonable and effective manner not only tests the business wisdom of listed company executives, but also examines their professional integrity. We consider that the use and investment of funds raised in over-financed IPOs among Chinese listed companies provide a natural setting for examining the relationship between internal corporate governance mechanisms and corporate investment decisions. It also provides a better environment for testing the effectiveness of internal corporate governance. There are two main reasons for this. First, the use and investment of the funds raised in over-financed IPOs more truly reflect the real motives of executives. The relevant provisions require that funds raised by a listed company through a public offering must be used for specific purposes in accordance with the applicable commitments in the prospectus.² However, the use of excess funds raised in such offerings is not subject to this rule. There is no commitment related to an established purpose and investment plan for funds raised in excess of the IPO target, and no problem would arise even if the investments for which such funds were used changed. Because excess funds raised in IPOs are essentially an extra source of finance given to the company by its shareholders when the company goes public, shareholders do not immediately require cash dividends from such capital, which is akin to manna from heaven. Therefore, listed companies can use this portion of additional funds as they wish. In addition, the huge amount of funds raised in over-financed IPOs also induces companies to engage in rapid investment and expansion. After meeting the funding needs of the enterprise's established investments, the listed company's executives are more likely to use funds raised in an over-financed IPO to further their own interests because of agency problems. Hence, the use and investment of excess funds raised in over-financed IPOs are more reflective of the real motives of executives. This provides us with a better opportunity to test the effect of internal corporate governance.

Second, analysis of the ways in which excess funds raised in over-financed IPOs are used may help us distinguish between firms that engage in distinct forms of over-investment. The public financing of enterprise investment projects is approved following rigorous discussion by the board of directors and at the shareholders meeting. In addition, Chinese financings are currently managed through an examination and approval system. The use of project financing funds is subject to stringent scrutiny by the China Securities Regulatory Commission (CSRC). Chinese enterprises are required to submit their prospectus to the issuance examination committee of the CSRC during the listing process. Investment projects are the focus of scrutiny by the CSRC issuance examination committee. In accordance with relevant laws and regulations, such as the Administrative Measures for Initial Public Offerings and Listings and the Interim Measures for the Administration of Initial

¹ For example, the Shenzhen Stock Exchange issued the "Memorandum on information disclosure business in GEM No.1 – the use of funds raised in IPO over-financings" in 2009 in response to the frequent occurrence of IPO over-financing in the newly established Growth Enterprises Market.

² It is noteworthy that Chinese listed companies have frequently changed the investment projects to which they are committed and seriously undermined the interests of small shareholders when using money raised through public offerings (Wang et al., 2011; Zhang and Zhai, 2005; Liu and Dai, 2004).

Public Offerings and Listings on the Growth Enterprises Market, funds raised should be used for the main business of the issuer and should be compatible with the issuer's existing scale of production operations, financial condition, level of technology and management capabilities, as well as being in line with laws, rules and regulations covering national industrial policy, investment management, environmental protection, land management and other matters. If the funds raised are not used in compliance with the IPO conditions, the application of the company to go public will be rejected by the CSRC.³ Therefore, the IPO investment plan formed through the approval process should be relatively scientific and reasonable, and the size and purpose of IPO investment projects must comply with the requirements of appropriate regulations, as well as being closely aligned to the company's corporate investment and development needs over the next few years. However, if a listed company continues to use excess IPO funds to invest in projects outside the scope of the established investment plan, it is more likely to engage in over-investment, which will inevitably result in a decline in the rate of return on investment, thus providing us with a good opportunity to explore whether internal governance inhibits corporate over-investment.

We make a number of theoretical contributions to the literature in this paper. First, by targeting the IPO over-financing phenomenon unique to the emerging capital market of China, we explore agency problems experienced by listed companies using funds raised in over-financed IPOs. We find that most listed companies engage in severe over-investment when using excess IPO funds. This finding complements and expands free cash flow theory in the corporate finance literature. Second, listed companies with good internal corporate governance can effectively alleviate the over-investment problem, reduce over-investment in the use of funds raised in over-financed IPOs, and improve the efficiency with which such funds are used. This conclusion not only adds to our understanding of the role of corporate governance and expands our conception of the part played by corporate governance in emerging capital markets and improving investment efficiency, but also provides a basis for corresponding policy recommendations for Chinese securities regulators to ensure listed companies use funds raised in over-financed IPOs in a rational manner. Third, we extend the line of research examining how listed companies use and invest funds raised through public offerings. Previous studies of the domestic market in China show listed companies frequently change the investment projects to which they are committed and seriously undermine the interests of small shareholders in their use of money raised through public offerings. This type of behavior also occurs in the use of funds raised in over-financed IPOs, suggesting the use and investment of funds raised through public offerings must be closely governed.

The remainder of this paper is organized as follows. In Section 2, we outline our theoretical analysis and develop our hypotheses. Section 3 presents the research design and Section 4 provides the test results and empirical analysis. Additional checks are discussed in Section 5. Section 6 concludes the paper.

2. Theoretical analysis and hypotheses

The main function of the capital market is to optimize resource allocation and distribute funds among high-quality corporations requiring funds for development. However, the over-allocation of funds to good enterprises will also result in a low level of resource allocation efficiency in the capital market. Consequently, the over-financing of an enterprise implies the reduction and disappearance of financing opportunities for other enterprises that urgently need funding (Jiang and Li, 2010; Fang and Fang, 2010). The essence of the IPO over-financing phenomenon is the mismatch of resources in the Chinese capital market, reflecting its imperfections and poor investment channels. It is impossible to completely eliminate the over-financing problem in the short term without establishing efficient investment channels in China. Therefore, establishing a sound internal corporate governance mechanism is an effective way for listed companies to supervise and ensure the rational and proper use of funds raised in over-financed IPOs.

We have not yet established a clear picture of how Chinese listed companies make use of the funds they raise in over-financed IPOs or whether they act against the interests of investors in using such funds, which is one focus of this study. Agency theory indicates that due to the separation of ownership and management,

³ For example, Shanghai Chaori Solar Energy Science & Technology Co., Ltd. and Beijing Fuxing Xiaocheng Electronic Technology Stock Co., Ltd. both had their IPO applications rejected by the CSRC in recent years because their use of the funds raised did not comply with the IPO conditions.

managers of modern enterprises will deviate from the interests of shareholders and engage in self-serving practices. Managers of enterprises with substantial free cash flows tend to become involved in activities contrary to the interests of shareholders, such as awarding themselves perks, over-investment and empire building (Jensen and Meckling, 1976; Jensen, 1986). Jensen (1986) found that in the late 1970s and early 1980s, the excess-capacity US oil and tobacco industries became involved in over-investment due to agency problems, blindly expanding the scope of their business and affecting the interests of investors instead of returning surplus cash flows to them via cash dividends. Lamont (1997) and Ghose (2005) come to similar conclusions in later studies. Focusing on US oil companies, they find the level of over-investment is directly related to the amount of cash available to managers. Therefore, enterprises need a corresponding internal governance mechanism to align the interests of managers and shareholders, to supervise and motivate managers and to reduce principal-agent costs (Jensen and Meckling, 1976; Eisenhardt, 1988; Shleifer and Vishny, 1997).

We consider that given China's status as an emerging economy, the IPO over-financing phenomenon unique to the Chinese capital market has some similarities to the free cash flow problem of Jensen (1986).⁴ Where basic financing needs are satisfied, listed companies with excess IPO funds provided by investors are more likely to engage in over-investment and misuse or waste such funds because of agency problems, thereby resulting in the inefficient use of enterprise funds and damaging the interests of shareholders. Chinese listed companies that raise excess funds in IPOs currently provide a natural population for examining the relationship between internal corporate governance mechanisms and corporate investment decisions, and for testing the effectiveness of internal corporate governance in a more rigorous fashion. The use and investment of funds raised in over-financed IPOs more truly reflect the real motives of executives. Excess IPO funds are not subject to any commitment related to an established purpose and investment plans, and no problem would arise even if the projects in which such funds were invested changed. Therefore, listed companies can use this source of additional funds as they please. After meeting the funding needs of the enterprise's established investments, the listed company's executives are more likely to use IPO funds left over to further their own interests because of agency problems. In addition, the huge amount of funds raised in over-financed IPOs will also induce companies to engage rapidly in investment and expansion. A typical case is that of the company Beijing Lier High-Temperature Materials Co., Ltd. (002392)⁵ listed on the Shenzhen SME Board. In circumstances where the industry was contracting and there were a lack of good investment opportunities, Beijing Lier misused the funds it raised and embarked on a counter-cyclical expansion program in September 2010, blindly investing in a technology line that had been taken out of production and seriously damaging the interests of investors as a result.

Jensen (1993) argues that managers generally have an impulse to over-invest because they can obtain more private benefits by controlling more resources such as perks, which are often positively related to the size of the company, and that managers have the motivation to expand the scale of business investments. Jensen and Meckling (1976) considered that giving managers corresponding incentives to reduce their opportunistic behavior can reduce agency conflicts to realize the maximization of enterprise value. Morck et al. (1988) find that self-serving managers who hold fewer shares in the company will exacerbate conflicts of interest between

⁴ Although the IPO over-financing phenomenon unique to the Chinese capital market has some similarities to the free cash flow problem referred to by Jensen, there are some major differences between them. First, excess funds raised in IPOs and free cash flows come from different sources. Free cash flows are generated by corporations which have survived for a long time and are the result of many years of production and operation. However, this is not the case for excess funds raised in IPOs, as they are not generated by the corporation's production and operating activities. Excess funds raised in an IPO are essentially an extra portion of capital given to the company by its shareholders when the company goes public, and is akin to manna from heaven. Second, whether excess IPO funds and free cash flows should be paid back to shareholders through cash dividends involves different considerations for these two sources of funds. Excess IPO funds are an extra portion of capital given to the company by its shareholders, who require no immediate cash dividends in return. However, this is not the case for free cash flow. Jensen (1986) argued that free cash flow should be returned to shareholders as soon as possible in the form of cash dividends to reduce agency problems such as empire building, diversification and mergers and acquisitions. Third, while excess IPO funds are easily identified, this is not so for free cash flow. Although Jensen (1986) clearly defines free cash flow as cash flow in excess of that required to fund all projects that have positive net present values when discounted at the cost of capital, this definition cannot be implemented in practice because outsiders have no way of knowing which of the enterprise's investment projects have a positive NPV. Therefore, it is difficult to judge whether an enterprise has free cash flow, and if so, the amount of free cash flow. However, funds raised in over-financed IPOs are easy to recognize.

⁵ This information is sourced from [www.wlstock.com \(http://hudong.wlstock.com/StockBar/d7934732.aspx\)](http://hudong.wlstock.com/StockBar/d7934732.aspx).

managers and outside shareholders. With higher managerial ownership, managers have a greater share of residual income, thus incentivizing them to focus on the long-term performance of the enterprise and exerting a convergence effect. Hall and Liebman (1998) point out in a study of US listed companies that in comparison with wages, bonuses and other forms of compensation, equity incentives are an effective incentive tool. Therefore, managerial ownership can reduce the conflict between the interests of shareholders and effectively reduce agency costs. Subsequent research has also shown that equity incentives can improve the efficiency of investment, inhibit managers from engaging in myopic behavior (Balkin et al., 2000; Tang et al., 2011) and reduce over-investment (Broussard et al., 2004).

Studies based on China's domestic market have found that managers of listed companies also have a tendency to over-invest and that this kind of over-investment leads to less efficient investments that damage firm value (Wei and Liu, 2007). Given the lack of financing constraints and securities market mechanisms in China's capital market as the country goes through a period of economic transition, listed companies lack constraints on their integrity (Liu and Dai, 2004). Moreover, information asymmetry in investment projects exacerbates opportunistic behavior among managers and promotes their misuse of funds raised in over-financed IPOs to engage in over-investment. As yet, we lack a clear understanding of whether managers granted stock option incentives use excess funds raised in IPOs in a reasonable and effective manner based on the investment opportunities available. Therefore, we propose Hypothesis 1 as follows:

Hypothesis 1. The higher the proportion of equity incentives granted to executives, the greater the extent to which they alleviate the over-investment of funds raised in over-financed IPOs.

Jensen and Murphy (1990) argue that a well-designed compensation contract is an important mechanism enabling the company to converge the interests of managers and shareholders. Enterprises motivate executives in various ways. One of the methods most commonly adopted is monetary compensation contracts. Monetary compensation contracts set out how much the enterprise may pay an executive during the contract period (Chen et al., 2010). Compensation contracts that do not incentivize managers to work hard and compensate them for doing so are likely to cause opportunistic behavior among managers. In comparison with equity incentives, monetary rewards exert an incentive effect within a short period and tie compensation more closely to the current efforts of managers.

Studies conducted to date are not unanimous on whether monetary compensation plays a role in inspiring the managers of Chinese enterprises. Wei (2000) and Li (2000) find that monetary compensation paid to managers does not play an incentivizing role in China, showing the performance of Chinese listed companies is not positively related to managers' annual pay. However, the empirical evidence of Liu et al. (2003) and Zhang et al. (2003) shows that monetary rewards have an incentivizing effect to some degree, demonstrating firm performance has a significant positive relationship with monetary rewards paid to managers. However, the effect of managerial monetary compensation on over-investment among enterprises remains an untested empirical question.

Xin et al. (2007) point out that managers who can obtain large private benefits from corporate investment projects are more likely to accept investment projects with a negative net present value and that setting monetary compensation too low will cause managers to engage in over-investment, thereby seriously damaging the wealth of shareholders. Executives with higher monetary rewards are likely to engage in myopic behavior because they are insufficiently incentivized and have a greater likelihood of directly misusing excess funds raised in IPOs to over-invest and obtain private benefits. Based on this discussion, we propose Hypothesis 2 as follows:

Hypothesis 2. The greater the monetary rewards paid to executives, the more likely they use funds raised in over-financed IPOs to engage in over-investment.

Jensen (1993) argues that the function of the chairman is to run board meetings and oversee the process of hiring, firing, evaluating and compensating the CEO. Clearly, the CEO cannot perform this function in isolation from their personal interest. Without the direction of an independent leader, it is much more difficult for the board to perform its critical functions. Therefore, the corresponding internal control systems of the enterprise will be ineffective. Fama and Jensen (1983) and Jensen (1993) argue that the separation of the chair-

man and CEO roles allows the board to monitor the CEO more effectively, thus reducing agency costs, whereas having the CEO also serve as chairman of the board may result in higher agency costs. Based on this discussion, we propose Hypothesis 3 as follows:

Hypothesis 3. CEO duality leads to the over-investment of funds raised in over-financed IPOs.

Cronqvist and Fahlenbrach (2009) find that the largest shareholder has an influence on investment, financing, executive compensation and other company policies. Using a theoretical model, Shleifer and Vishny (1986) point out that the existence of large shareholders and concentrated ownership can reduce managers' opportunistic behavior, can partially solve the free-rider problem of small and medium-sized shareholders, and can alleviate agency conflicts between shareholders and managers. However, Shleifer and Vishny (1997) argue that most agency costs in some emerging countries come from conflicts of interest between controlling shareholders and small shareholders rather than from conflicts of interest between managers and dispersed shareholders.

Based on their investigation of the phenomenon whereby Chinese listed companies frequently change the projects to which money raised through public offerings is committed, Zhang and Zhai (2005) show that the probability and degree of these changes is significantly negatively related to ownership concentration. This means that large shareholders of listed companies in China determine how the interests of small shareholders are served by controlling how funds raised are used. In addition, Chen and Chen (2005) find that the use of IPO proceeds was influenced by the agency problems of large shareholders and that the largest shareholder controlled the proceeds of listed company IPOs. Therefore, governance mechanisms are needed to curb the behavior of large shareholders and prevent them from acting against the interests of small shareholders.

The theoretical literature suggests that balanced ownership is an effective internal corporate governance mechanism and that ownership checks and balances can to some extent inhibit large shareholders from acting against the interests of small shareholders and improve firm performance (Shleifer and Vishny, 1986; La Porta et al., 1999). If the company has more than one large shareholder, the behavior of the largest shareholder can be restricted and the interests of other shareholders can be upheld. Due to the improvement brought about by balanced ownership, checks and balances between multiple large shareholders can limit the misappropriation of private benefits of control (Zhu and Wang, 2004; Tu and Liu, 2010) and increase the time and energy directed toward the supervision of managers so they dare not over-invest. Based on the above theoretical predictions, mutual checks and balances among the largest shareholders to some extent influence the use and investment of funds raised in IPOs. However, empirical evidence pointing to whether such checks and balances between large shareholders can inhibit the misuse of excess IPO funds to engage in over-investment is still lacking. Based on this discussion, we propose Hypothesis 4 as follows:

Hypothesis 4. The more even the balance of power between shareholders, the greater the extent to which they alleviate the over-investment of funds raised in over-financed IPOs.

3. Research design

3.1. Sample selection and data sources

Since 2005, the Chinese capital market has experienced the split-share structure reform, the implementation of an IPO inquiry system and the promulgation of provisions on the use of funds raised by listed companies. Given this background, we select as the sample for this study companies listed on the A-share section of the Shenzhen Stock Exchange that launched over-financed IPOs in the 2006–2010 period. The first reason we consider the Shenzhen market only is that only 31 companies listed on the Shanghai Stock Exchange had over-subscribed IPOs in the same period and no specific disclosures on the use of excess funds raised by such companies can be found. The second reason is that the listing rules and information disclosure system of the Shenzhen Stock Exchange are stricter than those of its Shanghai counterpart and information disclosed on the use of excess funds raised by Shenzhen listed companies is more complete. A total of 542 Shenzhen-listed companies launched over-financed IPOs in the 2006–2010 period, of which 170 did not make disclosures on their use of excess funds. After excluding missing data, we have a final sample comprising 372 firm-year

observations. Among these observations, 27, 30, 21, 56 and 238 are for each of the years from 2006 to 2010 respectively. Financial and corporate governance data are obtained from the China Stock Market and Accounting Research (CSMAR) Database.

3.2. *The use and investment of funds raised in over-financed IPOs*

Data regarding the use and investment of funds raised in over-financed IPOs are drawn from “Assurance reports on the annual use and storage of raised funds”, “Independent opinions of independent directors on the plan to use excess funds raised”, “Announcements on the use of some of the funds raised in over-financed IPOs to repay bank loans and add liquidity” and other publicly available information. We manually collect data on the use of funds raised in over-financed IPOs. Funds raised in over-financed IPOs are invested for purposes including the following: add liquidity, set up subsidiaries, mergers and acquisitions, purchase plant, construct self-built buildings and plant, purchase land and real estate, purchase office space, pay back bank loans, investment in subsidiaries, investment projects and construction projects, capital increase, overseas investment, deposit in dedicated account, working capital related to the main business, advertising, marketing services network construction, expansion of headquarters R&D center, investment in the main business and not disclosed.

According to the relevant requirements of the “Memorandum on information disclosure business of GEM No. 1 – the use of funds raised in over-financed IPOs” promulgated by the Shenzhen Stock Exchange: (1) funds raised in over-financed IPOs should be deposited in a dedicated account; (2) funds raised in over-financed IPOs should be used for the main business of the company and should not be used for securities investment, trust management, derivatives investment, venture capital or other high-risk investments, or to provide financial assistance to others; (3) the amount of funds raised in an over-financed IPO to permanently add liquidity and repay bank loans should not exceed 20% of the total amount of funds raised every 12 months; and (4) the use of funds raised in an over-financed IPO to temporarily add liquidity is to be regarded as the same as using idle funds raised funds to temporarily add liquidity. Therefore, adding liquidity, paying back bank loans, making deposits in a dedicated account and other working capital accounts related to the main business are classified as non-capital investments. That is, they constitute projects that only maintain value and cannot add value, while other projects are classified as capital investments.

3.3. *Model specification and variable definitions*

In this paper, we study the effect of executive ownership incentives, monetary compensation paid to executives, CEO duality and the balance of power between shareholders on the over-investment of funds raised in over-financed IPOs. We follow prior literature in selecting the corresponding control variables. Based on data on Chinese listed companies, Wei and Liu (2007) find that the better the firm performs and the stronger its profitability (EPS), the greater the possibility of over-investment. In addition, investment opportunities (Tobin's q) have a far-reaching influence on the investment behavior of enterprises (Broussard et al., 2004; Richardson, 2006; Wei and Liu, 2007; Xin et al., 2007; Tang et al., 2010). Previous studies point out that corporate over-investment is related to ineffective corporate governance (Wei and Liu, 2007; Xin et al., 2007). Yu et al. (2010) and Qin (2010) further find that independent directors can play a supervisory role to a certain extent and that the higher the proportion of independent directors, the more the board can inhibit over-investment. However, the empirical evidence of Luo et al. (2012), Tang et al. (2010) and Liu (2006) shows that Chinese independent directors do not yet play a significant role in the restraint of corporate over-investment. Although some studies point out that a reasonable board size is an assurance that the enterprise is highly efficient (Yermack, 1996), there is no unanimous conclusion on the relationship between board size and corporate over-investment in China. Qin (2010) finds that board size is significantly negatively correlated with over-investment. However, Luo et al. (2012) point out there is no clear relationship between them. Other studies demonstrate that in comparison with private enterprises, state-owned enterprises engage in more serious over-investment (Yu et al., 2010; Qin, 2010; Luo et al., 2012). Therefore, we select as our control variables the investment opportunities of the firm (Tobin's q), firm performance (EPS), nature of the controlling owner (Control), proportion of independent directors (Dirp), board size (Dirsize), year effects (Year) and industry

effects (Industry), and build the following model. The definitions of the main variables are presented in Table 1.

$$OI_{t+1} = \alpha_0 + \alpha_1 Stock_t + \alpha_2 Lpay_t + \alpha_3 Dual_t + \alpha_4 Dirp_t + \alpha_5 Dirsize_t + \alpha_6 Z_t + \alpha_7 Eps_t + \alpha_8 Control_t \\ + \sum_{i=1}^m \alpha_{8+i} Year + \sum_{i=1}^n \alpha_{8+m+i} Industry + \varepsilon$$

$$OF_{t+1} = \alpha_0 + \alpha_1 Stock_t + \alpha_2 Lpay_t + \alpha_3 Dual_t + \alpha_4 Dirp_t + \alpha_5 Dirsize_t + \alpha_6 Z_t + \alpha_7 Eps_t + \alpha_8 Control_t \\ + \sum_{i=1}^m \alpha_{8+i} Year + \sum_{i=1}^n \alpha_{8+m+i} Industry + \varepsilon$$

The empirical logic we follow in this paper includes the following three steps: first, if the company uses excess IPO funds for non-capital investment projects, its retention of idle funds means it is more likely to wait for better investment opportunities in the future and participate in investment projects with an NPV greater than zero. It can maintain the value of the funds raised while holding them in custody and at least help alleviate the agency problems it faces. Second, if the enterprise uses funds raised in an over-financed IPO for capital investments, we need to undertake a specific analysis of whether such capital investments constitute over-investment. The key measure of over-investment is to investigate the investment purposes of the enterprise's capital investments. We use investment opportunities to determine whether a capital investment represents over-investment. If the enterprise has good investment opportunities in comparison with those available in its industry and uses excess IPO funds to make investments that maintain and add value, such capital investments do not constitute over-investment. In contrast, if the enterprise does not have good investment opportunities relative to those in its industry and uses excess IPO funds to make investments, the capital investments represent over-investment increasing the agency costs of the enterprise. Third, we investigate what internal corporate governance mechanisms are effective in suppressing over-investment in capital projects.

4. Empirical results

4.1. Descriptive statistics

Table 2 shows that the average proportion of sample companies that use funds raised in over-financed IPOs for capital investments (RI) is 0.3631. In addition, the descriptive statistics in Table 3 indicate that the proportion of sample companies that use excess IPO funds to add liquidity, make deposits in dedicated accounts or participate in other non-capital investment projects is 46.49%, with the remaining 53.51% using such funds for capital investment projects. As much as 54.84% of all non-capital investment projects are used to add liquidity, with 44.89% being used to pay back bank loans. The largest category of capital investments is investment projects and construction projects, accounting for 56.10%, followed by mergers and acquisitions (15.12%), setting up subsidiaries (11.68%) and investment in subsidiaries (10.67%). It should be noted that 170 listed companies did not disclose any details of their investment of excess IPO funds.

We further analyze how Shenzhen A-share listed companies have used funds raised in over-financed IPOs by year. Table 4 reports the corresponding data. We find that the number of listed companies raising excess funds in IPOs is small for the 2006–2008 period. Even listed companies that raised funds in over-financed IPOs used such funds to add liquidity and rarely made capital investments in any form. However, in 2009 and 2010, listed companies used excess IPO funds for various forms of capital investment, indicating agency problems became increasingly serious in the Chinese capital market in those two years. In our view, the major reason may be that the Chinese government has since 2008 put 4 trillion yuan into the market to expand domestic demand and stimulate economic growth. Thus, the over-investment problem is becoming more serious under the influence of excess liquidity.

Table 5 shows that in comparison with state-owned enterprises, non-state-owned enterprises are more likely to make capital investments. In addition, state-controlled listed companies tend to concentrate their capital investments in investment projects and construction projects, mergers and acquisitions and setting up subsidiaries, having no involvement in the other categories of capital investment. However, non-state-controlled

Table 1
Definitions of variables.

	Variable	Symbol	Definition
Dependent variables	Capital investment	RI	Capital investment of funds raised in over-financed IPO of listed company/(capital investment of funds raised in over-financed IPO + non-capital investment of funds raised in over-financed IPO)
		OI	Over-investment proportion of funds raised in over-financed IPO, that is, OI = capital investment of funds raised in over-financed IPO of listed company/(capital investment of funds raised in over-financed IPO + non-capital investment of funds raised in over-financed IPO) when Tobin's $q <$ industry average value or Ppa $<$ industry average value
		RF	Capital investment of funds raised in over-financed IPO of listed company/total assets at year-end
		OF	Over-investment proportion of funds raised in over-financed IPO, that is, OF = capital investment of funds raised in over-financed IPO of listed company * 100/total assets at year-end when Tobin's $q <$ industry average value or Ppa $<$ industry average value
	Return on long-term capital	ROLC	ROLC = (total profit + financial expenses)/long-term capital = 2 (total profit + financial expenses)/(long-term liabilities at beginning of year + long-term liabilities at year-end) + (equity at beginning of year + equity at year-end)
Explanatory variables	Equity incentives of executives	Stock	Stock ownership of executives
	Amount of monetary compensation paid to executives	Lpay	Natural logarithm of maximum amount of top three executives' compensation
	CEO duality	Dual	Dummy variable equal to 1 for CEO duality and 0 otherwise
	Balance of power between shareholders	Z	Ownership of largest shareholder/ownership of second largest shareholder
Control variables	Proportion of independent directors	Dirp	Number of independent directors/number of members of the board of directors
	Board size	Dirsize	Total number of members of the board of directors
	Investment opportunities of firm	Tobin's q	Tobin's q = firm's market value/firm's replacement cost = (number of tradable shares * this year's closing price + non-tradable shares * book value of net assets per share + book value of liabilities)/total assets at year-end
		Ppa	Ppa = firm's market value/total assets at year-end
	Firm performance	EPS	Earnings per share, EPS = Net profit/total number of ordinary shares at year-end
	Nature of controlling owner	Control	A dummy variable equal to 1 for a state-owned listed company, 0 otherwise
	Industry effects	Industry	First-level industry classification according to the CSRC industry standard; after removing the finance industry, we define 12 dummy variables for which the benchmark is M representing the comprehensive industry
	Year effects	Year	We define 4 dummy variables, for which the benchmark year is 2006

listed companies make capital investments in various forms. These results indicate that non-state-owned enterprises are more likely to use funds raised in over-financed IPOs to make capital investments than their state-owned counterparts.

4.2. Univariate analysis

In accordance with the hypotheses stated above, we use Tobin's q to measure investment opportunities and to divide the sample into two sub-groups. One sub-group consists of firms with a Tobin's q greater than the industry average, with the other sub-group comprising firms with a Tobin's q less than the industry average. Our logic outlined above suggests that if a company uses funds raised in an over-financed IPO for projects with good investment opportunities (Tobin's $q >$ industry average), it does not engage in over-investment and alleviates the agency problems of the enterprise. Otherwise, it engages in over-investment and exacerbates the agency problems of the enterprise. Panel A of Table 6 shows that in capital investments (RI or RF), the

Table 2
Descriptive statistics.

Variable	Mean	Median	SD	Min	Max	<i>N</i>
RI	0.3631	0.1303	0.4054	0.0000	1.0000	372
RF	7.27e–06	7.63e–07	1.31e–05	0.0000	1.13e–04	372
OI ^a	0.4126	0.3972	0.3923	0.0000	1.0000	223
OF ^b	8.43e–06	3.01e–06	1.29e–05	0.0000	0.0001	223
OI ^c	0.2809	0.0000	0.3735	0.0000	1.0000	200
OF ^d	4.88e–06	0.0000	9.61e–06	0.0000	6.31e–05	200
Dirsize	8.7263	9.0000	1.6230	3.0000	18.0000	369
Dirp	0.3649	0.3333	0.0506	0.2500	0.6667	369
Stock	0.3461	0.3425	0.3113	0.0000	0.9969	372
Lpay	14.48525	14.4702	0.6594	12.7195	16.5883	372
Z	4.1020	2.4371	4.7494	1.0000	34.6150	372
Control	0.1243	0.0000	0.3304	0.0000	1.0000	372
Eps	0.7666	0.6400	0.4884	0.1100	4.4200	372
Ppa	1.6132	1.5636	0.3341	0.9554	3.5671	372

^a The over-investment proportion of funds raised in an over-financed IPO, that is, OI = capital investment of funds raised in over-financed IPO of listed company/(capital investment of funds raised in over-financed IPO + non-capital investment of funds raised in over-financed IPO) when Tobin's $q <$ industry average value.

^b The over-investment proportion of funds raised in an over-financed IPO, that is, OF = capital investment of funds raised in over-financed IPO of listed company * 100/total assets at year-end when Tobin's $q <$ industry average value.

^c The over-investment proportion of funds raised in an over-financed IPO, that is, OI = capital investment of funds raised in over-financed IPO of listed company/(capital investment of funds raised in over-financed IPO + non-capital investment of funds raised in over-financed IPO) when Ppa < industry average value.

^d The over-investment proportion of funds raised in an over-financed IPO, that is, OF = capital investment of funds raised in over-financed IPO of listed company * 100/total assets at year-end when Ppa < industry average value.

number of sample firms with good investment opportunities is 149 and the number of sample firms with poor investment opportunities is 223, almost double that of the former. In addition, the mean t -value for the good investment opportunities group is significantly lower than that of the poor investment opportunities group (the mean differences are -9.98% and $-3.89e-06$, significant at the 1% level). The results show that enterprises do not use excess IPO funds for projects with good investment opportunities and that more such funds are used for projects with poor investment opportunities. This indicates that Chinese listed companies often engage in severe over-investment behavior when using funds raised in over-financed IPOs.

We also conduct parametric tests (t -tests) on the state-owned enterprise and non-state-owned enterprise subsamples respectively. Panel B of Table 6 reports the corresponding data. In Panel B, when capital investments are measured by RI, we find no significant differences between state-owned enterprises and non-state-owned enterprises. However, when capital investments are measured by RF, there are significant differences between state-owned enterprises and their non-state-owned counterparts. The mean value for state-owned enterprises is lower than that for non-state-owned enterprises (the mean difference is $-4.83e-06$, significant at the 1% level). This indicates that the over-investment problem is less severe among state-controlled listed companies than among non-state-controlled listed companies. Wang and Zhou (2006) and Wang (2008) demonstrate that because of their greater social and public responsibilities, state-owned companies more effectively protect the interests of investors and thus have better firm performance. We believe that because managers of state-owned enterprises are often appointed by the Chinese government, they are subject to government oversight and intervention and thus may behave in a manner consistent with the interests of investors and superior to that of the managers of other companies, thereby reducing agency costs (Li, 2009). Therefore, the over-investment problem is less acute in state-controlled listed companies than in their non-state-controlled counterparts.

We also undertake further parametric tests (t -tests) of state-owned enterprises and non-state-owned enterprises, respectively, according to their investment opportunities (Tobin's q). The corresponding results are shown in Panels C and D of Table 6. The results reported in Panel C show that most state-owned enterprises are more likely to engage in projects with good investment opportunities. Moreover, when capital investments are measured by RF in Panel C, the mean value of good investment opportunities is significantly lower than that of poor investment opportunities (the mean difference is $-4.15e-06$, significant at the 5% level). This

Table 3
Descriptive statistics regarding the investment purpose of funds raised in over-financed IPOs.

Investment purpose of funds raised in over-financed IPOs	Number of companies	Amount (¥)	Percentage 1 ^a (%)	Percentage 2 ^b (%)
<i>Panel A: Descriptive statistics regarding the non-capital investment of funds raised in over-financed IPOs</i>				
Add liquidity	246	1826099.56	54.84	25.49
Deposit in dedicated account	1	9033.98	0.27	0.13
Pay back bank loans	148	1494811.35	44.89	20.87
Working capital related to the main business	30	0.00	0.0000	0.00
Total		3329945	100	46.49
			Percentage 3 ^c (%)	Percentage 4 ^d (%)
<i>Panel B: Descriptive statistics regarding the capital investment of funds raised in over-financed IPOs</i>				
Set up subsidiaries	52	447617.31	11.68	6.25
Mergers and acquisitions	36	579439.01	15.12	8.09
Purchase plant, construct self-built buildings and plant	3	49538.20	1.29	0.69
Purchase land and real estate	21	141895.47	3.70	2.00
Purchase of office space	1	4994	0.13	0.07
Purchase office supplies	1	7000	0.18	0.10
Investment in subsidiaries	40	409083.61	10.67	5.71
Investment projects and construction projects	111	2150250.1	56.10	30.02
Capital increase	1	4900	0.13	0.07
Overseas investment	1	2200	0.06	0.03
Investment in the main business	2	16745.74	0.43	0.23
Advertising	1	2170	0.06	0.03
Marketing services network construction	1	14562	0.38	0.20
Expansion of headquarters R&D center	1	2405	0.07	0.02
Not disclosed	170	0.00	0.00	0.0000
Total		3832800	100	53.51

^a Percentage 1 = Amount/non-capital investment of funds raised in over-financed IPO.

^b Percentage 2 = Amount/(capital investment of funds raised in over-financed IPO + non-capital investment of funds raised in over-financed IPO).

^c Percentage 3 = Amount/capital investment of funds raised in over-financed IPO.

^d Percentage 4 = Amount/(capital investment of funds raised in over-financed IPO + non-capital investment of funds raised in over-financed IPO).

indicates that some state-owned enterprises engage in over-investment. The results in Panel D where capital investments are measured by RI and RF show the mean value of good investment opportunities is significantly lower than that of poor investment opportunities (the mean differences are -0.0932 and $-3.89e-06$, significant at the 5% and 1% levels, respectively). These results once again demonstrate that non-state-owned enterprises are more likely than their state-owned counterparts to use funds raised in over-financed IPOs to make capital investments, and have a more serious problem of over-investment.

4.3. Multivariate regression analysis

We examine the relationship between internal governance mechanisms and over-investment behavior further through multivariate analysis. Table 7 presents the results. The coefficients on Stock are negative and statistically insignificant in models (1) and (2). This means ownership incentives paid to executives do not curb over-investment, thus rejecting hypothesis 1. We find that the coefficients for Lpay and Dual are positive and statistically significant in models (1) and (2). This indicates that executives paid greater monetary rewards and executives in firms with CEO duality are more likely to use excess IPO funds to engage in over-investment. The empirical evidence in Table 7 thus supports hypotheses 2 and 3. We also find that the coefficients for Z are negative and statistically significant in models (1) and (2), indicating the greater the balance of power between shareholders, the greater the alleviation of over-investment in the use of excess IPO funds. The empirical evidence reported in Table 7 thus supports hypothesis 4. In the results for the control variables, we find that the coefficients for Eps are positive and statistically significant in models (1) and (2). Therefore, better firm performance (EPS) leads to a greater possibility of over-investment.

Table 5
State-owned vs. non-state-owned enterprises: Descriptive statistics regarding the investment purpose of funds raised in over-financed IPOs.

Investment purpose of funds raised in over-financed IPOs	State-owned enterprises		Non-state-owned enterprises	
	Amount (¥ Ten thousand)	Percentage (%)	Amount (¥ Ten thousand)	Percentage (%)
Add liquidity	251617.47	40.63	1566682.09	24.04
Deposit in dedicated account	0	0	9033.98	0.14
Pay back bank loans	57654.43	9.31	1431656.92	21.97
Working capital related to the main business	0	0	0	0
Set up subsidiaries	31031.00	5.01	415056.3	6.37
Mergers and acquisitions	27670.00	4.47	550789.81	8.45
Purchase plant, construct self-built buildings and plant	0	0	49538.20	0.76
Purchase land and real estate	7082.50	1.14	134812.97	2.07
Purchase of office space	0	0	4994	0.08
Purchase office supplies	0	0	7000	0.11
Investment in subsidiaries	13481	2.18	395602.61	6.07
Investment projects and construction projects	226019.48	36.50	1912706	29.35
Capital increase	0	0	4900	0.08
Overseas investment	0	0	2200	0.03
Advertising	0	0	2170	0.03
Marketing services network construction	0	0	14562	0.22
Expansion of headquarters R&D center	0	0	2405.00	0.04
Investment in the main business	4745.735	0.8	12000	0.18
Not disclosed	0	0	0	0

Table 6
Univariate analysis of capital investments.

Variable	Mean (N)		Mean difference test (t-value)
	Tobin's $q >$ industry average	Tobin's $q <$ industry average	
<i>Panel A: Full sample</i>			
RI	0.3231 (149)	0.4229 (223)	-0.0998 (-2.3396 ^{***})
RF	5.71e-06 (149)	9.60e-06 (223)	-3.89e-06 (-2.8308 ^{***})
	Mean (N)		
	State-owned enterprises	Non-state-owned enterprises	
<i>Panel B: State-owned enterprises vs. non-state-owned enterprises</i>			
RI	0.3186 (46)	0.3686 (326)	-0.0500 (-0.7806)
RF	3.05e-06 (46)	7.88e-06 (326)	-4.83e-06 (-2.3442 ^{***})
	Mean (N)		
	Tobin's $q >$ industry average	Tobin's $q <$ industry average	
<i>Panel C: State-owned enterprises</i>			
RI	0.2573 (19)	0.4057 (27)	-0.1484 (-1.1206)
RF	1.34e-06 (19)	5.49e-06 (27)	-4.15e-06 (-2.2927 ^{**})
<i>Panel D: Non-state-owned enterprises</i>			
RI	0.3322 (130)	0.4254 (196)	-0.0932 (-2.0700 ^{**})
RF	6.32e-06 (130)	1.02e-05 (196)	-3.89e-06 (-2.5297 ^{***})

*Statistical significance at the 10% level for two-tailed tests.

** Statistical significance at the 5% level for two-tailed tests.

*** Statistical significance at the 1% level for two-tailed tests.

We further investigate the influence of over-investment behavior among enterprises on future firm performance and report the results in Table 8. Over-investment (OI and OF) is significantly negatively related to the return on long-term capital, indicating the misuse of funds raised in over-financed IPOs significantly reduces the company's future investment yield, thus negatively affecting the firm's performance in the future.

Table 7

Regression results for internal corporate governance and the over-investment of funds raised in over-financed IPOs.

Variables	Predicted sign	OI (1)		OF (2)	
		Coef.	<i>t</i> -Value	Coef.	<i>t</i> -Value
Cons	?	-0.164	-1.00	-2.45e-05	-1.45
Stock	-	-1.18e-10	-1.42	-9.01e-06	-1.22
Lpay	+	0.058***	4.14	3.33e-05***	5.15
Dual	+	0.057**	2.53	1.09e-04**	2.38
Dirp	-	-0.075	-0.69	-9.43e-03	-0.58
Dirsize	-	-0.544	-0.82	-2.35e-04	-0.55
Z	-	-0.004*	-1.92	-2.45e-05***	-3.96
Eps	+	0.092***	2.75	1.42e-04**	2.23
Control	-	-0.399	-0.96	-2.24e-04	-0.78
Year		Yes		Yes	
Industry		Yes		Yes	
Pseudo R2		0.0773		-0.0020	
N		222		222	

We use clustering by years in the regression.

* Statistical significance at the 10% level for two-tailed tests.

** Statistical significance at the 5% level for two-tailed tests.

*** Statistical significance at the 1% level for two-tailed tests.

Table 8

Regression results for corporate over-investment and future return on investment.

Variables	Predicted sign	ROIC		ROIC	
		Coef.	<i>t</i> -Value	Coef.	<i>t</i> -Value
Cons	?	0.077	0.44	0.091	0.53
OI	-	-0.001**	-2.47		
OF	-			-571.09*	-1.89
Size	+	0.005	0.63	0.005	0.57
Lev	+	0.032*	1.65	0.023	0.61
Year		Yes		Yes	
Industry		Yes		Yes	
F-statistics		2.03**		2.27***	
Adj-R2		7.05%		8.57%	
N		222		222	

We use OI and OF as proxy variables for over-investment when Tobin's $q <$ industry average.

* Statistical significance at the 10% level for two-tailed tests.

** Statistical significance at the 5% level for two-tailed tests.

*** Statistical significance at the 1% level for two-tailed tests.

5. Robustness tests

5.1. Tests of corporate investment opportunities

We use the market to book value ratio (Ppa) as the proxy variable for corporate investment opportunities in conducting our robustness tests. We form a new sample of firms with a market to book value ratio higher than the industry average (comprising 200 firm-year observations) to carry out parametric tests (t -tests). The corresponding results are shown in Tables 9–11. The results reported in Table 9 are consistent with those of Table 6, indicating our earlier empirical results are robust. The results shown in Table 10 also remain consistent with those reported in Tables 7 and 11 results are consistent with the results of Table 8. Taken together, these results provide additional support for our hypotheses.

Table 9
Univariate analysis of capital investment (robustness tests).

Variable	Mean (N)		Mean difference test (t-value)
	Ppa > industry average	Ppa < industry average	
<i>Panel A: Full sample</i>			
RI	0.2964 (172)	0.4405 (200)	-0.1441 (-3.4684 ^{***})
RF	4.99e-06 (172)	9.92e-06 (200)	-4.93e-06 (-3.6811 ^{***})
	Mean (N)		
	State-owned enterprises	Non-state-owned enterprises	
<i>Panel B: State-owned enterprises vs. non-state-owned enterprises</i>			
RI	0.3186 (46)	0.3686 (326)	-0.0500 (-0.7806)
RF	3.05e-06 (46)	7.88e-06 (326)	-4.83e-06 (-2.3442 ^{***})
	Mean (N)		
	Ppa > industry average	Ppa < industry average	
<i>Panel C: State-owned enterprises</i>			
RI	0.2854 (17)	0.3753 (29)	-0.0899 (-0.6593)
RF	1.14e-06 (17)	6.31e-06 (29)	-5.17e-06 (-2.8881 ^{***})
<i>Panel D: Non-state-owned enterprises</i>			
RI	0.2983 (155)	0.4477 (171)	-0.1494 (-3.4216 ^{***})
RF	5.64e-06 (155)	1.03e-05 (171)	-4.68e-06 (-3.1198 ^{***})

* Statistical significance at the 10% level for two-tailed tests.

** Statistical significance at the 5% level for two-tailed tests.

*** Statistical significance at the 1% level for two-tailed tests.

Table 10
Regression results for internal corporate governance and over-investment of funds raised in over-financed IPOs (robustness tests).

Variables	Predicted sign	OI (1)		OF (2)	
		Coef.	t-Value	Coef.	t-Value
Cons	?	-1.482*	-1.77	-5.64e-04	-0.23
Stock	-	-4.85e-10	-0.75	-3.22e-14	-0.16
Lpay	+	0.106 ^{***}	4.19	2.83e-05*	1.91
Dual	+	0.061 ^{***}	5.30	5.72e-05 ^{***}	3.30
Dirp	-	-1.025	-0.47	-3.71e-04	-0.83
Dirsize	-	-0.200	-0.42	-2.36e-05	-0.62
Z	-	-0.010 ^{***}	-3.94	-1.23e-05 ^{**}	-2.45
Eps	+	0.254 ^{***}	6.34	8.43e-05 ^{***}	4.87
Control		-0.100	-0.45	-3.00e-04	-1.23
Year		Yes		Yes	
Industry		Yes		Yes	
Pseudo R2		0.1360		-0.0024	
N		200		200	

We use clustering by years in the regression.

* Statistical significance at the 10% level for two-tailed tests.

** Statistical significance at the 5% level for two-tailed tests.

*** Statistical significance at the 1% level for two-tailed tests.

5.2. Tests of selection bias

If listed companies self-select in making disclosures on the use of funds raised in over-financed IPOs, the main regression results of this study may be subject to self-selection bias. Therefore, we also perform the following robustness tests. We select as the sample Shenzhen A-share listed companies that launched over-financed IPOs in the 2006–2010 period. Since 2009, the Shenzhen Stock Exchange has required listed

Table 11

Regression results for corporate over-investment and future return on investment (robustness tests).

Variables	Predicted sign	ROLC		ROLC	
		Coef.	<i>t</i> -Value	Coef.	<i>t</i> -Value
Cons	?	-0.223	-1.07	-0.214	-1.07
OI	-	-0.001*	-1.67		
OF	-			-1366.63**	-2.56
Size	+	0.020**	2.08	0.020**	2.14
Lev	+	-0.006	-0.13	-0.012	-0.27
Year		Yes		Yes	
Industry		Yes		Yes	
<i>F</i> -statistics		2.12***		2.56***	
Adj-R2		8.83%		11.86%	
<i>N</i>		200		200	

We use OI and OF as proxy variables for over-investment when $Ppa < \text{industry average}$.

* Statistical significance at the 10% level for two-tailed tests.

** Statistical significance at the 5% level for two-tailed tests.

*** Statistical significance at the 1% level for two-tailed tests.

Table 12

Regression results for internal corporate governance and over-investment of funds raised in over-financed IPOs (2009–2010).

Variables	Predicted sign	OI (1)		OF (2)	
		Coef.	<i>t</i> -Value	Coef.	<i>t</i> -Value
Cons	?	-2.15	-0.06	-6.67e-03	-1.48
Stock	-	-2.64e-10	-0.27	-6.05e-07	-0.02
Lpay	+	0.120*	1.67	3.34e-04**	2.02
Dual	+	0.036**	2.45	1.51e-04***	2.85
Dirp	-	-0.846	-0.76	-1.98e-03	-0.51
Dirsize	-	-0.129	-1.15	-2.64e-04	-0.68
Z	-	-0.123*	-1.82	-8.51e-04**	-2.37
Eps	+	0.322***	3.09	1.17e-03**	2.51
Control	-	-0.051	-0.25	-5.52e-04	-0.80
Year		Yes		Yes	
Industry		Yes		Yes	
Pseudo R2		0.968		-0.0321	
<i>N</i>		159		159	

We use clustering by years in the regression.

We use OI and OF as proxy variables for over-investment when Tobin's $q < \text{industry average}$.

* Statistical significance at the 10% level for two-tailed tests.

** Statistical significance at the 5% level for two-tailed tests.

*** Statistical significance at the 1% level for two-tailed tests.

companies to disclose how they use funds raised in over-financed IPOs. The main sample used for this study thus comprises two groups: listed companies making voluntary disclosures and listed companies making mandatory disclosures. Therefore, we limit the sample used to retest the hypotheses to listed companies making mandatory disclosures on the use of funds raised in over-financed IPOs after 2009. Tables 12 and 13 report the corresponding results.

The results of the robustness tests are all consistent with the results of earlier tests. Tables 12 and 13 show that executives who receive greater monetary compensation are more likely to use funds raised in over-financed IPOs to engage in over-investment. Moreover, CEO duality will lead to the over-investment of excess IPO funds. In addition, improving the balance of power between shareholders will help alleviate the over-investment of funds raised in over-financed IPOs. Taken together, these findings provide further support for the hypotheses and show the main empirical results are robust to a variety of specifications.

Table 13
Regression results for internal corporate governance and over-investment of funds raised in over-financed IPOs (2009–2010).

Variables	Predicted sign	OI (1)		OF (2)	
		Coef.	t-Value	Coef.	t-Value
Cons	?	–2.845	–0.95	–1.77e–04	–1.36
Stock	–	–1.84e–09	–0.57	–2.04e–13	–0.76
Lpay	+	0.083*	1.71	1.04e–04*	1.78
Dual	+	0.042**	2.25	5.32e–04*	1.74
Dirp	–	–1.795	–0.43	–2.57e–03	–0.68
Dirsize	–	–0.052	–0.29	–3.89e–06	–0.34
Z	–	–0.034**	–2.26	–8.22e–05**	–1.87
Eps	+	0.184*	1.97	5.67e–04**	1.84
Control		–0.045	–0.90	–5.29e–03	–1.12
Year		Yes		Yes	
Industry		Yes		Yes	
Pseudo R2		–0.0067		–0.0114	
N		161		161	

We use clustering by years in the regression.

We use OI and OF as proxy variables for over-investment when $P_{pa} < \text{industry average}$.

*** Statistical significance at the 1% level for two-tailed tests.

* Statistical significance at the 10% level for two-tailed tests.

** Statistical significance at the 5% level for two-tailed tests.

6. Conclusions and implications

As a phenomenon unique to China's capital market, IPO over-financing has become an important concern for the China Securities Regulatory Commission, China's domestic financial media and scholars alike. Using a sample of Shenzhen A-share listed companies that launched over-financed IPOs in the 2006–2010 period, we explore the relationship between internal corporate governance and the use of funds raised in over-financed IPOs. The major findings are as follows.

First, due to agency problems, severe over-investment behavior is prevalent among listed companies that raise excess funds in their IPOs. The major uses of funds raised in over-financed IPOs are construction projects, mergers and acquisitions, and establishing and investing in subsidiary companies. In addition, over-investment behavior has a negative impact on the future performance of the enterprise and can significantly negatively affect the long-term return on firm capital.

Second, internal corporate governance mechanisms can be effective in alleviating the over-investment of funds raised in over-financed IPOs of listed companies. Improving the balance of power between shareholders will help alleviate the over-investment of funds raised in over-financed IPOs. However, CEO duality leads to the over-investment of excess IPO funds. In addition, the greater the monetary rewards paid to executives, the more likely they will use funds raised in over-financed IPOs to engage in over-investment.

We also find that the over-investment problem encountered in the use of excess IPO funds is less common among state-controlled listed companies than it is among their non-state-controlled counterparts. When making capital investments, state-controlled listed companies tend to limit funding to construction projects, mergers and acquisitions, and establishing and investing in subsidiary companies. In contrast, non-state-controlled listed companies participate in various forms of capital investment.

Our study raises a number of implications for researchers, managers and regulators. First, the Growth Enterprises Market (GEM) complements and improves the existing Chinese capital market system. The GEM helps accelerate the growth of innovative high-tech enterprises, adjust the structure of Chinese industry, transform and upgrade Chinese small and medium enterprises, and strengthen the international competitiveness of Chinese firms. Although the IPO over-financing phenomenon currently seen in the GEM is the result of market choice, this not only goes against the original purpose of setting up the GEM, but also poses a major challenge to the stable and healthy development of the Chinese capital market. Therefore, GEM systems require further improvement, such as by regulating IPO pricing, reducing the IPO threshold and establishing an exit mechanism to raise the standard of supervision of the use of funds raised in over-financed IPOs.

Second, good internal corporate governance of listed companies can effectively alleviate the over-investment problem encountered in the use of excess IPO funds and improve the efficiency with which such funds are used. The corporate governance mechanisms of listed companies should thus be improved further to promote the sound operation of GEM companies. Third, this study highlights the need to take further steps to establish and improve China's multi-level capital market system and widen the range of direct financing channels available to enterprises, while continuing to broaden the investment channels open to residents and guiding the reasonable and orderly flow of funds.

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