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## Article

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# Does media governance restrict corporate overinvestment behavior? Evidence from Chinese listed firms



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## ABSTRACT

Using China's A-share listed firms from 2007 to 2011, this paper empirically tests how media governance affects firms' levels of overinvestment and whether external supervision and informal institutional mechanisms reduce these levels. We find that media governance and overinvestment are significantly negatively related. When firms are located in a district with a stronger media governance environment their levels of overinvestment are lower, indicating that media governance significantly restricts overinvestment behavior. When internal corporate governance efficiency is low, the negative relationship between the media environment and overinvestment behavior is significantly enhanced, indicating that when internal governance or formal systems have reduced efficacy, an important complementary role is played by external supervision and the informal institutional environment. After considering endogeneity and different measures of overinvestment and other related variables, the conclusions remain unchanged.

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## 1. Introduction

In the recent years, overinvestment has become an important problem in China's macro- and micro-economic development. For example, a report released by Li, China's chief representative to the International Monetary Fund (IMF), on April 15, 2013 stated that the level of overinvestment in China was 12–20% above

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the equilibrium level as a share of GDP.<sup>1</sup> Academic research shows that serious problems are caused by inefficient investment by Chinese corporations (Tang et al., 2007) and that overinvestment by listed Chinese companies is relatively common (e.g., Li and Jiang, 2007; Wei and Liu, 2007; Jiang et al., 2009; Luo et al., 2012). Scholars have recently explored methods for managing overinvestment, mostly by focusing on the level of overinvestment by corporate or direct stakeholders. That is, recent studies on the governance of overinvestment have mostly been conducted from the internal corporate perspective and less attention has been paid to the role of informal institutional mechanisms, such as the external environment or external supervision. In China, a typical emerging market economy in transition, the formalization and implementation of the legal system is not perfect and certain informal institutions have an important role in managing firms' behavior (Allen et al., 2005; Chen et al., 2013).

Many recent studies have shown that the effects of media supervision on public opinion may effectively supplement internal corporate governance. In particular, given the high degree of information asymmetry in the capital market, the media acts as an information intermediary (Zavyalova et al., 2012). By collecting and disseminating information, the media develops an effective information environment and helps to reduce asymmetry between corporations and external investors. As a typical emerging market economy, China exhibits a wide disparity in the levels of media development in different areas (Yu, 2012), providing a useful setting for examining the supervisory function of the media governance environment on corporate behavior.

Based on China's A-share listed firms from 2007 to 2011, this paper empirically tests how media governance affects the level of overinvestment and whether external supervision and informal institutions can reduce overinvestment. We find that media governance and overinvestment are significantly negatively related. That is, if a district has a stronger media governance environment, corporations' levels of overinvestment are lower, suggesting that media governance significantly restricts overinvestment behavior. In addition, when corporate governance efficiency is low, the negative relationship between the media environment and overinvestment behavior is significantly enhanced, indicating that external supervision and the informal institutional environment play an important complementary role when internal governance or formal systems have reduced efficacy. After considering endogeneity and different measures of overinvestment and other related variables, the conclusions remain unchanged.

Our study makes three main contributions to the literature. First, it shows that the media governance environment can help to efficiently reduce the overinvestment levels of corporations, which enriches and expands the literature on the governance function of media supervision. Second, it explores how overinvestment behavior by corporations may be inhibited. Because previous studies on overinvestment governance have mostly focused on the design or restriction of overinvestment within corporations or by their direct stakeholders, little attention has been paid to supervisory roles outside the firm and to informal institutional mechanisms. Therefore, this paper further extends the literature in this field. Third, our study shows that when internal corporate governance fails, restrictions on overinvestment that are based on external supervision are significantly enhanced. In other words, when a formal system of internal governance fails, external oversight or informal institutional arrangements can have a significant supplementary role. This paper thus complements the literature that explores the corporate governance effects of informal institutions.

The remainder of the study is structured as follows. Section 2 provides a literature review and introduces the research hypotheses. Section 3 describes the sample and our research design. Section 4 presents and analyzes the empirical results. Section 5 provides some conclusions.

## 2. Literature review and research hypotheses

### 2.1. Literature review

#### 2.1.1. Corporate overinvestment behavior

The previous academic literature mainly discusses the reasons for overinvestment from the principal-agent and asymmetric information perspectives. In terms of the principal-agent view, Jensen (1986) argues that the

<sup>1</sup> Source: <http://finance.ifeng.com/news/macro/20130416/7909163.shtml>.

most direct way for managers to achieve personal gain is to expand the size of their firms. Thus, a manager will try to make investments using a firm's free cash flow and may even invest in projects with a negative NPV to pursue the benefits of corporate expansion and construct a "corporate empire." From the asymmetric information perspective, information asymmetry between outside investors and internal corporate managers regarding firms' asset values and investment project earnings is widespread in China (Zhang and Lu, 2009). Insiders possess more information about the value of a company and are more likely to seize an opportunity to sell over-priced assets in the market. If the market fails to detect such overvaluations, then overinvestment occurs (e.g., Myers and Majluf, 1984; Heinkel and Zechner, 1990; Baker et al., 2003; Pan and Jin, 2003).

There has been much discussion about methods for regulating overinvestment. Most of the literature contemplates restricting overinvestment by strengthening supervision or constraining corporations' financial policies. For example, some studies suggest that the board of directors (e.g., Chung et al., 2003; Chen and Xie, 2011), institutional investors (e.g., Shleifer and Vishny, 1997; Ye et al., 2012), the controlling shareholder (Tang et al., 2007; Yu et al., 2010) or other supervisory parties can significantly reduce overinvestment by corporations. Other studies show that strengthening internal controls (Cheng et al., 2013), raising levels of debt (e.g., Huang and Shen, 2009), distributing cash dividends (e.g., Tang, 2007; Wei and Liu, 2007) or other internal financial policy constraints can help to improve the efficiency of corporate investments.

### 2.1.2. Governance efficiency of media supervision

The media can play an important role in encouraging public participation in corporate supervision. Media supervision can effectively supplement traditional methods of governance by greatly reducing the costs incurred by stakeholders in searching for information, and may thereby indirectly provide effective supervision (Zhang, 2009). Public review via media communications can be an important mechanism for the social supervision of corporate governance (Craven and Marston, 1997; Li and Shen, 2010). In general, the media does not own stakes in listed companies or exercise direct control over them, but it can influence some users of the information it provides to play a role in corporate governance (Yang and Zhao, 2012). The media's role in corporate governance has been verified in many studies (Besley and Prat, 2002; Miller, 2006; Dyck et al., 2008; Joe et al., 2009; Xu and Xin, 2011; Yang and Zhao, 2012). For example, Gillan (2006) notes in a literature review related to corporate governance that the media is equal to the law in its importance as an external governance mechanism. Joe et al. (2009) examine the worst boards of directors in the United States as published by *Business Weekly* in 1996, 1997 and 2000 and find that media reports that are critical of such boards lead them to attempt to improve their efficiency, exemplifying the media's role in governance. Xu and Xin (2011) argue that the media played an important role in governance during the Split Share Structure Reform, while Yang and Zhao (2012) find that the media has a supervisory function in setting executive pay rates in listed companies.

There are also attempts in the literature to explain how the media plays a supervisory role in corporate governance. Zhang (2009) argues that it is difficult to obtain all of the necessary information and knowledge about companies because of the high costs of information searching. Instead, investors are only able to obtain certain information and remain ignorant about other aspects. Media reports can greatly reduce the cost of investors' access to information and make the information they receive more complete, which helps stakeholders to effectively supervise a corporation and make rational investment decisions. Yan (2008) argues that the media supervision of firms affects three aspects of corporate governance: companies' internal governance structures, the internal and external governance mechanisms of various stakeholders, and external supervision. Li and Xiong (2012) note that the media mainly provides supervision through the dissemination of information. Through information intermediaries, the media can achieve the desired effect of expanding the amount of information available and can then affect the audience's understanding of that information, or it can change the conditions for the distribution of information. Thus, the media can effectively reduce the information asymmetry problem whenever a contract is signed and implemented. Compared with legal and regulatory supervision, which have shortcomings such as high costs, a heavy burden of proof and delayed implementation, the media has the advantage of early intervention and low costs relating to corporate supervision.

## 2.2. Research hypotheses

To a certain extent, media supervision can solve both the “principal-agent” and “information asymmetry” problems.

In terms of the “principal-agent” problem, the media can help to expose listed firms supervised by related parties via the dissemination of information, information manufacturing and other functions. It can effectively restrain managers’ opportunistic behavior and reduce the incidence of agency problems (Yu et al., 2011). Scholars outside China have confirmed that the reputation mechanism can significantly restrict manager behavior (e.g., Fama and Jensen, 1983; Dyck et al., 2008). Although many Chinese scholars do not consider a manager reputation mechanism to be active in China, Zheng et al. (2011) use IPO data from the Shanghai and Shenzhen stock markets to show that negative media reports cause ordinary people to pay attention to companies, which constitutes an external constraint on the behavior of managers who care about their firms’ reputation. Liang et al. (2012) note that media supervision reduces corporate agency costs by activating internal corporate governance mechanisms. After negative reports in the media, a firm’s stakeholders tend to believe that the firm’s problems may be even more serious than portrayed and will therefore take active measures to safeguard their own interests and improve efficiency (Yao et al., 2011).

In terms of “information asymmetry,” Owen (2002) argues that the media is a very important information intermediary institution in modern economic life and a potential channel for reducing information asymmetry. The media can increase market efficiency by reducing the degree of information asymmetry among investors so that information can affect stock prices more quickly (Li and Xiong, 2012). The media can be seen as an alternative mechanism for disclosure of information relating to listed companies and media coverage can reduce the degree of information asymmetry in capital markets (Zhang and Liu, 2011). Yan (2008) demonstrates that the media plays an important role in reducing information asymmetry from the four perspectives of manufacturing information, the auxiliary processing of information disclosure and re-disclosure, disseminating information, and guiding public opinion.

Based on the foregoing analysis of the important role played by media governance in reducing information asymmetry and solving the principal-agent problem, improvements to the media supervision environment should effectively decrease corporations’ overinvestment levels. The media can supervise and govern corporate behavior through the reputation mechanism or by encouraging the involvement of administrative agencies. To preserve firm reputation or due to pressure from the market, managers will forgo short-sighted and opportunistic behavior and work to improve decision-making efficiency, thereby reducing agency costs. Additionally, improvements to the media governance environment can reduce the cost of information transmission, allowing market participants to obtain the relevant information to effectively supervise managers and to increase the costs and risks of managers not obeying the law or acting contrary to the will of shareholders. Thus, the media can act as an implicit constraint mechanism and reduce agency costs.

Based on the important role that media governance plays in solving the “principal-agent” and “information asymmetry” problems described above, we propose our first research hypothesis:

**H1.** The level of media governance in the region where a firm is located is significantly negatively related to the level of corporate overinvestment in that region.

Corporate supervision by the media and the public is effective in eliminating corruption caused by too much power and a lack of constraints, making it an important supplement to corporate governance mechanisms (Xu and Xin, 2011). When a firm’s internal management efficiency is low or its formal internal governance system is not effective, informal institutional mechanisms derived from external public supervision can play a more pronounced role.

Thus, we propose our second research hypothesis:

**H2.** When internal corporate governance efficiency is low, the negative relationship between the level of media governance and the degree of corporate overinvestment is significantly enhanced.

### 3. Research design and sample selection

#### 3.1. Research design

##### 3.1.1. Overinvestment estimation

Overinvestment (*Overinv*) represents the extent of corporate investment beyond a reasonable level and is measured as the amount by which the actual corporate investment level deviates from a normal level, where the portion that is greater than the normal level is defined as overinvestment.

We follow the framework of Richardson (2006) to estimate the normal level of investment. In constructing the model, we consider not only the influence of investment opportunities (*Growth*) but also the scale of the firm (*Asset*), its level of debt (*Level*), its market performance (*Ret*), the number of years the firm has been listed (*Age*), the level of cash holdings (*Cash*) and other control variables. The effects of time (*Year*) and industry (*Industry*) are also controlled for. In addition, because firms' investments in projects are often assigned to more than one accounting period, we include the lag of investments. The specific calculations and definitions of the variables are shown in Table 1. Yu et al. (2010), Tang et al. (2010) and Luo et al. (2012) use a similar approach.

We construct a model for estimating the normal level of investment as follows:

$$Inv_{i,t} = \alpha_0 + \beta_1 Asset_{i,t-1} + \beta_2 Lev_{i,t-1} + \beta_3 Growth_{i,t-1} + \beta_4 Ret_{i,t} + \beta_5 Age_{i,t} + \beta_6 Cash_{i,t-1} + \beta_7 Inv_{i,t-1} + \varepsilon_{i,t} \quad (1)$$

Table 1  
Variable definitions.

| Variable name    | Definition                            | Calculation  |
|------------------|---------------------------------------|--|
| <i>Asset</i>     | Asset scale                           | Natural logarithm of total assets  |
| <i>Lev</i>       | Leverage level                        | Total liabilities/total assets   |
| <i>Growth1</i>   | Growth1                               | Sales growth   |
| <i>Growth2</i>   | Growth2                               | Tobin's <i>Q</i> value, the ratio of market value to book value  |
| <i>Ret</i>       | Market return                         | Cumulative return rate from May in year <i>t</i> to April in year <i>t</i> + 1   |
| <i>Age</i>       | Number of years listed                | The number of years between the latest annual financial report and the firm's IPO  |
| <i>Cash</i>      | Cash holdings                         | (Cash + short-term investments or tradable financial assets)/total assets  |
| <i>Inv1</i>      | Investment 1                          | (Cash for buying fixed assets, intangible assets and other long-term assets – net cash for disposing of recovered fixed assets, intangible assets and other long-term assets)/total assets |
| <i>Inv2</i>      | Investment 2                          | {Long-term assets at the end of the year – long-term assets at the beginning of the year}/total assets at the beginning of the year  |
| <i>Overinv1</i>  | Overinvestment 1                      | Overinvestment estimated using <i>Inv1</i> and <i>Growth1</i>  |
| <i>Overinv2</i>  | Overinvestment 2                      | Overinvestment estimated using <i>Inv1</i> and <i>Growth2</i>  |
| <i>Overinv3</i>  | Overinvestment 3                      | Overinvestment estimated using <i>Inv2</i> and <i>Growth1</i>  |
| <i>Media</i>     | Media governance                      | The <i>Chinese Media Development Index Report</i> by Guoming Yu measures the degree of regional media supervision. For the missing index for 2011, we adopt an OLS trend prediction        |
| <i>HHI5</i>      | Equity concentration                  | The sum of the squares of the top five shareholders' shareholding ratios   |
| <i>Magstk</i>    | Management shareholdings              | Managerial stockholding ratio  |
| <i>Duality</i>   | Chairman and general manager combined | Whether the chairman and CEO roles are assumed by the same person; equals 1 if yes, and 0 otherwise  |
| <i>Boardsize</i> | The size of the board of directors    | Number of directors on the board   |
| <i>Idr</i>       | Ratio of independent directors        | Proportion of independent directors on the board of directors  |
| <i>Fcf</i>       | Free cash flow                        | Natural logarithm of cash flow from operations less capital expenditure  |
| <i>Otac</i>      | Large shareholder governance          | Other receivables/total assets   |
| <i>SOE</i>       | Nature of property rights             | Equals 1 for state-owned corporations, and 0 otherwise   |
| <i>EM</i>        | Earnings management                   | Absolute value of manipulated accrual level; equals 1 if the value is higher than the median, and 0 otherwise  |



For the sake of robustness, based on Model (1) we define the normal investment level in three ways and obtain three estimates of overinvestment.

1. Using *Inv1* as a proxy for the level of actual investment and sales growth (*Growth1*) as a proxy for corporate investment opportunities, we obtain the residual value *Overinv1* as the level of overinvestment. Wang (2009) uses this estimation method.
2. Using *Inv1* as a proxy for the level of actual investment and the Tobin's Q value (*Growth2*) as a proxy for corporate investment opportunities, we obtain the residual value *Overinv2* as the level of overinvestment. Zhong et al. (2010) use this estimation method.
3. Using *Inv2* as a proxy for the level of actual investment and sales growth (*Growth1*) as a proxy for corporate investment opportunities, we obtain the residual value *Overinv3* as the level of overinvestment. Yang and Hu (2007) use this estimation method.

### 3.1.2. Research model

To test Hypothesis 1, we establish the following research model:

$$\begin{aligned} \text{Overinv} = & \alpha_0 + \beta_1 \text{Media} + \beta_2 \text{HHI5} + \beta_3 \text{Magstk} + \beta_4 \text{Duality} + \beta_5 \text{Boardsize} + \beta_6 \text{Idr} + \beta_7 \text{Fcf} + \beta_8 \text{Lev} \\ & + \beta_9 \text{Otac} + \sum \text{Year} + \sum \text{Ind} + \varepsilon_{i,t} \end{aligned} \quad (2)$$

In this model, the dependent variable is the corporation's overinvestment level, which we estimate from Model (1). The media governance variable (*Media*) is measured from the *Chinese Media Development Index Report* (2008–2012), which systematically evaluates media development in China and, for the first time, quantitatively examines its supervisory ability. The report also establishes the Chinese Media Development Index (CMDI), which depicts the regional media environment in China theoretically. The greater the value of the CMDI, the stronger the media supervision in that region (He and Wei, 2012; Wu et al., 2012). Because of a lack of data for 2011, we use the 2007–2010 data to predict an OLS trend for the 2011 media governance variable (*Media*). Following Tang et al. (2010) and Luo et al. (2012), we control for the corporate governance variables of equity concentration level (*HHI5*), the proportion of management shareholdings (*Magstk*), whether the chairman is also the CEO (*Duality*), the size of the board of directors (*Boardsize*) and the proportion of independent directors on the board of directors (*Idr*). In addition, because studies show that free cash flow (*Fcf*) (Jensen, 1986; Fazzari et al., 1988), debt ratio (*Lev*) (Huang and Shen, 2009; Zhang and Wang, 2010) and tunneling by controlling shareholders (*Otac*) (Luo et al., 2008) are important factors that influence overinvestment, we also control for these variables. Based on Hypothesis 1, we forecast the sign of  $\beta_1$  in Model (2) to be significantly negative.

We also test Hypothesis 2, that is, whether media governance influences overinvestment differently when corporate internal governance efficiency is low. Based on Model (2), we use interaction terms for internal governance efficiency and media governance in Model (3). To a certain extent, a company's degree of earnings management can be used as ex-post evidence of internal governance efficiency.

Following relevant research, such as that of Chen et al. (2013), we use the degree of earnings management as a proxy for internal governance efficiency. We estimate the level of a firm's non-discretionary accruals by using the cross-sectional modified Jones model. Discretionary accruals are represented by regression residuals. We adopt the absolute value of the residuals as a proxy for the degree of earnings management (EM). To avoid collinearity issues, we group EM by its median; thus, firms with values higher than the median are set to 1, and to 0 otherwise.

$$\begin{aligned} \text{Overinv} = & \alpha_0 + \beta_1 \text{Media} + \beta_2 \text{EM} * \text{Media} + \beta_3 \text{EM} + \beta_4 \text{HHI5} + \beta_5 \text{Magstk} + \beta_6 \text{Duality} + \beta_7 \text{Boardsize} \\ & + \beta_8 \text{Idr} + \beta_9 \text{Fcf} + \beta_{10} \text{Lev} + \beta_{11} \text{Otac} + \sum \text{Year} + \sum \text{Ind} + \varepsilon_{i,t} \end{aligned} \quad (3)$$

Table 2  
Descriptive statistics for the main variables.

| Variable         | Mean   | Minimum | P25    | Median | P75    | Maximum | Standard deviation |
|------------------|--------|---------|--------|--------|--------|---------|--------------------|
| <i>Asset</i>     | 21.551 | 18.367  | 20.692 | 21.420 | 22.275 | 25.388  | 1.289              |
| <i>Lev</i>       | 0.496  | 0.040   | 0.306  | 0.484  | 0.641  | 2.186   | 0.300              |
| <i>Growth1</i>   | 0.270  | -0.786  | 0.001  | 0.155  | 0.340  | 6.056   | 0.771              |
| <i>Growth2</i>   | 2.062  | 0.825   | 1.219  | 1.589  | 2.273  | 11.309  | 1.553              |
| <i>Ret</i>       | -0.087 | -0.989  | -0.398 | -0.113 | 0.233  | 1.600   | 0.552              |
| <i>Age</i>       | 9.325  | 1       | 4      | 10     | 14     | 19      | 5.405              |
| <i>Cash</i>      | 0.212  | 0.004   | 0.090  | 0.159  | 0.283  | 0.791   | 0.174              |
| <i>Inv1</i>      | 0.057  | -0.069  | 0.014  | 0.041  | 0.085  | 0.271   | 0.060              |
| <i>Inv2</i>      | 0.065  | -0.286  | -0.004 | 0.039  | 0.111  | 0.655   | 0.134              |
| <i>Media</i>     | 62.439 | 33.270  | 53.530 | 62.080 | 73.540 | 81.090  | 10.976             |
| <i>HHI5</i>      | 0.172  | 0.013   | 0.076  | 0.145  | 0.245  | 0.567   | 0.121              |
| <i>Magstk</i>    | 0.074  | 0.000   | 0.000  | 0.000  | 0.003  | 0.692   | 0.172              |
| <i>Duality</i>   | 0.794  | 0       | 1      | 1      | 1      | 1       | 0.405              |
| <i>Boardsize</i> | 9.072  | 5       | 8      | 9      | 9      | 15      | 1.824              |
| <i>Idr</i>       | 0.365  | 0.273   | 0.333  | 0.333  | 0.385  | 0.571   | 0.051              |
| <i>Fcf</i>       | 19.019 | 14.387  | 18.042 | 18.993 | 19.984 | 23.311  | 1.610              |
| <i>Otac</i>      | 0.023  | 0       | 0.004  | 0.010  | 0.024  | 0.228   | 0.037              |
| <i>SOE</i>       | 0.508  | 0       | 0      | 1      | 1      | 1       | 0.500              |

### 3.2. Sample data

The sample comprises A-share listed companies in the Shanghai and Shenzhen stock markets from 2007 to 2011. Financial data for these companies are derived from the CSMAR database. Media governance data are derived from the *Chinese Media Development Index Report (2008–2012)*<sup>2</sup> and the industry classifications are from the *Industry Classification Guidance of Listed Companies* published by the China Securities Regulatory Commission (CSRC). Consistent with similar studies, we remove (1) firms in the financial industry and (2) abnormal observation values from the sample, and obtain a sample of 9191 observations. Additionally, to eliminate the influence of extreme values, we winsorize the continuous variables with extreme values in the intervals of 0–1% and 99–100%. We also carry out accuracy checks on all of the data and adjust the estimations for heteroskedasticity.

## 4. Empirical tests and analysis of results

### 4.1. Descriptive statistics

Table 2 gives the descriptive statistics for the main variables. We rule out the influence of outliers through winsorization. The maximum value for the media governance variable (*Media*) is 81.090 while the minimum is only 33.270. Thus, there are large differences between the media governance levels in different regions, which further indicates the significance of this study.

We divide our sample into two groups according to whether the level of media governance (*Media*) for the region in which each firm is located is greater than the median level.<sup>3</sup> We test the mean levels of overinvestment for the two groups via the indices *Overinv1*, *Overinv2* and *Overinv3*. The results are shown in Table 3.

We can see from Table 3 that the mean level of overinvestment for the high media governance group is significantly lower than that of the low media governance group in all three columns. These results statistically

<sup>2</sup> The index covers five types of indicators: the media product index, the media profit index, the audience consumption index, the competitive advertisement index and the media environment index. The index covers mass media, social media and academic journals through the dimensions of attention and influence. It objectively measures the media development index for 31 provinces, municipalities and autonomous regions in China.

<sup>3</sup> We eliminate those observations that are equal to the median, and use the same approach in Table 3.



Table 3  
Results of t-tests for overinvestment under different levels of media governance.

| Year         | Media governance level | Overinv1 |          | Overinv2 |          | Overinv3 |          |
|--------------|------------------------|----------|----------|----------|----------|----------|----------|
|              |                        | Mean     | T value  | Mean     | T value  | Mean     | T value  |
| 2007         | High                   | -0.0046  | -2.65*** | -0.0057  | -2.07**  | -0.0130  | -3.14*** |
|              | Low                    | 0.0035   |          | 0.0010   |          | -0.0026  |          |
| 2008         | High                   | -0.0034  | -2.58*** | -0.0069  | -2.33**  | -0.0137  | -4.02*** |
|              | Low                    | 0.0048   |          | 0.0015   |          | 0.0016   |          |
| 2009         | High                   | -0.0095  | -3.31*** | -0.0080  | -3.95*** | -0.0184  | -4.52*** |
|              | Low                    | 0.0002   |          | 0.0045   |          | -0.0035  |          |
| 2010         | High                   | -0.0001  | -2.37**  | -0.0059  | -4.30*** | -0.0172  | -5.22*** |
|              | Low                    | 0.0073   |          | 0.0080   |          | 0.0008   |          |
| 2011         | High                   | -0.0003  | -2.17**  | -0.0027  | -3.34*** | -0.0158  | -4.01*** |
|              | Low                    | 0.0078   |          | 0.0107   |          | 0.0025   |          |
| Total sample | High                   | -0.0030  | -5.30*** | -0.0046  | -6.22*** | -0.0151  | -8.94*** |
|              | Low                    | 0.0046   |          | 0.0051   |          | -0.0003  |          |

Notes: \*  $p < 0.1$ .

\*\*  $p < 0.05$ .

\*\*\*  $p < 0.01$ .

support the hypothesis that the level of media governance is negatively related to the degree of corporate overinvestment for all of the years from 2007 to 2011, which is consistent with [Hypothesis 1](#).

#### 4.2. Estimation of normal investment levels

[Table 4](#) reports the estimations of the normal levels of investment. For each of the three estimation methods, corporate scale (*Asset*), investment opportunities (*Growth*), market performance (*Ret*), firms' cash holding levels (*Cash*) and lagged levels of investment ( $Inv_{i,t-1}$ ) are significantly positively related to the firms' levels of corporate investment, while debt levels (*Level*) and listed years (*Age*) are significantly negatively related to corporate investment levels. These results are consistent with our expectations and with the results of similar studies (e.g., [Yu et al., 2010](#); [Tang et al., 2010](#); [Luo et al., 2012](#)).

#### 4.3. Empirical results for Hypothesis 1

[Table 5](#) reports the results of the regression analysis of media governance using the different overinvestment variables (*Overinv1*, *Overinv2*, and *Overinv3*).

We can see from columns 1, 3 and 5 of [Table 5](#) that, after controlling for year and industry effects, media governance (*Media*) and overinvestment (*Overinv*) are significantly negatively related at the 1% level. We add other control variables, the results of which are shown in columns 2, 4 and 6 of [Table 5](#), and find that the results are still significant. Thus, [Hypothesis 1](#) is confirmed. In addition, the regression coefficient for *Fcf* is positive. That is, the greater the free cash flow in a firm, the higher the overinvestment level, indicating significant overinvestment behavior for high levels of free cash flow within listed companies in China. The results are consistent for all three estimation modes (*Overinv1*, *Overinv2* and *Overinv3*).

We also explore whether there is a significant difference between state-owned and non-state-owned listed companies. [Table 6](#) reports the results of the regression analysis using *Overinv1* as the dependent variable.<sup>4</sup> We find that for both types of company, the coefficients for media governance (*Media*) are significantly negative. We re-test these results using the interaction variable *Media\*SOE* and give the results in the third

<sup>4</sup> This conclusion is also consistent using *Overinv2* and *Overinv3* as the dependent variables. These results are also consistent for the tests that follow.

Table 4  
Results of the estimation of normal investment levels.

| Variable                               | Overinv1                 | Overinv2                 | Overinv3                 |
|--|--------------------------|--------------------------|--------------------------|
| <i>Asset</i> <sub><i>i,t-1</i></sub>   | 0.00313***<br>(0.00053)  | 0.00406***<br>(0.00055)  | 0.00995***<br>(0.00139)  |
| <i>Lev</i> <sub><i>i,t-1</i></sub>     | -0.00860***<br>(0.00181) | -0.00985***<br>(0.00181) | -0.03657***<br>(0.00576) |
| <i>Growth1</i> <sub><i>i,t-1</i></sub> | 0.00165**<br>(0.00084)   |                          | 0.00658***<br>(0.00255)  |
| <i>Growth2</i> <sub><i>i,t-1</i></sub> |                          | 0.00181***<br>(0.00048)  |                          |
| <i>Ret</i> <sub><i>i,t-1</i></sub>     | 0.00444***<br>(0.00099)  | 0.00211***<br>(0.00053)  | 0.01792***<br>(0.00315)  |
| <i>Age</i> <sub><i>i,t-1</i></sub>     | -0.00083***<br>(0.00015) | -0.00086***<br>(0.00014) | -0.00259***<br>(0.00038) |
| <i>Cash</i> <sub><i>i,t-1</i></sub>    | 0.04057***<br>(0.00519)  | 0.04245***<br>(0.00507)  | 0.09911***<br>(0.01347)  |
| <i>Inv1</i> <sub><i>i,t-1</i></sub>    | 0.49392***<br>(0.01404)  | 0.49447***<br>(0.01398)  |                          |
| <i>Inv2</i> <sub><i>i,t-1</i></sub>    |                          |                          | 0.13462***<br>(0.01735)  |
| <i>Constant</i>                        | 0.06104***<br>(0.01045)  | -0.13566***<br>(0.01179) | -0.10546***<br>(0.02824) |
| <i>Year</i>                            | Controlled               | Controlled               | Controlled               |
| <i>Industry</i>                        | Controlled               | Controlled               | Controlled               |
| Number of observations                 | 7119                     | 7200                     | 7155                     |
| <i>R</i> <sup>2</sup>                  | 0.41696                  | 0.41604                  | 0.12557                  |

Notes: (1) \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ .

(2) The standard errors are shown in brackets. The following tables use the same method.

Table 5  
Empirical results for the testing of Hypothesis 1.

| Variable               | Overinv1                 |                          | Overinv2                 |                          | Overinv3                 |                          |
|------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
|                        | (1)                      | (2)                      | (3)                      | (4)                      | (5)                      | (6)                      |
| <i>Media</i>           | -0.00025***<br>(0.00008) | -0.00028***<br>(0.00008) | -0.00021***<br>(0.00005) | -0.00028***<br>(0.00006) | -0.00038***<br>(0.00009) | -0.00041***<br>(0.00009) |
| <i>HHI5</i>            |                          | -0.01637**<br>(0.00644)  |                          | -0.01377**<br>(0.00583)  |                          | -0.04093***<br>(0.00791) |
| <i>Magstk</i>          |                          | 0.00057<br>(0.00670)     |                          | 0.01164**<br>(0.00589)   |                          | -0.00999<br>(0.00764)    |
| <i>Duality</i>         |                          | -0.00134<br>(0.00238)    |                          | -0.00247<br>(0.00180)    |                          | -0.00236<br>(0.00249)    |
| <i>Boardsize</i>       |                          | -0.00072*<br>(0.00042)   |                          | -0.00026<br>(0.00034)    |                          | -0.00106**<br>(0.00048)  |
| <i>Idr</i>             |                          | -0.02080<br>(0.01309)    |                          | -0.01738<br>(0.01204)    |                          | -0.02959*<br>(0.01536)   |
| <i>Fcf</i>             |                          | 0.00536***<br>(0.00052)  |                          | 0.00544***<br>(0.00042)  |                          | 0.00624***<br>(0.00059)  |
| <i>Lev</i>             |                          | 0.00126<br>(0.00207)     |                          | 0.00054***<br>(0.00013)  |                          | 0.00646***<br>(0.00114)  |
| <i>Otac</i>            |                          | -0.01069<br>(0.02175)    |                          | -0.02202<br>(0.01371)    |                          | -0.03113<br>(0.01948)    |
| <i>Constant</i>        | 0.12448***<br>(0.00599)  | -0.13039***<br>(0.01105) | 0.01201***<br>(0.00416)  | -0.09635***<br>(0.01041) | 0.14883***<br>(0.00564)  | -0.16615***<br>(0.01289) |
| <i>Year</i>            | Controlled               | Controlled               | Controlled               | Controlled               | Controlled               | Controlled               |
| <i>Industry</i>        | Controlled               | Controlled               | Controlled               | Controlled               | Controlled               | Controlled               |
| Number of observations | 7118                     | 4954                     | 7200                     | 5040                     | 7128                     | 4959                     |
| <i>R</i> <sup>2</sup>  | 0.03413                  | 0.06486                  | 0.00581                  | 0.04907                  | 0.09557                  | 0.15639                  |

Notes: (1) \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ .

Table 6  
Media governance, property rights and overinvestment.

| Variable               | (1)<br>State-owned              | (2)<br>Non-state-owned         | (3)<br>Total sample            |
|------------------------|---------------------------------|--------------------------------|--------------------------------|
| <i>Media</i>           | <b>-0.00029***</b><br>(0.00008) | <b>-0.00032**</b><br>(0.00015) | <b>-0.00028**</b><br>(0.00013) |
| <i>Media*SOE</i>       |                                 |                                | <b>-0.00013</b><br>(0.00015)   |
| <i>SOE</i>             |                                 |                                | 0.00623<br>(0.00932)           |
| <i>HHI5</i>            | -0.02053**<br>(0.00810)         | 0.00075<br>(0.01139)           | -0.01841***<br>(0.00566)       |
| <i>Magstk</i>          | -0.00766<br>(0.01074)           | -0.00315<br>(0.00874)          | -0.00488<br>(0.00694)          |
| <i>Duality</i>         | 0.00042<br>(0.00263)            | -0.00133<br>(0.00382)          | -0.00093<br>(0.00225)          |
| <i>Boardsize</i>       | -0.00048<br>(0.00044)           | -0.00157<br>(0.00101)          | -0.00063<br>(0.00041)          |
| <i>Idr</i>             | -0.01280<br>(0.01599)           | -0.04775*<br>(0.02496)         | -0.02549**<br>(0.01296)        |
| <i>Fcf</i>             | 0.00475***<br>(0.00058)         | 0.00712***<br>(0.00103)        | 0.00544***<br>(0.00047)        |
| <i>Lev</i>             | -0.00222<br>(0.00396)           | 0.00183<br>(0.00223)           | 0.00036<br>(0.00206)           |
| <i>Otac</i>            | -0.03933**<br>(0.01838)         | 0.02373<br>(0.04698)           | -0.02719<br>(0.02109)          |
| <i>Constant</i>        | -0.07078***<br>(0.01362)        | -0.08727***<br>(0.02449)       | -0.06616***<br>(0.01183)       |
| Year                   | Controlled                      | Controlled                     | Controlled                     |
| Industry               | Controlled                      | Controlled                     | Controlled                     |
| Number of observations | 3040                            | 1914                           | 4954                           |
| <i>R</i> <sup>2</sup>  | 0.08369                         | 0.08422                        | 0.06548                        |

Notes: (1) \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ .

column of Table 6. The results indicate that regardless of the method adopted to estimate overinvestment, the coefficients for the interaction variable are not significant, indicating that there are no significant differences between state-owned and non-state-owned listed companies.

#### 4.4. Empirical results for Hypothesis 2

Table 7 reports the test results for Hypothesis 2. We can see that the regression coefficient for the interaction term  $EM^*Media$  is significantly negative at the 5% level. In Table 7, column 2, the coefficient for *Media* in the group with low levels of internal governance is  $-0.00023$ , while that for the group with high levels of internal governance is  $-0.00035$  ( $= -0.00023 - 0.00012$ ). These results confirm Hypothesis 2; that is, when internal corporate governance efficiency is low, the negative association between the level of media governance and the degree of corporate overinvestment is significantly enhanced. This result suggests that the media governance environment plays a stronger complementary role for firms with low internal governance efficiency.

#### 4.5. Robustness tests

To guarantee the reliability of the results, we perform several robustness tests.

##### 4.5.1. Re-estimating the variable for overinvestment

Overinvestment (*Overinv*) is the core variable in this research. To ensure that our conclusions are not driven by the method used to estimate overinvestment, we re-estimate overinvestment in the following ways.

Table 7  
Empirical results for the testing of Hypothesis 2.

| Variable               | (1)                      | (2)                      |
|------------------------|--------------------------|--------------------------|
| <i>Media</i>           | −0.00025***<br>(0.00009) | −0.00023**<br>(0.00010)  |
| <i>EM*Media</i>        | −0.00021**<br>(0.00009)  | −0.00012**<br>(0.00006)  |
| <i>EM</i>              | 0.00697<br>(0.00810)     | 0.00686<br>(0.00844)     |
| <i>HHIS</i>            |                          | −0.02149***<br>(0.00615) |
| <i>Magstk</i>          |                          | 0.00130<br>(0.00587)     |
| <i>Duality</i>         |                          | −0.00092<br>(0.00222)    |
| <i>Boardsize</i>       |                          | −0.00087**<br>(0.00039)  |
| <i>Idr</i>             |                          | −0.02344*<br>(0.01323)   |
| <i>Fcf</i>             |                          | 0.00514***<br>(0.00051)  |
| <i>Lev</i>             |                          | 0.00102<br>(0.00224)     |
| <i>Otac</i>            |                          | −0.01988<br>(0.02055)    |
| <i>Constant</i>        | 0.01902***<br>(0.00539)  | −0.06163***<br>(0.01143) |
| Number of observations | 7118                     | 4954                     |
| <i>R</i> <sup>2</sup>  | 0.00636                  | 0.04099                  |

Notes: (1) \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ .

1. By setting a firm's investment level as a function of its ability to grow at the beginning of the year, we estimate each firm's normal investment level. We use the residual from the estimation as an additional proxy for overinvestment, *Overinv4*. Following Biddle et al. (2009) and Chen et al. (2011), normal investment is estimated in Model (4):

$$Inv_{i,t} = \alpha_0 + \beta Growth_{i,t-1} + \epsilon_{i,t} \quad (4)$$

2. Based on the *Overinv1* values estimated by Model (1), we retain only the sample group with residuals greater than 0. The residual measures the overinvestment level, and we define it as *Overinv5*. Xin et al. (2007) and Zhang and Lu (2012) use this method.
3. Based on the *Overinv1* values estimated by Model (1), we divide the data into two categories. We set the group with residual errors greater than 0 to 1 (the overinvestment group), and to 0 otherwise. We then obtain the overinvestment estimator *Overinv6*, and adopt the Logit model for the regression. Jiang et al. (2009) adopt this estimation method.
4. Based on the *Overinv1* values estimated by Model (1), we group our observations by the quartile of the residuals and set the dummy variable *Overinv7* as a proxy for overinvestment. Following Biddle et al. (2009) and Zhang and Lu (2012), we divide the residuals into four groups according to the quartiles. The largest group is defined as the overinvestment group and is assigned a value of 1. We delete the set with the smallest residuals and define the two groups in the middle as the control group, the value of which is 0. A probit model is used for the regression.
5. Studies examining company investment behavior show that cash flow, debt levels and uncertainty are the major factors affecting the level of business investment. However, uncertainty variables are not included in the estimation model used by Richardson (2006),<sup>5</sup> which may distort the estimation of overinvestment. We

<sup>5</sup> This method is the same as Model (1) earlier in this paper.

Table 8  
Robustness tests 1.

| Variable               | (1)<br>Overinv4-OLS             | (2)<br>Overinv 5-OLS          | (3)<br>Overinv 6-Logit          | (4)<br>Overinv 7-Probit         |
|------------------------|---------------------------------|-------------------------------|---------------------------------|---------------------------------|
| <i>Media</i>           | <b>-0.00031***</b><br>(0.00007) | <b>-0.00021*</b><br>(0.00011) | <b>-0.00951***</b><br>(0.00296) | <b>-0.00625***</b><br>(0.00218) |
| <i>HH15</i>            | 0.00549<br>(0.00665)            | -0.00950<br>(0.00986)         | -0.11884<br>(0.26291)           | -0.88480***<br>(0.19288)        |
| <i>Magstk</i>          | 0.06543***<br>(0.00744)         | 0.01888**<br>(0.00949)        | 1.89833***<br>(0.22562)         | -0.69482***<br>(0.16472)        |
| <i>Duality</i>         | -0.00662***<br>(0.00200)        | -0.00356<br>(0.00276)         | -0.35512***<br>(0.07700)        | 0.01855<br>(0.05681)            |
| <i>Boardsize</i>       | 0.00061<br>(0.00040)            | -0.00043<br>(0.00054)         | -0.01708<br>(0.01698)           | -0.00470<br>(0.01228)           |
| <i>Idr</i>             | -0.00872<br>(0.01359)           | -0.04224**<br>(0.01890)       | -0.24491<br>(0.57885)           | 0.30987<br>(0.42662)            |
| <i>Fcf</i>             | 0.01123***<br>(0.00049)         | 0.00358***<br>(0.00067)       | 0.17587***<br>(0.02119)         | 0.14567***<br>(0.01584)         |
| <i>Lev</i>             | 0.00009<br>(0.00035)            | 0.00144<br>(0.00122)          | 0.18172***<br>(0.04414)         | -0.01221<br>(0.02260)           |
| <i>Otac</i>            | -0.09006***<br>(0.01599)        | -0.02790<br>(0.04234)         | 1.27237*<br>(0.71336)           | -1.72347***<br>(0.63035)        |
| <i>Constant</i>        | -0.11232***<br>(0.01182)        | -0.01075<br>(0.01934)         | -2.54870***<br>(0.52299)        | -3.00508***<br>(0.37663)        |
| Year                   | Controlled                      | Controlled                    | Controlled                      | Controlled                      |
| Industry               | Controlled                      | Controlled                    | Controlled                      | Controlled                      |
| Number of observations | 5098                            | 2076                          | 5670                            | 4467                            |
| <i>R</i> <sup>2</sup>  | 0.26492                         | 0.07622                       | 0.0673                          | 0.0801                          |

Notes: (1)\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ .

add uncertainty variables and stock price volatility (*Stock*) to the original model and re-estimate *Overinv1*, *Overinv2* and *Overinv3* to generate three new overinvestment estimators, *Overinv8*, *Overinv9* and *Overinv10*.

6. In general, firms with high levels of free cash flow and a lack of investment opportunities tend to overinvest. We divide the sample firms into overinvestment and underinvestment groups based on these two variables, forming a new variable *Overinv11*. For both free cash flow and investment opportunities, we divide the firms into high and low groups by the medians, with investment opportunities being measured by the Tobin's Q values (Zhong et al., 2010). We define *Overinv11* as being equal to 1 for firms with a combination of high free cash flow and low investment opportunities, and 0 otherwise. Because this overinvestment estimation method is not based on Richardson (2006), some firm-level characteristic variables are not effectively controlled for and we thus add these to the regressions.

The regression results for media governance using the four estimation methods for overinvestment (*Overinv4*, *Overinv5*, *Overinv6*, and *Overinv7*) are shown in estimations (1), (2), (3) and (4) in Table 8. The results using estimation methods (5) and (6) (*Overinv8*, *Overinv9*, *Overinv10*, and *Overinv11*) are shown in Table 9. In all cases, the coefficients for the media governance variable (*Media*) are significantly negative, suggesting that our conclusions are not affected by the overinvestment estimation method used.

#### 4.5.2. Balanced panel data

To examine as many firms as possible, the foregoing results are based on non-balanced panel data, which may cause bias. We re-select the sample retaining only those listed firms with complete data for the five years from 2007 to 2011, and perform the tests again. The results for *Overinv1*, as an example, are given in Table 10, column 1. The regression results show that the coefficient for media governance (*Media*) is significantly negative, which is consistent with our previous results.

Table 9  
Robustness tests 2.

| Variable               | (1)<br>Overinv 8-OLS     | (2)<br>Overinv 9-OLS     | (3)<br>Overinv 10-OLS    | (4)<br>Overinv 11-probit  |
|------------------------|--------------------------|--------------------------|--------------------------|---------------------------|
| <i>Media</i>           | −0.00024***<br>(0.00007) | −0.00024***<br>(0.00007) | −0.00062***<br>(0.00016) | −0.00478**<br>(0.00243)   |
| <i>HH15</i>            | −0.01462**<br>(0.00596)  | −0.01641***<br>(0.00565) | −0.08274***<br>(0.01403) | 0.76693***<br>(0.22194)   |
| <i>Magstk</i>          | 0.00283<br>(0.00633)     | 0.01175**<br>(0.00488)   | 0.03731***<br>(0.00857)  | 0.66298***<br>(0.21958)   |
| <i>Duality</i>         | −0.00314*<br>(0.00187)   | −0.00322*<br>(0.00175)   | −0.00071<br>(0.00393)    | 0.03826<br>(0.06388)      |
| <i>Boardsize</i>       | −0.00041<br>(0.00035)    | −0.00069**<br>(0.00035)  | −0.00399***<br>(0.00101) | −0.00726<br>(0.01370)     |
| <i>Idr</i>             | −0.01609<br>(0.01215)    | −0.02167*<br>(0.01206)   | −0.07027**<br>(0.03019)  | −0.24077<br>(0.46628)     |
| <i>Fcf</i>             | 0.00515***<br>(0.00043)  | 0.00578***<br>(0.00042)  | 0.02081***<br>(0.00109)  | 0.33683***<br>(0.02484)   |
| <i>Lev</i>             | 0.00396***<br>(0.00094)  | 0.00350**<br>(0.00098)   | 0.00436<br>(0.00283)     | 0.10250***<br>(0.02781)   |
| <i>Otac</i>            | −0.02010<br>(0.01531)    | −0.01528<br>(0.01562)    | −0.05264<br>(0.04807)    | −0.31735<br>(0.70104)     |
| <i>Asset</i>           |                          |                          |                          | 0.38911***<br>(0.03562)   |
| <i>Growth</i>          |                          |                          |                          | −0.07653*<br>(0.03948)    |
| <i>Return</i>          |                          |                          |                          | −0.63669***<br>(0.07333)  |
| <i>Age</i>             |                          |                          |                          | −0.01717***<br>(0.00654)  |
| <i>Cash</i>            |                          |                          |                          | −0.23504<br>(0.19738)     |
| <i>Constant</i>        | −0.12766***<br>(0.01013) | −0.04767***<br>(0.01041) | −0.20275***<br>(0.02989) | −14.35959***<br>(0.62496) |
| Year                   | Controlled               | Controlled               | Controlled               | Controlled                |
| Industry               | Controlled               | Controlled               | Controlled               | Controlled                |
| Number of observations | 4896                     | 5435                     | 5446                     | 4938                      |
| <i>R</i> <sup>2</sup>  | 0.07833                  | 0.08167                  | 0.10674                  | –                         |

Notes: (1) \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ .

#### 4.5.3. Re-estimating the media governance variable

We use OLS trend prediction to estimate the media governance variable (*Media*) for 2011 from an averaged index of media development for each of 2007 to 2010 and the Media Development Index for 2010. In this way we obtain new estimators *Media2* and *Media3*. We re-run the tests and provide the results in Table 10 (using the dependent variable *Overinv1* as an example, the results are the same as before).

The media governance levels are measured by the regional media governance environment and this may be highly correlated with the overall environment and with the marketization level in different regions. To prevent a potential influence on our estimations, we perform the following two supplementary tests. First, we add control variables for the marketization index (*Market*) to Model (2) to rule out the effect of the degree of marketization on the results. This index is derived from the marketization report of Fan et al. (2011) for China.<sup>6</sup> Second, we use the Baidu Media Index (*Media4*) to reassess the levels of media governance. We hand-collect the Baidu Media Index data for all of the listed companies in 2011 (to be statistically consistent,

<sup>6</sup> The index consists of 23 indicators, with each indicator scoring all of the provinces by establishing the relative position of the marketization process in each field. We use principal component analysis to determine each individual item's weight in the aspects index, and use these weights to calculate an aspects index. In addition, we use the same method to determine each aspect's weight in the total index, and use these weights to calculate the total index.



Table 10  
Robustness test 3.

| Variable               | (1)                             | (2)                             | (3)                             | (4)                             | (5)                           | (6)                             | (7)                             |
|------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|-------------------------------|---------------------------------|---------------------------------|
| <i>Media</i>           | <b>-0.00029***</b><br>(0.00008) |                                 |                                 | <b>-0.00026***</b><br>(0.00008) |                               | <b>-0.00036***</b><br>(0.00007) | <b>-0.00026***</b><br>(0.00007) |
| <i>Media2</i>          |                                 | <b>-0.00026***</b><br>(0.00008) |                                 |                                 |                               |                                 |                                 |
| <i>Media3</i>          |                                 |                                 | <b>-0.00027***</b><br>(0.00008) |                                 |                               |                                 |                                 |
| <i>Media4</i>          |                                 |                                 |                                 |                                 | <b>-0.00021*</b><br>(0.00012) |                                 |                                 |
| <i>ST*Media</i>        |                                 |                                 |                                 |                                 |                               |                                 | <b>-0.00023***</b><br>(0.00008) |
| <i>ST</i>              |                                 |                                 |                                 |                                 |                               |                                 | 0.00357<br>(0.06897)            |
| <i>HHI5</i>            | -0.01597**<br>(0.00662)         | -0.01638**<br>(0.00645)         | -0.01636**<br>(0.00645)         | -0.01589**<br>(0.00645)         | -0.01882***<br>(0.00637)      | -0.01913***<br>(0.00607)        | -0.02266***<br>(0.00627)        |
| <i>Magstk</i>          | -0.00287<br>(0.00809)           | 0.00058<br>(0.00671)            | 0.00060<br>(0.00670)            | 0.00095<br>(0.00673)            | -0.00167<br>(0.00663)         | -0.00176<br>(0.00608)           | 0.00317<br>(0.00616)            |
| <i>Duality</i>         | -0.00073<br>(0.00249)           | -0.00135<br>(0.00238)           | -0.00134<br>(0.00238)           | -0.00126<br>(0.00238)           | -0.00115<br>(0.00240)         | -0.00124<br>(0.00195)           | -0.00128<br>(0.00195)           |
| <i>Boardsize</i>       | -0.00070*<br>(0.00043)          | -0.00072*<br>(0.00042)          | -0.00072*<br>(0.00042)          | -0.00072*<br>(0.00042)          | -0.00070*<br>(0.00042)        | -0.00067*<br>(0.00040)          | -0.00098**<br>(0.00041)         |
| <i>Idr</i>             | -0.02149<br>(0.01347)           | -0.02078<br>(0.01309)           | -0.02084<br>(0.01309)           | -0.01997<br>(0.01301)           | -0.01873<br>(0.01305)         | -0.02598*<br>(0.01404)          | -0.02142<br>(0.01408)           |
| <i>Fcf</i>             | 0.00519***<br>(0.00052)         | 0.00536***<br>(0.00052)         | 0.00536***<br>(0.00052)         | 0.00534***<br>(0.00052)         | 0.00543***<br>(0.00053)       | 0.00538***<br>(0.00046)         | 0.00526***<br>(0.00048)         |
| <i>Lev</i>             | 0.00138<br>(0.00207)            | 0.00127<br>(0.00207)            | 0.00126<br>(0.00207)            | 0.00124<br>(0.00207)            | 0.00123<br>(0.00203)          | 0.00048<br>(0.00164)            | 0.00171<br>(0.00167)            |
| <i>Otac</i>            | -0.01346<br>(0.02192)           | -0.01037<br>(0.02176)           | -0.01059<br>(0.02176)           | -0.00872<br>(0.02179)           | -0.00538<br>(0.02186)         | -0.02767<br>(0.02056)           | -0.01965<br>(0.02091)           |
| <i>Market</i>          |                                 |                                 |                                 | -0.00009<br>(0.00035)           |                               |                                 |                                 |
| Constant               | -0.00074<br>(0.01178)           | -0.03759***<br>(0.01143)        | -0.03724***<br>(0.01145)        | -0.03415***<br>(0.01198)        | -0.05148***<br>(0.01178)      | -0.05695***<br>(0.01103)        | -0.05889***<br>(0.01202)        |
| Year                   | Controlled                      | Controlled                      | Controlled                      | Controlled                      | Controlled                    | Controlled                      | Controlled                      |
| Industry               | Controlled                      | Controlled                      | Controlled                      | Controlled                      | Controlled                    | -                               | Controlled                      |
| Number of observations | 4734                            | 4954                            | 4954                            | 4927                            | 4951                          | 4954                            | 4954                            |
| <i>R</i> <sup>2</sup>  | 0.06318                         | 0.06471                         | 0.06480                         | 0.06495                         | 0.06250                       | 0.03433                         | 0.04073                         |

Notes: (1)\*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ .

we use stock names as the search terms), and use the firm-level media governance index to reduce the influence of other regional factors as much as possible. The results are given in Table 10, columns 2, 3, 4 and 5.<sup>7</sup>

The coefficients for the media governance variables (*Media2*, *Media3* and *Media4*) are all significantly negative. After controlling for the marketization variable, the coefficient for media governance (*Media*) is still significantly negative, suggesting that the results are not affected by the method used to measure media governance.

#### 4.5.4. Re-selecting the econometric method

The main econometric method used is OLS. A panel data model is likely to have fewer missing variables, allowing better elimination of the effect of these non-observed factors. We also examine how fixed effects influence the results. The regression results are given in Table 10, column 6. The coefficient for the media governance variable (*Media*) is significantly negative at the 1% level, indicating that the results are not affected by the econometric method used.

<sup>7</sup> The Baidu Media Index is a number related to the keywords recorded by the Baidu news channel for Internet media news reports.

Table 11  
Endogeneity tests.

| Variable               | (1)<br>2SLS                            | (2)<br>GMM                             |
|------------------------|--|--|
| <i>Media</i>           | <b>-0.00032***</b><br><b>(0.00009)</b> | <b>-0.00049***</b><br><b>(0.00018)</b> |
| <i>HHIS</i>            | -0.01592**<br>(0.00639)                | 0.00525<br>(0.02262)                   |
| <i>Magstk</i>          | 0.00094<br>(0.00666)                   | 0.03538<br>(0.04553)                   |
| <i>Duality</i>         | -0.00139<br>(0.00234)                  | 0.00109<br>(0.00348)                   |
| <i>Boardsize</i>       | -0.00072*<br>(0.00042)                 | 0.00014<br>(0.00087)                   |
| <i>Idr</i>             | -0.02101<br>(0.01297)                  | -0.02397<br>(0.01617)                  |
| <i>Fcf</i>             | 0.00538***<br>(0.00051)                | 0.00503***<br>(0.00063)                |
| <i>Lev</i>             | 0.00127<br>(0.00205)                   | 0.00201<br>(0.00237)                   |
| <i>Otac</i>            | -0.01158<br>(0.02147)                  | -0.03772<br>(0.03748)                  |
| Constant               | -0.05921***<br>(0.01179)               | -0.01728<br>(0.04589)                  |
| Year                   | Controlled                             | Controlled                             |
| Industry               | Controlled                             | Controlled                             |
| Number of observations | 4954                                   | 4954                                   |
| <i>R</i> <sup>2</sup>  | 0.06478                                | –                                      |

Notes: (1) \*  $p < 0.1$ ; \*\*  $p < 0.05$ ; \*\*\*  $p < 0.01$ .

#### 4.5.5. Re-estimating the variable for internal governance efficiency

The preceding portion of this paper uses the work of [Chen et al. \(2013\)](#) to choose the proxy for the internal governance efficiency of a company. To test the robustness of [Hypothesis 2](#), we use ST firms (*ST*) as the measure of low internal governance efficiency, setting *ST* to 1 when a firm receives special treatment, and 0 otherwise. Column 10 of [Table 7](#) gives the results. The regression coefficient for the interaction variable *ST\*Media* is significantly negative at the 1% level. These results confirm [Hypothesis 2](#); that is, when corporate internal governance efficiency is lower, the negative relationship between the level of external media supervision and overinvestment is more pronounced.

#### 4.5.6. Endogeneity tests

According to past research, many factors influence overinvestment (*Overinv*), such as the institutional environment ([Yang and Hu, 2007](#)), bank credit ([Luo et al., 2012](#)), cash distributions ([Zhang and Lu, 2012](#)) and the background governance ([Jiang et al., 2009](#)). Extra-regional governance indicators such as these are correlated with some extent with media governance (*Media*). There may also be a bias caused by omitted variables in the foregoing results.

Accordingly, this paper further adopts the instrumental variable method to solve the problem of endogeneity. We use four variables as instrumental variables: the per capita number of newspapers in print (*Newspaper*), the per capita number of magazines in print (*Magazine*), TV ownership per 100 households (*Television*), and computer ownership per 100 households (*Computer*). The data are derived from the [China Statistical Yearbook \(2008–2012\)](#) and the [Collection of China Press and Publication Statistical Data \(2008–2012\)](#). These variables are highly correlated with media governance (*Media*) (the correlation coefficients are 0.375, 0.710, 0.554, and 0.871, respectively), but no direct relationship between these variables and overinvestment (*Overinv1*) is found (the correlation coefficients are 0.026, 0.026, 0.058, and 0.052, respectively). We re-estimate the results using two-stage least squares (2SLS) regressions; column 1 in [Table 11](#) shows the results. Then, to take account of heteroskedasticity within a large sample, we use the generalized method of moments (GMM); the results of which are shown in column 2 of [Table 11](#).

The regression results are consistent with the previous conclusion that media governance (*Media*) and overinvestment (*Overinv*) are significantly negatively related.

Having carried out these tests, we believe that this paper's conclusions are robust.

## 5. Conclusion and discussion

Based on China's A-share listed firms from 2007 to 2011, this paper empirically tests how the level of media governance affects the level of corporate overinvestment. We find that when a region has a stronger media governance environment, levels of overinvestment by corporations are lower, suggesting that media governance significantly restricts overinvestment behavior. There is no significant difference in media governance between state-owned and non-state-owned corporations. Further, when corporate governance efficiency is low, the negative relationship between the media environment and overinvestment behavior is significantly enhanced. To guarantee the reliability of our results, we carry out multiple robustness tests, but the results remain unchanged.

This paper shows that a strong media supervision environment can create potential constraints on corporations that help to reduce overinvestment. In particular, when a formal system of internal governance fails, external supervision or informal institutional mechanisms can play an important supplementary role. Our conclusions highlight the important role played by media supervision in corporate governance, and especially in overinvestment, from the perspective of external corporations or informal institutions.

It should be noted that our focus is on the effect of the media governance environment in the region in which a corporation is located on the local investment efficiency of listed companies and we do not specifically analyze the degree to which firms' behavior may vary under the influence of emerging media that can break through regional limits, such as the media's interest in individual corporations, micro-blogging and Weixin. These types of media could be the focus of future research.

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