# Overinvestment When Control Separates from Ownership: Evidence from Publicly Listed Companies in China*

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**JEL classification:** G31; G34; G38

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# Overinvestment When Control Separates from Ownership: Evidence from Publicly Listed Companies in China

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## I. Introduction

Recent studies have shown that most public traded companies in countries without good legal protection of minority shareholders are often not widely held, but rather have controlling shareholders (La Porta et al., 1999). Even in the United States, there are several hundred publicly traded firms with shareholders of more than 51 percent (Holderness and Sheehan, 1988). Significant share concentration of ownership is also observed in other developed nations, such as Germany (Edwards and Fischer, 1994; Franks and Mayer, 1994; Gorton and Schmid, 1996), Japan (Prowse, 1992), and Italy (Barca, 1995). The existence of controlling shareholders is a more widely prevalent phenomenon in developing countries where protection of minority shareholders is absent or poor (Claessens et al., 2000). The controlling shareholder in these companies, typically an individual, a family or the state, often controls a large number of firms in a pyramidal structure. This pyramidal structure allows the controlling shareholder to achieve the ultimate control of a company through a chain of ownership relations. This structure also allows the shareholder to achieve effective control of the company with much smaller cash-flow ownership right. For example, a shareholder that directly controls 51% of firm A which in turn controls 51% of firm B achieves effective control of firm B with only 26% of cash flow right.

In a widely held corporation in which the ownership is separated from management, the central agency issue is the failure of managers to look after the interest of shareholders. Numerous studies have focused on how to design a mechanism to align the interest of management with that of shareholders (e.g., Jensen and Meckling, 1976; Myers and Majluf, 1984; Grossman and Hart, 1988; Harris and Raviv, 1988). The existence of controlling shareholders has changed the central agency problem. In most countries, many publicly traded companies that shares are highly concentrated are often managed directly by controlling shareholders or by managers whom are closely monitored and designated by controlling shareholders. The agency problem in this context is no longer the expropriation of shareholders by

managers, but rather the likelihood of controlling shareholders to expropriate minority or creditors, often legally (Shleifer and Vishny, 1997).

The essence of the agency problem when shares are highly concentrated is the separation of control from ownership of the controlling shareholders. A controlling shareholder can be viewed as serving dual roles: first as the shareholder and second as the manager. The separation of control from ownership splits the interest as the manager from the shareholder. The larger the ownership of a company, the less the incentive the controlling shareholder has to expropriate other investors because doing so, though generates private benefits, would reduce the cash flow that the controlling shareholder is entitled to. This is the same incentive effect emphasized by Jensen and Meckling (1976) to minimize the agency cost by making managers owning some portions of a company. However in many countries the largest shareholder establishes effective control over a company despite a substantial smaller cash flow right using a pyramidal structure. In such a structure, the controlling shareholder may have a strong incentive to expropriate other investors by diverting funds for her private benefits, which is referred to as "tunneling" by Johnson et al. (2000). Tunneling, also called stealing in this paper, can take the form of outright theft or fraud. It can also take any form of cash extracting transactions, such as transfer pricing advantageous to the controlling shareholder, excessive executive compensation, transferring assets to other connected companies under control, diluting the interest of minority shareholders, and so on. Several studies report direct evidence of expropriation of minority shareholders by examining data of connected transactions between companies listed in Hong Kong (Cheung et al., 2006), Korea (Bae et al., 2004), and India (Bertrand et al., 2002) and their controlling shareholders.

In this paper, we study how tunneling by controlling shareholders results in overinvestment. We contribute to the literature by extending a simple model developed by La Porta et al. (2002), by explicitly including the separation of voting right and ownership. In this model, the controlling shareholder whose ownership in a firm is only a fraction of her voting right decides on the fund to be expropriated to maximize the value derived from her entitled cash dividend and private benefit of

stolen funds net of cost of stealing. We show that the controlling shareholder will expropriate more from her controlled firm, if her control right is more diverged from her cash flow right. We also show in this model that as long as the marginal private benefit of expropriated fund exceeds the controlling shareholder's ownership share, firm will overinvest, even if the expropriated fund is used for other purposes. This is because the controlling shareholder decides for the firm to invest when her expected return exceeds her share of investment cost. With her ownership being a small portion of her voting right, the controlling shareholder shoulders only a fraction of total investment cost. The fund expropriated for her private benefits, however, augments the controlling shareholder's expected investment return. Therefore, a firm that is controlled by a shareholder whose private benefit of expropriated funds exceeds her ownership share in the firm is likely to invest more than the amount which maximizes the firm value. Further, we demonstrate that firm overinvests more if the separation ratio between ownership and control becomes larger.

Our model also derives other testable implications. It predicts that firm makes more overinvest if small investors are less protected, or if expropriated fund generates more private benefits for controlling shareholders, or if there is more free cash flow. Our model also implies that a higher ownership of the controlling shareholder of a firm results in lower overinvestment.

Using over 1000 Chinese firms listed on both Shanghai and Shenzhen stock exchanges, we then evaluate how separation between ownership and control affects overinvestment. China is a particular interesting case for studying the tunneling phenomenon. As a transitional economy, most of its firms started as the State Owned Enterprises (SOEs) in which the state is the dominant shareholder. As economic reform deepens, many have transformed to different ownership structures. Today, most of these firms still have a highly concentrated ownership structure, with either the state, or local government, or private family being the controlling shareholder. However, as a legacy problem, the controlling shareholders in many Chinese firms often own block non-tradable shares, which effectively limits their abilities to take advantage of price appreciation. Naturally this increases the incentive

for the controlling shareholders to expropriate funds via a complex pyramidal structure. Jiang, Lee and Yue (2005) documents evidence of tunneling when block shareholder's controlling right is significantly larger than her ownership right. Fan, Wong, and Zhang (2005) explains why different types of owners in China decide using pyramidal structure to control their firms. Second, the co-existence of state and private ownerships provides an ideal test ground to compare which type of ownership structure is more conducive to tunneling. Third, our study of overinvestment by Chinese firms provides an interesting alternative explanation for China's high investment. A study by Kuijs (2005) finds that China's high total investment is largely explained by enterprise investment, while investment by household and government are steady and comparable to other nations. To the extent that the separation of ownership and control results in overinvestment, our study points to the potential source of inefficiency in China's capital formation.

We find that the separation of ownership and control has a significant effect on overinvestment. Our estimate indicates that for every one unit of increase in the ratio of control to ownership right leads to about 0.0066 unit increase in overinvestment-total asset ratio. This implies that on average a Chinese firm overinvests about US$3.8 million relative to a company without separation of ownership and control rights. Given that our sample firms on average make about 336 million Yuan or about $50 million new investment a year, this implies that the overinvestment due to pyramid structure of control is more than 7.5 percent of annual new capital spending. We also find that companies with a larger free cash flow tend to overinvest. Private enterprises, due to external financing constraints, tend to make more overinvestment than central or local government owned firms, particularly for those firms with private entities controlling with small ownership. None of the corporate governance measures, however, is found to be significant in constraining overinvestment.

Our work contributes to the current literature on corporate pyramidal structure in an important way. Many studies (for example, Clasessens et al., 2002; La Porta et al., 2002; Shleifer and Wolfenzon, 2002) have shown that pyramidal

ownership structure results in lower firm value as capital market understands that resources are likely to be tunneled by controlling shareholders for private benefits. We show that separation of control from ownership in a pyramidal structure is likely to cause overinvestment. The inefficient capital formation due to overinvestment is an additional important cause for value destruction on top of resources expropriated by controlling shareholders.

We present our model in Section II. Section III describes the data. Section IV presents our empirical results. We provide further empirical analyses in Section V to show the robustness of our results. Section VI concludes.

## II. A Simple Model

In this section, we extend a simple model used by La Porta et al. (2002) and Johnson et al. (2000) by explicitly including the separation of cash flow right and voting. We are interested in seeing how the separation of ownership and control of the controlling shareholder affects the investment decision.

We assume that there is a controlling shareholder whose cash flow or equity ownership in the firm is α, which is assumed to be exogenously determined by the history. The controlling shareholder typically controls a much larger voting right of the firm through a pyramidal ownership structure (La Porta et al. 1999). We assume that the voting right $v$ of this controlling shareholder is a multiplier of her cash flow right, $v = t\alpha,$ where $t \geq 1.$ $t,$ called separation ratio, is the ratio of voting right to cash flow right, which measures the separation of ownership from control.

The firm has an amount of free cash flow, $I$, which is used for investment in a project wholly. The investment is risky and there are two states of nature: high return $R_h$ with probability $P$, and low return $R_l$ with probability $1 - P$. We assume that $R_h > I > R_l$

For simplicity, we assume that the firm does not have any cost so the profit is $R$, which is either $R_h$ or $R_l$ depending on the states of nature. A portion $s$ of the profits is "stolen", a term we use for diverting or tunneling, from the firm by the

controlling shareholder to herself so the rest *(1-s)R* is distributed as dividends. The tunneling can take the form of excessive executive compensation, favorable contractual pricing agreement with connected firms, subsidized personal loans, and so on. Such stealing of funds, though often legal in many countries, usually involves costly transactions, such as paying off others to maintain a good image, or setting up connected companies to carry out the transaction. We label $C(s,k,v)$ as a portion of profit to be wasted due to expropriation, where $k$ is a parameter measuring the quality of corporate governance. Therefore the total cost of expropriation is $C(s,k,v)R$. We assume that $C_s > 0,\ C_k > 0,\ C_v < 0$. The first inequality says that the marginal cost of stealing is positive. The second inequality implies that the better the corporate governance system is, the costlier it is to steal as more resource needs to be wasted to expropriate a given share of profits. Unlike previous studies (La Porta et al., 2002, Johnson et al. 2000), we include voting right in the steal cost function, which allows us to study how the separation of ownership and control impacts corporate investment decision. The third inequality suggests that a higher degree of control makes it easier for the controlling shareholder to steal and thus cost-of-theft is lower. We also assume that the marginal cost of stealing is an increasing function of stealing, $C_{ss} > 0$, and $C = 0$, when $s = 0$, i.e., the cost-of-theft is zero when there is no tunneling.

For every dollar expropriated, the controlling shareholder receives some private benefits. m is the marginal benefit of stealing, and varies depending on the nature of the controlling shareholder. In many developing countries, the state owned enterprises usually receive preferential treatment in funding while the private businesses often face challenges of getting loans. Resource expropriated brings more benefits if the controlling shareholder is a private enterprise. Thus, the marginal benefit of stealing is larger if a private business rather than a state owned enterprise is the controlling shareholder.

The controlling shareholder is assumed to be risk neutral and is to maximize

$$Max\ _sF = Max\ _s[\alpha(1-s)R + msR - C(s,k,v)R] \quad (1)$$

where the first term is her share of dividend due to her cash flow right, the second term is her private benefit generated by the expropriated fund, and the last term is the total cost of stealing. F is the objective function. Notice that when $s = 0$, $F = \alpha R$, which is the controlling shareholder's share of return due to her ownership. Thus, the controlling shareholder will not consider stealing if $(m - \alpha)s < C$. The optimal stealing $s$ is determined by solving the first order condition

$$m - a = \frac{\partial C}{\partial S} \tag{2}$$

subject to the constraint $(m - \alpha)s \geq C$. Since $\alpha$ is her share of dividend foregone, the left side of the equation (2) is the net marginal benefit of tunneling funds. The controlling shareholder decides the amount to be expropriated from the company that she owns α percent so that the marginal benefit equals the marginal cost of stealing.

To better understand how different factors affect the stealing decision, we follow La Porta et al. (2002), and Johnson et al. (2000) to use a specific cost-of-theft function

$$C(s, k, v) = \frac{ks^2}{2v} = \frac{ks^2}{2t\alpha} \tag{3}$$

This cost-of-theft function differs from the one used in La Porta et al. (2002) in that ours contains voting right. Combining equation (2) with (3), we find the optimal stealing

$$s^* = \frac{t\alpha(m-\alpha)}{k} \tag{4}$$

We can make a few important conclusions from (4). First, a larger $k$ means smaller $s^*$. In countries with better corporate governance structure, controlling shareholders choose to tunnel less funds from the companies they control. Second, when stolen fund brings more private benefits, there is more expropriation of minority

shareholders. To the extent that private enterprises are discriminated in getting finances from financial institutions in many developing countries, we expect that tunneling of funds are more likely to occur in companies where the controlling shareholders are private rather than the state owned enterprises. Third, companies of controlling shareholders with larger separation of ownership and control will see more funds to be expropriated. Fourth, the optimal stealing is a non-linear function of the cash flow right. When the cash flow right is low, increasing the ownership of the controlling shareholder encourages her to stealing more. On the other hand, if the controlling shareholder has already owned a large share of the company, increasing her ownership is associated with less expropriation of minority shareholders. The reason is that increasing the controlling shareholder's ownership has two effects. It increases the dividend foregone due to stealing. At the same time, it lowers the cost-of-theft because it increases her control of the company. When the cash flow ownership is small, the first effect is dominated by the second one so that the controlling shareholder steals more as her ownership increases. Notice that stealing is positive as long as the private benefit from stolen fund is larger than the controlling shareholder's ownership in the firm.

If the manager, in this case the controlling shareholder, operates the company in the best interest of all shareholders, she will invest in a project only if the future expected return is larger than the total investment. That is

$$PR_h + (1-P)R_l \geq I \tag{5}$$

We can calculate the threshold probability

$$P_1^* = \frac{I - R_l}{R_h - R_l} \tag{6}$$

which is the minimum probability of the high return state for the controlling shareholder to consider to invest in this project, if maximizing all shareholders' interest is the objective function. Investment in the project will be taken if $P > P_1^*$.

Of course, the controlling shareholder will only consider her own interest when making the company's investment decision. She will invest only if her expected return is larger than her share of investment cost:

$$P[\alpha(1-s^*)+ms^*-C]R_h+(1-P)[\alpha(1-s^*)+ms^*-C]R_l \geq \alpha I. \quad (7)$$

The threshold probability for the high return state

$$P_2^* = \frac{I-R_l}{R_h-R_l} - \frac{(m-\alpha)s^*-C}{[\alpha(1-s^*)+ms^*-C](R_h-R_l)}. \quad (8)$$

For the controlling shareholder, as long as the probability of the high return state is larger than $P_2^*$, she will choose to invest in the project. We can obtain

$$\Delta P = P_1^* - P_2^* = \frac{(m-\alpha)s^*-C}{[\alpha(1-s^*)+ms^*-C](R_h-R_l)} I > 0 \quad (9)$$

This implies that the controlling shareholder is more likely to invest than if she acts upon the interests of all shareholders. With equations (3) and (4), we calculate that the amount of over-investment when the controlling shareholder expropriates company's fund for her private benefit is

$$E = \Delta PI = (P_1^* - P_2^*)I = [1 - \frac{2k}{2k+t(m-\alpha)^2}]\frac{I^2}{R_h-R_l} \quad (10)$$

where we label E as the overinvestment. Notice that in our model, the company will overinvest as long as the marginal private benefit of expropriated fund exceeds the controlling shareholder's ownership share. The expropriated fund does not necessarily have to be used for investment. The intuition is very simple. When ownership is separated from control, the controlling shareholder only shares a fraction of the investment cost. On the other hand, by stealing fund from the company for her private benefit, the controlling shareholder augments her expected returns from investment. Thus, even if the expropriated fund is used for the purpose of other than investment,

the company with a controlling shareholder whose ownership separates from control is more likely to overinvest. We also notice that a larger separation ratio $t$ results in more overinvestment. Therefore, we derive our major testable prediction:

H1: The larger the separation of ownership and control, the more the overinvestment firms makes.

Based on expression (10), we also derive the following testable predictions:

H2: Firms with more cash flow overinvest more.

H3: Firms with better legal protection of minority shareholders are less likely to overinvest.

Equation (10) also allows us to address the relationship between the overinvestment and the cash flow right of the controlling shareholder, as well as the private benefit of stolen fund. Differentiating equation (10) with respect to $\alpha$ and $m$, we obtain

$$\frac{dE}{d\alpha} = -\frac{4kt(m-\alpha)}{[4k+t\alpha(m-\alpha)]^2} \times \frac{I^2}{R_h - R_l} \tag{11}$$

$$\frac{dE}{dm} = \frac{4kt(m-\alpha)}{[4k+t\alpha(m-\alpha)]^2} \times \frac{I^2}{R_h - R_l} \tag{12}$$

One necessary condition for the controlling shareholder to expropriate funds from a company that she also owns is that the marginal private benefit of stolen fund exceeds the share of cash dividend that she is entitled to, i.e., $m - \alpha > 0$. Therefore for those firms that controlling shareholders are engaging tunneling, equations (11) and (12) imply that firm overinvestment decreases as cash flow right increases, or increases as private benefit is higher. We thus have two more testable predictions:

H4: Firms overinvest more when controlling shareholders derive more private

benefits from expropriated funds.

H5: Firms controlled by shareholders with higher ownership stakes overinvest less.

## III. Data

We first follow La Porta et al. (1999) to identify the controlling shareholders of the public companies listed on the Shanghai Stock Exchange and Shenzhen Stock Exchange. Besides direct voting rights through shares registered under her name, a shareholder can also hold indirect voting rights of a firm through shares held by a chain of entities that she controls. We identify the controlling shareholder as the one with overall direct and indirect votes consolidated through all the control chains exceeding 10 percent. If multiple shareholders have over 10 percent of the votes, the one with the highest overall voting stake along all the control chains is selected. To calculate the control rights, we aggregate the direct and indirect voting stakes of the controlling shareholder. We calculate the cash flow right of the controlling shareholder by first computing her cash flow ownership along each control chain, and then aggregating the ownerships across all these chains. For example, suppose that a shareholder owns 15 percent of firm A and 20 percent of firm B, which in turn own 30 percent and 10 percent of firm C, respectively. Suppose that firm A also directly owns 10 percent of firm C. We then say that this shareholder's control right in firm C is 50 percent. However, she only has 16.5 percent of the cash flow rights of firm C.

The data for cash flow ownership and control right, as of 2004-2007, were manually collected from the Shanghai Stock Exchange website. The controlling shareholders are classified in four categories: central government, local government, private, and others. "Central government" consists of companies that are controlled by and report to the State Asset Commission and ministries such as the Ministry of Finance. Companies report to agencies at local government levels are classified as "local government". Private individuals, couples, families, village committees,

employee committees, etc., are put into "private" category. We exclude controlling shareholders that are classified as "others". We also exclude the companies that the controlling shareholders had changed during the time.

For the corporate governance variable, k, we use three rough proxies measuring protection of minority shareholders. The first is the government intervention index. This index measures the degree of intervention by local governments in company management. It can occur quite often to some companies that local governments interfere with management practices by influencing board decision in China. Smaller government intervention index implies heavy government intervention in corporate decisions and thus may indicate a weak corporate board in protecting small investors. The second proxy is a rule of law index. The third proxy for the quality of corporate governance is the marketisation index. Fan et al. (2007) constructed these indices for 2001-2005[1]. We take these three indices of 2004-2005, and use 2005 data to represent 2006-2007, believing that they tend to be relatively stable.

All the rest of the data are collected from Wind Database. We select annual data from 2002 to 2007. We exclude from the sample all financial, and ST companies which are often financially distressed[2]. We have total 1086 public listed companies in our sample. After matching all data and checking the consistency, we obtain a sample size of 2914. Table 1 summarizes all the variables.

**Table I Definition of Variables**

This table describes the variables collected for 1086 companies listed on the Shanghai and Shenzhen Stock Exchanges. We present the description and the sources of data.

| Symbols | Definition |
|---|---|
| $I_{total}$ | The sum of all outlays on capital expenditure divided by total asset at the end of the year. Source: Wind Database. |
| $I_m$ | Investment expenditure necessary to maintain assets in place which we use reported amortization and depreciation as proxy, divided by total asset at the end of the year. Source: |

[1] These indices have also been used in Fan et al. (2007), Fan et al. (2008), and Li, Yue and Zhao (2006).

[2] A company receiving ST (Special Treatment) status is one that has reported two consecutive annual losses, or whose book value has become negative. A company with ST status can still be traded, with some trading restrictions. Trading will be suspended if third year lose is reported and will be delisted with four consecutive annual loses.

| | |
|---|---|
| | Wind Database. |
| $I_{new}$ | Investment expenditure on new projects: $I_{new} = I_{total} - I_m$. |
| $I_{\exp}$ | Expected level of new investment: The fitted value in the expected investment model equation (13). |
| $I_{over}$ | Over-investment: The positive residual in the expected investment model equation (13). |
| CFO | Operating cash Flows, divided by total asset at the end of the year. Source: Wind Database |
| FCF | Free cash flow: $FCF = CFO - I_m - I_{\exp}$. |
| Cash Flow Right | The cash flow that the largest shareholder is entitled to receive from listed company. Same definition as La Porta et al(1999). Source: company annual reports from the Shanghai Stock Exchange. |
| Control Right | The controlling power of the largest shareholders of listed company. Same Definition as La Porta et al.(1999). Source: company annual reports from the Shanghai Stock Exchange. |
| Separation Ratio | Separation of control right and cash flow right: Ratio of control right (voting right) to cash flow right. |
| $InOppt$ | Investment opportunity: The arithmetic average of past two yeas' sales growth rate at the end of each year. Source: Wind Database. |
| $ROA$ | Return of total asset. Source: Wind Database. |
| $Return$ | The stock returns for the year prior to the investment year. It is measured as the change in market value of the firm over that prior year. Source: Wind Database. |
| $Leverage$ | Total debts divided by total asset. Source: Wind Database. |
| $Cash$ | The balance of cash deflated by total assets measured. Source: Wind Database. |
| $Age$ | The number of years the firms has been listed. Source: Wind Database. |
| $Size$ | The Log of total assets measured. Source: Wind Database. |

Table II reports the descriptive statistics of the variables used in the empirical analyses. Of the 1086 public listed companies, an average controlling shareholder has 35.37 percent of cash flow rights, and 41.51 voting rights. The separation of cash flow and control rights is on average 1.48. The maximum of cash flow-control separation of a controlling shareholder is 27.04. On average, a shareholder controls a public listed company through 2.42 layers of pyramids. Some even use up to 8 layers of pyramids to control a firm. An average firm has 6.35 years of being listed.

**Table II Descriptive Statistics**

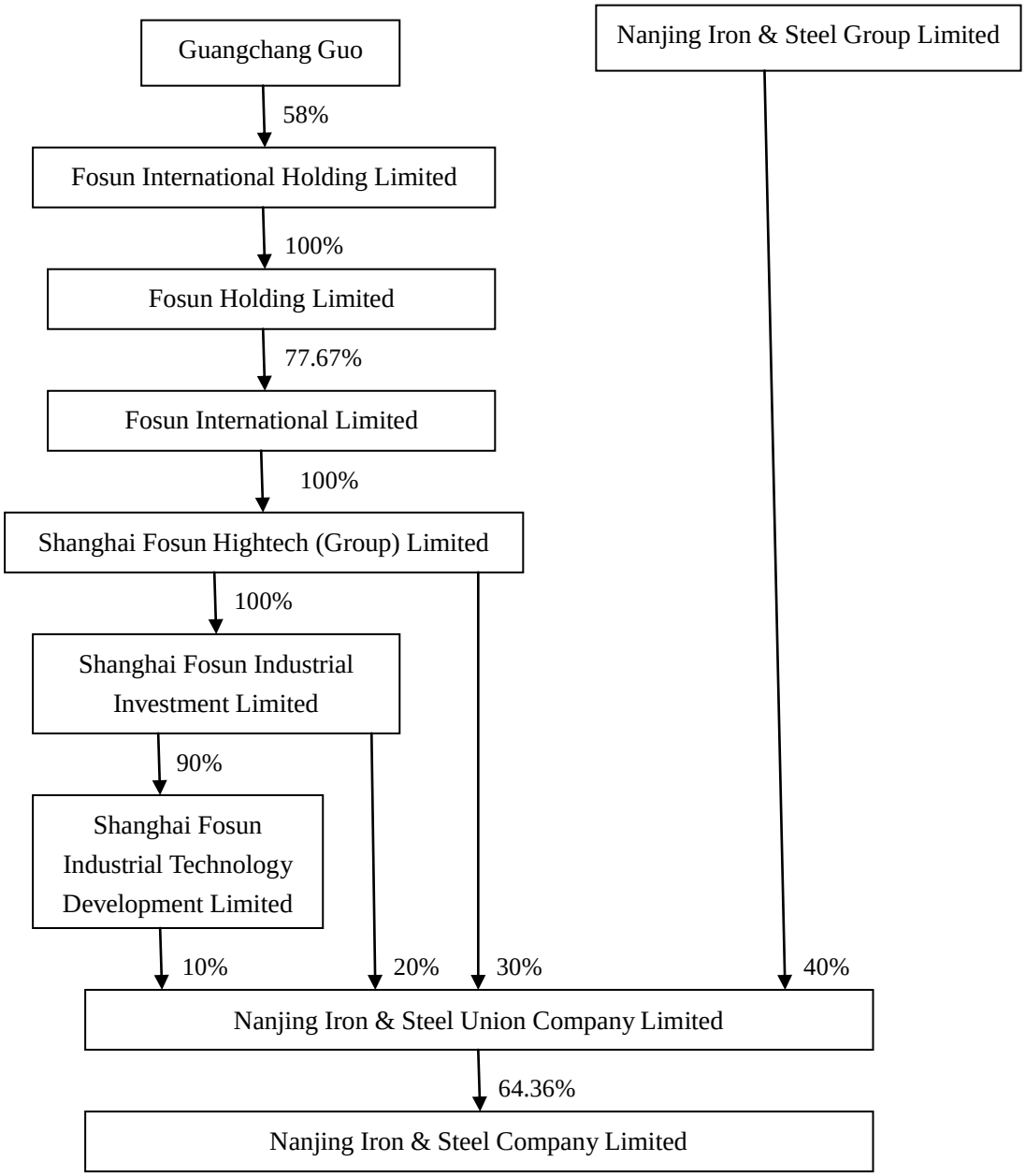
This table provides descriptive statistics of some variables used in this study. # of pyramids is the number of pyramids through which the controlling shareholder controls a firm. Non-tradable is the percentage of the shares that are not permissible to trade.

| | Mean | Median | Max | Min | Std |
|---|---|---|---|---|---|
| α | 35.37 | 33.05 | 88.06 | 0.53 | 17.65 |
| v | 41.51 | 40.60 | 88.06 | 8.94 | 15.82 |
| t | 1.48 | 1 | 27.04 | 1 | 1.41 |
| # of pyramids | 2.42 | 2 | 8 | 1 | 0.83 |
| Size | 21.56 | 21.45 | 27.30 | 18.50 | 1.05 |
| Return | 8.06 | -8.65 | 533.33 | -90.93 | 56.15 |
| ROA | 5.62 | 5.44 | 138.29 | -84.20 | 7.38 |
| Age | 6.35 | 6 | 14 | 1 | 3.20 |
| Leverage | 50.58 | 51.34 | 368.25 | 4.30 | 18.77 |

It is interesting to use one company as a case study for further illustration. Table III shows the relationship between Nanjing Iron & Steel Company Limited (NJISC, tick symbol 600282), listed on the Shanghai Stock Exchange, and its controlling shareholder, Mr. Guangchang Guo. Through seven layers of pyramid, Mr. Guo controls 60 percent of voting rights of Nanjing Iron & Steel Union Company Limited, which in turn holds 64.36 percent of the public listed NJISC. With only 17.1 percent of cash flow right, Mr. Guo effectively controls NJISC with 64.36 percent of the votes, by using total eight layers of pyramid to reach the target company. The separation ratio of his control to ownership is 3.76. By the end of 2007, Nanjing Iron & Steel Union Company Limited, the largest shareholder of NJISC, has total 602 million shares, of which about 81.28 percent is non-tradable.

**Table III Nanjing Iron & Steel Company Limited**

This table shows the relationship between Nanjing Iron & Steel Company Limited (NJISC), public listed on the Shanghai Stock Exchange, and its ultimate controlling shareholder, Mr. Guangchang Guo. Each arrow line shows the percentage of shares of upper layer company. The ownership structure is based on 2007 company annual report.




## IV. Empirical Results

The focus of this paper is to study how the divergence of cash flow and control rights impacts the overinvestment. To achieve this objective, we first need to measure firm's overinvestment based on the method developed by Richardson (2006).

This method decomposes total investment expenditure into two components: (i) required investment expenditure to maintain assets in place, (ii) investment expenditure on new projects. The first component is often measured by amortization and depreciation as a proxy. The second component, investment expenditure on new projects, is total investment expenditure net of required investment. There is an extensive literature that has examined firm level investment decisions on new projects (Hubbard, 1998; Richardson, 2006). This literature usually decomposes investment expenditure on new projects into an expected investment in new positive NPV projects, which is explained by a set of variables, and a residual component. A positive (negative) residual component corresponds to over-(under-)investment. In this paper, we focus on firms with positive values of residual.

Following Richardson (2006), we assume that the investment expenditure on new projects is explained by the following regression equation:

$$I_{new} = \alpha_0 + \alpha_1 Inoppt_{-1} + \alpha_2 Leverage_{-1} + \alpha_3 Cash_{-1} + \alpha_4 Age_{-1} + \alpha_5 Size_{-1} + \alpha_6 Return_{-1} + \alpha_7 ROA_{-1} + \alpha_8 I_{new\,-1} + \varepsilon, \quad (13)$$

where all the variables are described in Table I. Those indexed with -1 refer to t-1 variables. To estimate equation (13), we need to measure the investment opportunity, $Inoppt$. We use the arithmetic average of annual sales growth rate over the most recent two years. La Porta et al. (2002) argues for using sales growth instead of earnings growth as a proxy for growth opportunities, because it is less likely to be manipulated as earnings growth[3]. In the following analyses, we also used other measures as proxies for the investment opportunity.

Table IV shows the regression results of equation (13). Model 1 only uses the investment opportunity, $Inoppt_{-1}$ as the explanatory variable for investment. Though $Inoppt_{-1}$ is highly significant, its explanatory power is low. When we include other explanatory variables in Model 2, the adjusted $R^2$ increases to 22.2 percent. Most exogenous variables are significant at 10 percent level. We use Model 2 in Table IV to generate the residuals. The positive residuals are taken as the

[3] La Porta et al. (2002) in fact uses geometric average annual percentage growth. To make sure that this difference does not result in different conclusions in the following analyses, we also estimate the investment equation using geometric average. Our conclusions are the same.

overinvestment.

## Table IV Analysis of Investment Expenditure

The table provides regression results of equation (13). The dependent variable is the new investment, which is the total investment net of maintenance investment, scaled by total assets. The independent variables are explained in Table II. Index "-1" refers to lag one variable. We also include year indicators in the regressions to capture annual fixed effects. The year indicators are dummy variables: if year = 2004, then year1 = 1, else year1 = 0; if year = 2005, then year2 = 1, else year2 = 0; if year = 2006, then year3 = 1, else year3 = 0. The sample companies are classified into 20 industries. We also include a vector of dummies to capture the industry fixed effects in the regressions. T-statistics based on Huber-White robust standard errors are shown in parentheses.

| | Model 1 | Model 2 |
|---|---|---|
| Constant | 0.0368*** | -0.0130 |
| | (11.97) | (-0.51) |
| $Inoppt_{-1}$ | 0.0001*** | 0.00004 |
| | (2.78) | (0.95) |
| $Size_{-1}$ | | 0.0019 |
| | | (1.52) |
| $Return_{-1}$ | | 0.0001*** |
| | | (2.91) |
| $ROA_{-1}$ | | 0.0012*** |
| | | (5.99) |
| $Leverage_{-1}$ | | -0.0003*** |
| | | (-3.43) |
| $Age_{-1}$ | | -0.0011*** |
| | | (-2.64) |
| $Cash_{-1}$ | | 0.0382*** |
| | | (2.64) |
| $I_{-1}$ | | 0.3088*** |
| | | (14.15) |
| Adj. R-sq | 0.046 | 0.222 |

Note: *** at the 1 percent level; **at the 5 percent level; * at the 10 percent level.

Once we have generated the overinvestment data, we can test hypotheses H1-H5. Table V shows the regression results of the relationship between overinvestment, free cash flow, separation ratio, and investor protection. It also lists the expected sign of each explanatory variable based on hypotheses H1-H5. We report three regressions, each using different proxy for investor protection: government invention, rule of law, and marketization index. Our hypothesis H3 suggests that

better investor protection should have a negative impact on overinvestment. We expect that all three proxies for investor protection should have negative coefficients in these regressions. To test hypothesis H4, we include a private control dummy variable, which equals one if the controlling shareholder is "Private", and zero if otherwise. To the extent that it is more difficult to receive funding for a private enterprise than a state owned enterprise in a developing country, stealing generates higher marginal benefits for private enterprises and thus we expect that the coefficient for the Private Control dummy is positive.

In Table V, The coefficient for separation ratio in all regression equations is positive and significant at 10 percent level of significance. Other things the same, a firm is likely to increase overinvestment by about 0.0066 for every unit increase in the ratio of voting right to ownership right. The average total asset for all the firms in our sample is 7.962 billion Yuan. Thus, average firm increases overinvestment by about 53 million Yuan, or about US$7.9 million[4] for every one unit increase in the separation ratio. Our sample firms have an average separation ratio 1.48. Relative to an economy with voting right the same as ownership, a typical Chinese company overinvests 25 million Yuan, or about US$3.8 million. Our sample firms on average make about 336 million Yuan new investment a year. The overinvestment due to pyramid structure of control is about 7.5 percent of average annual new investment. This implies that our sample of 1086 firms generates 27.4 billion Yuan, or about $4 billion overinvestment a year relative to an economy without pyramidal structure. This is quite a significant number, indicating a substantial amount of resources is not used for the purpose of maximizing firm values in China due to the divergence of ownership and control.

As predicted by our model, the coefficient for FCF in all regressions is positive and significant at 10 percent level of significance. All proxies for investor protection do not have the expected sign, but all are not significant. These measures for corporate governance do not seem to achieve the intended effects of protecting small investors in China[5]. Jiang, Lee and Yue (2005) also reach a similar conclusion

[4] We use exchange rate as US$1 = 6.7 Yuan.
[5] We have also used other measures for investor's protection, but none of them seems to yield results predicted by

when evaluating the monitoring role of auditors. They speculate that unclean audit opinions alone are not sufficient to deter tunneling behavior. Allen, Qian and Qian (2005) also find that the standard corporate governance mechanisms are weak in China and are ineffective for the Chinese public listed companies.

The coefficient for cash flow right is positive, contradictory to hypothesis H5, but insignificant. The Private Control dummy has a positive sign on overinvestment which is consistent to hypothesis H4, but none of the estimates are significant[6]. We notice that the adjusted $R^2$ of the model in Table V is very low. Only a little over 2% of the variation is explained by FCF, cash flow right, separation ratio and other determinants. However, the explained variable (overinvestment) itself is the residual of another regression equation and thus this explanatory power is incremental to the set of variables explaining the firm level investment expenditure, which is 22.2% in Table IV. Therefore, the combined models of Table IV and V are able to explain a significant portion of the cross-sectional variation in investment over time[7].

**Table V Overinvestment and Corporate Governance**

The table presents results of regressions for the sample of 1086 Chinese firms with a controlling shareholder. The dependent variable is overinvestment calculated from regression equation (13) as the positive residual. The independent variables are: 1) FCF, the free cash flow; 2) Cash Flow Right, the ownership of the controlling shareholder; 3). Separation Ratio, the ratio of voting right to cash flow right; 4) Private Control, a dummy variable equals one if the controlling shareholder is a private enterprise or family; and 5) One of three indices measuring investor protection: Government Intervention, Rule of Law, and Marketization Index, of which a larger number indicates better investor protection. T-statistics based on Huber-White robust standard errors are shown in parentheses.

| Variable | Expected Sign | Model 1 | Model 2 | Model 3 |
|---|---|---|---|---|
| Constant | | 0.0259** | 0.0224** | 0.0200 |
| | | (2.39) | (2.18) | (1.40) |
| FCF | + | 0.1115* | 0.1097* | 0.1103* |
| | | (1.85) | (1.82) | (1.83) |
| Cash Flow Right | - | 0.0002 | 0.0002 | 0.0002 |
| | | (1.60) | (1.49) | (1.56) |
| Separate Ratio | + | 0.0066* | 0.0065* | 0.0066** |

the model. Appendix 1 provides regression results using three different indices of corporate governance.

[6] In fact, the hypotheses H4 and H5 are only true if $m - \alpha > 0$. Unfortunately, we have no way to identify the companies of which the private benefit of stolen fund exceeds cash flow right.

[7] This argument was also forcefully made by Richardson (2006).

| | | | | |
|---|---|---|---|---|
| | | (1.81) | (1.81) | (1.84) |
| Private Control | + | 0.0078 | 0.0076 | 0.0076 |
| | | (0.95) | (0.93) | (0.93) |
| Government Intervention | - | 0.0002 | | |
| | | (0.17) | | |
| Rule of Law | - | | 0.0009 | |
| | | | (0.94) | |
| Marketization Index | - | | | 0.0009 |
| | | | | (0.64) |
| Adj. R-sq | | 0.022 | 0.024 | 0.023 |

Note: *** at the 1 percent level; **at the 5 percent level; * at the 10 percent level.

We conclude in our theoretical discussion that firms will overinvest as long as controlling shareholders expropriate funds. One implication is that overinvestment will not occur in our model if controlling shareholders do not tunnel funds for their private benefits. Thus the hypotheses H1-H5 are conditional on that firms engage in tunneling. One necessary condition for tunneling is $m > \alpha$, that is, the marginal private benefit of stolen fund exceeds the cash flow ownership of the controlling shareholders. Since it is difficult to estimate the marginal private benefit of stolen fund, we hypothesis that our conclusions are probably more true for firms with smaller cash flow rights by the controlling shareholders. To test this, we divide our sample into two, using median level of cash flow right as a cut off line.

**Table VI Overinvestment and Corporate Governance with Split Sample**

The table presents results of regressions for the sample of 1086 Chinese firms with a controlling shareholder, using split sample. The dependent variable is overinvestment calculated from regression equation (13) as the positive residual. The independent variables are: 1) FCF, the free cash flow; 2) Cash Flow Right, the ownership of the controlling shareholder; 3). Separation Ratio, the ratio of voting right to cash flow right; 4) Private Control, a dummy variable equals one if the controlling shareholder is a private enterprise or family, and zero otherwise; and 5) Government Intervention, an index measuring investor protection, of which a larger number indicates better investor protection. High (Low) refers to sub-sample of cash flow right larger (smaller) than the median. T-statistics based on Huber-White robust standard errors are shown in parentheses.

| Variables | High | Low |
|---|---|---|
| Constant | 0.0168 | -0.0052 |
| | (0.45) | (-0.25) |
| FCF | 0.1304 | 0.0916 |

| | | |
|---|---|---|
| | (1.35) | (1.39) |
| Cash Flow Right | -0.0003 | 0.0010 |
| | (-0.90) | (1.61) |
| Separation Ratio | 0.0404 | 0.0084** |
| | (1.24) | (2.18) |
| Private Control | -0.0091 | 0.0181* |
| | (-0.89) | (1.63) |
| Rule of Law | 0.0006 | 0.0012 |
| | (0.48) | (0.86) |
| Adj. R-sq | 0.026 | 0.046 |

Note：***，** and * indicate 1%，5% and 10% levels of significance, respectively.

Table VI re-estimates the relationship between overinvestment and the explanatory variables with split samples of low and high cash flow rights, using the median as the cut-off line[8]. For the small ownership right sample, the coefficient for the separation ratio remains to be positive and becomes significant at 5 percent level. The private control dummy has a positively significant coefficient, implying that firms with controlling shareholders classified as "Private" tend to overinvest more than firms with other types of controlling shareholders. The coefficient for the cash flow right is still positive and but not significant. For the sample of high cash flow right, none of the coefficient estimates is significant. None of the measures for investor protection is significant in these equations.

## V. Robustness of Results

One criticism of our above analyses is the use of a particular proxy for investment opportunity. Like La Porta et al. (2002), we have used the average of annual sales growth rate over the most recent two years. This effectively uses past sales growth to forecast future. Alternatively we can use other measures for investment opportunity. One popular approach is to use Tobin's Q, the ratio of the market value of assets to the current replacement cost of those assets. However,

[8] We have also used 50 percent of cash flow right and the sample mean as a cut-off line. The results are basically similar.

Tobin's Q is also subject to the same criticism as the sales growth that it does not paint a complete picture of the growth opportunities. Other measures, such as book-to-market of equity (B/P) and earnings-price ratios (E/P) are not perfect proxies for investment opportunity either[9]. Richardson (2006) decomposes firm value into two components: value of the assets in place which reflects the value of the firm indicated by current book values and current earnings, and the value of growth opportunities. According to Richardson (2006), value of the assets in place can be estimated using residual income framework, assuming price equals discounted expected dividends, and abnormal earnings follow an auto-regressive process with a persistence parameter[10]. The value of growth opportunities is the difference between the value of the firm and value of the assets in place. This measure, V/P, according to Richardson (2006), simultaneously capturing market value relative to both book value and earnings in an accepted valuation framework, is able to measure growth opportunities better than other proxies. The index generated to measure growth opportunities based on Richardson (2006) is in fact a linear combination of B/P and E/P.

Identifying the best relationship to describe investment is not the objective of this paper. Thus, instead of using a particular measure for growth opportunities to generate overinvestment, we decide to use all the four possible proxies, keeping in mind that none of them is a perfect measure. Our objective is to test if our main result, that firm with higher separation ratio overinvests more, is robust no matter what measure is used as a proxy for growth opportunities.

**Table VII Investment Analysis Using Different Measures of Investment Opportunity**

The table provides regression results of equation (13), using four different proxies for Inoppt: B/P, E/P, Tobin's Q and V/P. B/P is the book-to-market of equity. E/P is the earnings-price ratio. Tobin's Q is the ratio of the market value of assets to the current replacement cost of those assets. V/P is measured as the ratio of value of the assets in

[9] BM (EP) can serve as sufficient statistics for growth opportunity if earnings are transitory (permanent). However, Decho, Hutton and Sloan (1999) shows that earnings contain a certain degree of mean reversion in between the two extremes.

[10] Richardson (2006) decomposes the value of a firm, P, into $P = V_{AIP} + V_{GO}$, where $V_{GO}$ the value of growth opportunity. $V_{AIP}$ is value of assets in place which is calculated according to $V_{AIP} = (1 - \alpha r)BV + \alpha(1 + r)X - \alpha r d$, where BV is the book value of equity, X is earnings, r is the discount rate, d is dividend, $\alpha = \omega/(1 + r - \omega)$, and $\omega$ a fixed persistence parameter restricted to be positive and less than one.

place to market value. The dependent variable is the new investment, which is the total investment net of maintenance investment, scaled by total assets. The independent variables are explained in Table II. Index "-1" refers to lag one variable. We also include the year indicators in the regressions to capture annual fixed effects. The year indicators are dummy variables: if year = 2004, then year1 = 1, else year1 = 0; if year = 2005, then year2 = 1, else year2 = 0; if year = 2006, then year3 = 1, else year3 = 0. The sample companies are classified into 20 industries. We use a vector of dummies to capture the industry fixed effects in the regressions. T-statistics based on Huber-White robust standard errors are shown in parentheses.

| | Model 1<br>B/P | Model 2<br>E/P | Model 3<br>Tobin's Q | Model 4<br>V/P |
|---|---|---|---|---|
| Constant | -0.0217 | -0.0117 | 0.0212 | -0.0040 |
| | (-0.77) | (-0.45) | (0.55) | (-0.35) |
| $Inoppt_{-1}$ | -0.0172*** | 0.0130 | -0.0013 | -0.0040 |
| | (-3.60) | (0.66) | (-0.50) | (-1.02) |
| $size_{-1}$ | 0.0035*** | 0.0017 | 0.0002 | 0.0025* |
| | (2.60) | (1.35) | (0.11) | (1.85) |
| $Return_{-1}$ | 0.0001* | 0.0001*** | 0.0001** | 0.0001** |
| | (1.68) | (2.95) | (1.93) | (2.44) |
| $ROA_{-1}$ | 0.0011*** | 0.0012*** | 0.0015*** | 0.0013*** |
| | (6.07) | (5.76) | (5.05) | (5.48) |
| $Leverage_{-1}$ | -0.0003*** | -0.0003*** | -0.0003** | -0.0003*** |
| | (-4.45) | (-3.23) | (-2.33) | (-3.52) |
| $Age_{-1}$ | -0.0012*** | -0.0011*** | -0.0003 | -0.0011*** |
| | (-2.94) | (-2.79) | (-0.57) | (-2.80) |
| $Cash_{-1}$ | 0.0388*** | 0.0381*** | 0.0434** | 0.0385*** |
| | (2.69) | (2.65) | (2.00) | (2.67) |
| $I_{-1}$ | 0.3053*** | 0.3081*** | 0.3465*** | 0.3100*** |
| | (14.08) | (14.01) | (9.81) | (14.19) |
| Adj. R-sq | 0.231 | 0.221 | 0.228 | 0.222 |

Note：***，** and * indicate 1%，5% and 10% levels of significance, respectively.

Table VII shows the regression results of investment equation (12), using B/P, E/P, Tobin's Q, and V/P as a measure for growth opportunities, $Inoppt_{-1}$. V/P is the ratio of value of the assets in place to the firm value, calculated according to Richardson (2006). Lower V/P indicates more growth opportunities so does B/P or E/P. The coefficients of these measures in the investment regression equations are expected to be negative. We find that the coefficient for $Inoppt_{-1}$, using B/P, is negative and significant. On the other hand, the coefficient using V/P or Tobin's Q is negative not significant. Coefficient estimates for other explanatory variables are mostly in line with Table IV, and are significant with expected sign. The explanatory

power for investment of these regression equations is reasonably good, with the adjusted $R^2$ being more than 22 percent.

From Table VII, we generate four sets of residuals. The positive residual is taken as the overinvestment. We re-estimate the relationship between overinvestment, FCF, Separation Ratio, and other explanatory variables, based on different proxies for growth opportunities. Table VIII lists the regression results.

**Table VIII Overinvestment and Corporate Governance Using Different Measures of Investment Opportunity**

The table presents results of regressions for the sample of 1086 Chinese firms with a controlling shareholder, using positive residuals generated from Table VI as the dependent variable. Four different proxies for Inoppt: B/P, E/P, Tobin's Q and V/P, are used. B/P is the book-to-market of equity. E/P is the earnings-price ratio. Tobin's Q is the ratio of the market value of assets to the current replacement cost of those assets. V/P is measured as the ratio of value of the assets in place to market value. The independent variables are: 1) FCF, the free cash flow; 2) Cash Flow Right, the ownership of the controlling shareholder; 3). Separation Ratio, the ratio of voting right to cash flow right; 4) Private Control, a dummy variable equals one if the controlling shareholder is a private enterprise or family; and 5) Government Intervention, an index measuring investor protection, of which a larger number indicates better investor protection. T-statistics based on Huber-White robust standard errors are shown in parentheses.

| Variable | B/P | E/P | Tobin's Q | V/P |
|---|---|---|---|---|
| Constant | 0.0194** | 0.0229** | 0.0166 | 0.0212** |
| | (1.92) | (2.22) | (1.23) | (2.06) |
| FCF | 0.1057* | 0.1036* | 0.0910 | 0.1079* |
| | (1.76) | (1.72) | (1.45) | (1.78) |
| Cash Flow Right | 0.0003* | 0.0002 | 0.0003 | 0.0002* |
| | (1.79) | (1.41) | (1.16) | (1.63) |
| Separate Ratio | 0.0075** | 0.0065* | 0.0070* | 0.0066* |
| | (2.10) | (1.82) | (1.84) | (1.84) |
| Private Control | 0.0078 | 0.0075 | 0.0072 | 0.0074 |
| | (0.96) | (0.91) | (0.93) | (0.91) |
| Rule of Law[11] | 0.0009 | 0.0009 | 0.0015 | 0.0009 |
| | (1.03) | (0.97) | (1.14) | (1.03) |
| Adj. R-sq | 0.029 | 0.023 | 0.027 | 0.024 |

Note：***，** and * indicate 1%，5% and 10% levels of significance, respectively.

[11] We have also used other measures for investor protection, and the results are the same. To save space, we do not list them here.

We find that our main conclusion is robust. The coefficient for Separation Ratio is positive and significant at 10 percent level, in all regressions. FCF in all specifications has a positive coefficient, and all coefficient estimates are significant, except using Tobin's Q as a proxy for growth opportunities to generate overinvestment. The coefficient on Private Control dummy has a positive sign, consistent to our model prediction, though none of the estimates is significant. Like in Table V, both coefficients on Cash Flow Right and small investor protection index, Rule of Law, are insignificant, except for the model using B/P.

We divide the sample into high and low cash flow rights and re-test the relationship between overinvestment and other explanatory variables. We expect that our hypotheses are more likely to be true for the low cash flow right sample. Table IX lists the results of regression using split samples. Our results are consistent with our findings from previous tables. The coefficient for separation ratio is positive and significant in all regressions using low cash flow right. The Private Control dummy is found to increase overinvestment significantly in all regressions. This suggests that a larger private benefit of expropriated fund results in more stealing and thus firms engage in more overinvestment. Higher free cash flow is found to increase overinvestment only in the model using Tobin's Q measure. The coefficient for cash flow right, however, does not allow us to draw any conclusion. We also find from Table IX that better investor protection has no significant effect on overinvestment.

**Table IX Overinvestment and Corporate Governance Using Different Measures of Investment Opportunity with Split Sample**

The table presents results of regressions for the sample of 1086 Chinese firms with a controlling shareholder, using split sample and positive residuals generated from Table VI as the dependent variable. Four different proxies for Inoppt: B/P, E/P, Tobin's Q and V/P, are used. B/P is the book-to-market of equity. E/P is the earnings-price ratio. Tobin's Q is the ratio of the market value of assets to the current replacement cost of those assets. V/P is measured as the ratio of value of the assets in place to market value. The independent variables are: 1) FCF, the free cash flow; 2) Cash Flow Right, the ownership of the controlling shareholder; 3). Separation Ratio, the ratio of voting right to cash flow right; 4) Private Control, a dummy variable equals one if the controlling shareholder is a private enterprise or family; and 5) Government Intervention, an index measuring investor protection, of which a larger number indicates better investor protection. High (Low) refers to sub-sample of cash flow right larger (smaller) the median. T-statistics based on Huber-White robust standard errors are shown in parentheses.

| Variable | B/P | E/P | Tobin's Q | V/P |
|---|---|---|---|---|

| | High | Low | High | Low | High | Low | High | Low |
|---|---|---|---|---|---|---|---|---|
| Constant | -0.0012 | -0.0049 | 0.0174 | -0.0042 | 0.0452 | 0.0011 | 0.0106 | -0.0040 |
| | (-0.03) | (-0.25) | (0.47) | (-0.21) | (0.52) | (0.04) | (0.29) | (-0.19) |
| FCF | 0.1281 | 0.0869 | 0.1254 | 0.0852 | 0.0592 | 0.1671* | 0.1281 | 0.0923 |
| | (1.31) | (1.35) | (1.30) | (1.29) | (0.60) | (1.85) | (1.32) | (1.40) |
| Cash Flow Right | -0.0001 | 0.0010* | -0.0003 | 0.0010 | -0.0007* | 0.0000 | -0.0002 | 0.0010 |
| | (-0.27) | (1.68) | (-0.91) | (1.53) | (-1.93) | (0.06) | (-0.64) | (1.51) |
| Separate Ratio | 0.0464 | 0.0092** | 0.0403 | 0.0083** | 0.0399 | 0.0075* | 0.0418 | 0.0082** |
| | (1.43) | (2.40) | (1.24) | (2.17) | (0.44) | (1.82) | (1.28) | (2.15) |
| Private Control | -0.0086 | 0.0179* | -0.0089 | 0.0178* | -0.0048 | 0.0153* | -0.0089 | 0.0175* |
| | (-0.84) | (1.63) | (-0.87) | (1.64) | (-0.37) | (1.68) | (-0.88) | (1.63) |
| Rule of Law | 0.0008 | 0.0011 | 0.0005 | 0.0013 | 0.0003 | 0.0023 | 0.0007 | 0.0013 |
| | (0.73) | (0.78) | (0.44) | (0.93) | (0.13) | (1.14) | (0.61) | (0.87) |
| Adj. R-sq | 0.024 | 0.050 | 0.023 | 0.045 | -0.003 | 0.133 | 0.023 | 0.043 |

Note：***，** and * indicate 1%，5% and 10% levels of significance, respectively.

## VI. Conclusion

In this paper, we study how separation of control and ownership of controlling shareholders via a pyramidal corporate structure affects overinvestment, by extending a simple model developed by La Porta et al. (2002). Using over 1000 public listed Chinese firms, we confirm the prediction of our model that firms overinvest more when the controlling shareholder's voting right is more separated from her ownership. This implies that firms with controlling shareholders via pyramidal corporate structure are likely to invest in projects that destroy firm value. Our paper provides an additional explanation on why capital market penalizes firms with large separation of control and ownership in terms of lower equity value. The result of this paper also points to the possible inefficiency in China's high investment in recent years.

This paper also draws other conclusions. Firms with more free cash flow tend to overinvest more. Private enterprises as controlling shareholders, due to limited external financing opportunities, derive more private benefits from expropriated funds. We find that with controlling shareholder's ownership being small, firms under private control tend to overinvest more relative to firms under state government or

local government control in China. Unlike implications from Claessens et al. (2002) and La Porta et al. (2002), we do not find evidence to support the hypothesis that better investor protection reduces overinvestment in China, using measures such as government intervention, rule of law index, marketization index, and others. La Porta et al. (2002) finds that higher cash flow right by the controlling shareholder improves firm valuation. Our paper, however, does not find evidence to link ownership of controlling shareholders with overinvestment.

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## Appendix 1 Overinvestment and Corporate Governance Using Different Measures

The table presents results of regressions for the sample of 1086 Chinese firms with a controlling shareholder, using other measures for investor protection. The dependent variable is overinvestment calculated from regression equation (12) as the positive residual. The independent variables are: 1) FCF, the free cash flow; 2) Cash Flow Right, the ownership of the controlling shareholder; 3). Separation Ratio, the ratio of voting right to cash flow right; 4) Private Control, a dummy variable equals one if the controlling shareholder is a private enterprise or family; and 5) One of three indices measuring investor protection: Independent, Internal Institutional Holding, and External Institutional Holding, of which a larger number indicates better investor protection. Independent is the percentage of independent members on the board. Internal Institutional Holding is the total percentage owned by the ten largest shareholders, excluding the controlling shareholder. External Institutional Holding is the total percentage owned by the ten largest shareholders of tradable shares. T-statistics based on Huber-White robust standard errors are shown in parentheses.

| Variable | Expected Sign | Model 1 | Model 2 | Model 3 |
|---|---|---|---|---|
| Constant | | 0.0284* | 0.0183 | 0.0256** |
| | | (1.86) | (1.34) | (2.43) |
| FCF | + | 0.1118* | 0.1139* | 0.1101* |
| | | (1.82) | (1.86) | (1.84) |
| Cash Flow Right | - | 0.0002 | 0.0003* | 0.0003* |
| | | (1.58) | (1.82) | (1.63) |
| Separation Ratio | + | 0.0066* | 0.0070* | 0.0067* |
| | | (1.79) | (1.89) | (1.81) |
| Private Control Dummy | + | 0.0078 | 0.0077 | 0.0079 |
| | | (0.95) | (0.94) | (0.97) |
| Independent | - | -0.0004 | | |
| | | (-0.14) | | |
| Internal Institutional Holding | - | | 0.0002 | |
| | | | (1.03) | |
| External Institutional Holding | - | | | 0.0001 |
| | | | | (0.33) |
| Adj. R-sq | | 0.022 | 0.025 | 0.022 |

Note：***，** and * indicate 1%，5% and 10% levels of significance, respectively.