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The impact of anti-corruption measures and risk effects on equity incentives and financial misreporting in China

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ABSTRACT

This study examines the effects of anti-corruption and equity incentive risk on financial misreporting in the context of China's unique corporate ownership structure and governance regime. Using a sample comprising 2,708 cases of financial restatement over the 2007–2017 period. Our key findings suggest that managers' shareholdings are significantly and positively associated with their firms' financial misreporting, and certain equity risk factors dramatically alter Chinese corporate governance. Furthermore, managers' motivation to misreport is significantly more pronounced in non-state owned enterprises (non-SOEs), suggesting that equity incentive risk effects mitigate the "absence of ownership" problem believed to affect SOEs. Managers in highly competitive industries and firms with low institutional ownership are found to be highly motivated to misreport performance.

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1. Introduction

A wide range of research has explored the relationship between equity incentives and financial misreporting in both developed economies and China; however, the evidence generated by such research is mixed. Some researchers attribute these mixed results to differences in sample size, research design and measures of equity incentives. The unique nature of Chinese businesses in terms of ownership structure and corporate governance

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suggests that agency problems are more pronounced in state-owned enterprises (SOEs) than in non-SOEs. In this context, SOE managers are believed to have stronger incentives to fraudulently correct stock prices to increase their personal wealth, and to face lower expected costs from doing so (Yu, 2007; Zhang and Ma, 2011; Hass et al., 2016; Zhang et al., 2018). New political and regulatory developments that have taken place in China since 2012 have not been considered in related research. Most studies have used datasets covering periods up to 2010, thereby failing to gauge the effect of new reforms, such as the anti-corruption campaign,¹ on Chinese corporate governance.

The anti-corruption campaign is thought to have directly reduced self-interested, in-service consumption and the willingness to seek rents by SOE executives (Wang and Kong, 2016; Zhong et al., 2016) while imposing stricter performance evaluation standards for the assessment, appointment, removal, reward and punishment of government officials and executives of SOEs.

Thus, it is reasonable to deduce that the anti-corruption campaign may have made executives more risk-averse; this may especially be true for SOE management. In this context, Armstrong et al. (2013) suggest that the incentives facing risk-averse executives comprise two countervailing effects, a positive “reward effect” and a negative “risk effect.” They find that equity holdings incentivize managers to misreport not because the managers’ wealth is linked to the value of the equity but because their wealth is linked to the equity’s risk. However, few studies have explored this risk effect in the context of the relationship between equity incentives and financial misreporting in China.

The anti-corruption campaign was intended to suppress firms’ speculative behavior, such as earnings management and abusive accounting policies, and led to improvements in their earnings quality (Lei and Wang, 2019). However, the number of instances of financial misreporting by listed firms has continued to increase. For example, in 2018, the China Securities Regulatory Commission (CSRC) meted out 310 administrative penalties, representing an increase of 38.39% from the previous year².

Therefore, there is need for a comprehensive investigation of financial misreporting that considers the characteristics of the structure of the Chinese business environment. This study aims to explore the risk effects of managers’ motivation to misreport in the context of the unique forms of prevailing ownership structure and corporate governance in China. To accomplish this, we use a large sample spanning ten years (2007–2017). The starting point of our sample is the year when the CSRC began to encourage public firms to introduce equity incentive schemes. Before 2007, few firms adopted equity incentive schemes; even in firms where such schemes were adopted, the impact of managers’ shareholdings was mitigated by “lock-up period restrictions³,” which reduced managers’ motivation to increase their wealth by influencing the stock price. On 1 January 2007, Accounting Standards for Business Enterprises No. 28—Changes of Accounting Policies and Accounting Estimates and Error Correction was implemented. This was the first time that a Chinese accounting standard officially introduced the concept of a “retrospective restatement,” marking the establishment of a formal system for governing financial restatement.

Current research on the effects of US equity incentive measures is typically based on the sensitivity of managers’ portfolios to stock prices (portfolio delta) or to stock price volatility (portfolio vega). In China, however, due to low investor protection, stock prices tend to only weakly reflect firms’ levels of performance and risk, and the data needed to compile these portfolio sensitivities are not always available.

Following the studies of Firth et al. (2006a,b, 2007), Conyon and He (2011, 2014), Conyon et al. (2013) and Hass et al. (2016), we use managers’ equity shareholding ratios as a proxy for managers’ equity incentives.

¹ The 18th National Congress of the Communist Party of China (CPC) was held in Beijing on 8 November 2012. Since then, a series of regulations on fighting corruption, such as the *Eight Provisions*, have been successively issued, setting off an unprecedented anti-corruption crackdown. As of October 2017, the CPC Central Committee had investigated 440 party members and other officials at or above the provincial level, including 43 members and alternate members of the CPC Central Committee and nine members of the CPC Central Commission for Discipline Inspection. More than 8,900 bureau-level and 63,000 county-level officials have been disciplined. The anti-corruption campaign has changed China’s political ecosystem dramatically (Han and Sun, 2017).

² From the annual report on the work of CSRC, http://www.csrc.gov.cn/pub/zjhppublic/G00306201/ndbg/201903/t20190329_353507.htm.

³ According to CSRC regulations for listed firms’ equity incentives, before 2007, relevant stocks could not be sold within a year of the date of vesting. Before the lock-up period expiry, the sale of shares not exceeding 5% of the firm’s share capital over 12 months were permissible.

Following the studies of [John et al. \(2008\)](#) and [Boubakri et al. \(2013\)](#), we use the volatility of firm earnings as a measure of the effects of business risk (*Risk*) and expect business risk to act as a mediator of managers' motivation to misreport, which, according to [Baron and Kenny \(1986\)](#), can be captured by the Sobel intermediate factor test.

As this study falls within the area of Generally Accepted Accounting Principles (GAAP), we use both restatements and earnings management as proxies for financial misreporting. For the empirical investigation, we first use logit regressions for our baseline tests to examine the relationship between equity incentives and two measures of financial misreporting, namely, financial restatement and earnings management. To control for observed differences between firms with different levels of equity incentive, we use propensity score matching (PSM) and then rerun the tests using the matched sample of firms having equity incentive plans. To alleviate concerns of self-selection bias, we further use Heckman tests to address the potential endogeneity issue.

We find that managers' shareholdings are significantly and positively correlated with financial misreporting, suggesting that equity incentives strongly motivate managers to manipulate firms' performance. The levels of industrial competitiveness and institutional ownership are also found to exert a strong influence on managers' motivation to manage earnings, especially in more competitive industries and in firms with low institutional ownership. It is also established that risk aversion-related mechanisms may mitigate managers' motivation to manipulate firms' performance in SOEs, less competitive industries and firms with high institutional ownership. The evidence obtained is of great significance, as it provides insights into the impact of the anti-corruption campaign on managers' risk behaviors.

This study makes three major contributions to the field. First, we extend the literature by examining equity incentives' risk effect in the context of China's unique forms of ownership structure and corporate governance. Second, we apply alternative empirical techniques to a granular dataset that spans a long period, generating robust evidence on the relationship between equity incentives and financial misreporting. Third, this study offers pertinent and timely recommendations to policymakers on how to improve the efficiency of China's stock markets, strengthen its ability to support the real economy and modify its regulations on equity incentives, if required. Appropriate modifications should help constrain self-interested behavior in managers, especially managers of non-SOEs and of firms in highly competitive industries and with low institutional ownership, as these conditions are found to exacerbate the manipulation of reported corporate performance.

The remainder of the paper is organized as follows: [Section 2](#) reviews the relevant literature, while [Section 3](#) develops our hypotheses on equity incentives and financial misreporting. [Section 4](#) presents the data, the variables used in the study and the empirical methodology adopted. [Section 5](#) discusses the results, and [Section 6](#) concludes the study.

2. Literature review

2.1. Equity incentives and financial misreporting

Equity incentive programs can provide an effective mechanism for solving the agency problem ([Jensen and Meckling, 1976](#)). However, while they are designed to align the interests of managers and shareholders, these performance-based incentives may also motivate managers to misreport performance and induce rising stock prices for their own benefit. [Bar et al. \(2003\)](#) demonstrate that managers can be incentivized to misreport performance under a broad range of conditions. Positive associations between equity incentives and financial restatements are also identified by [Bergstresser and Philippon \(2006\)](#), [Burns and Kedia \(2006\)](#), [Goldman and Slezak \(2006\)](#), [Harris and Bromiley \(2007\)](#), [Peng and Roell \(2008\)](#), [Johnson et al. \(2009\)](#) and [Armstrong et al. \(2013\)](#).

While there is a large body of empirical research on the impact of equity incentives on misreporting, the results are mixed or inconclusive. For example, [Erickson et al. \(2006\)](#) find no evidence of an association between equity incentives and accounting fraud. Similarly, [Armstrong et al. \(2010\)](#) find that accounting manipulation is less likely in firms whose CEOs enjoy high levels of equity incentives. [Armstrong et al. \(2013\)](#) identify a possible explanation for the mixed results found in the literature, namely that differences in the sample size or research design (e.g. regression usually derives positive correlations, whereas the use of a matched-pair design may yield no correlation). There is, however, another explanation for these mixed

results, namely that misreporting increases risk. The portfolio delta (sensitivity of a manager's wealth to changes in the stock price) has two countervailing effects on a risk-averse manager's incentive to misreport, resulting in a net effect with an ambiguous sign (Armstrong et al., 2013).

Financial restatements are most often made by firms that have suffered substantial losses in market value (Palmrose et al., 2004; Karpoff et al., 2008), increases in the cost of capital (Hribar and Jenkins, 2004) or high executive turnover (Srinivasan, 2005; Hennes et al., 2008). Restatements call into question the credibility of a firm's future financial reports, as they indicate the poor quality of its previously released financial information.

Firm managers can use their accounting discretion to affect reported earnings; through this mechanism, they can also affect stock prices, provided that capital markets have difficulty detecting earnings management. Cheng and Farber (2008) find that firms' managers may be motivated to inflate and/or smooth earnings to beat analysts' forecasts. Chen et al. (2005) find that in China, stock-based compensation and ownership patterns may provide an incentive for earnings management. Several researchers have also discovered that board composition and ownership structure affect the incidence of fraud (Chen et al., 2006; Jia et al., 2009; Hou and Moore, 2010; Firth et al., 2011). Conyon and He (2014) study the consequences of corporate fraud on executive compensation in China, showing a tendency for the fixed element of executive compensation (e.g. base salary, bonus and stipends) to decrease after the announcement of a CSRC enforcement action. The authors also show that corporate fraud is more pronounced in less developed regions of China.

Hass et al. (2016) demonstrate that equity incentives for management tend to encourage corporate fraud, and they also find a negative, albeit insignificant, relationship between supervisory board members' equity incentives and corporate fraud. These authors also argue that the effect of equity incentives on corporate fraud is more pronounced in SOEs than in non-SOEs. They attribute this to the observation that SOE management teams are less able to affect their compensation and simultaneously face weaker monitoring, which offers them more opportunities to commit fraud. Thus, the expected costs of such fraud are low and the incentives to commit it strong, potentially motivating SOE management teams to increase their wealth via their stockholdings. Zhang et al. (2018) find that "tournament incentives," in the form of large pay disparities between the CEO and other executives, may reduce the occurrence of financial restatement in China. This negative association is found to be more pronounced for SOEs than non-SOEs.

2.2. Risk effects of equity incentives

Previous studies suggest that the portfolio delta (the change in a manager's wealth resulting from a unit percentage change in the company's stock price) has two countervailing effects on a risk-averse manager's decision to misreport. First, a higher delta implies an increase in the value of the manager's wealth from any given increase in the stock price, i.e. the reward effect. However, a higher delta may discourage misreporting, as it amplifies the impact of the company's equity risk on the overall riskiness of a manager's equity portfolio, discouraging risk-averse managers from taking on risky projects, i.e. the "risk effect" (Carpenter, 2000; Ross, 2004; Lewellen, 2006; Armstrong and Vashishtha, 2012).

Research suggests two reasons for the association between financial misreporting and managers' assessments of equity risk. First, misreporting increases the likelihood of extreme negative returns. While successful misreporting temporarily inflates a stock's price, once detected, the price typically undergoes a significant decline (e.g. Feroz et al., 1991; Dechow et al., 1996; Palmrose et al., 2004; Karpoff et al., 2008; Bardos et al., 2011). Second, misreporting, by its very nature, decreases the quality of a firm's financial reports and obfuscates its true value. As a result, the level of uncertainty in the market concerning the firm's share value may increase (e.g. Kravet and Shevlin, 2010; Bhattacharya et al., 2012).

Some studies have investigated the impact of the anti-corruption campaign on corporate governance in China. Starting in 2012, the anti-corruption campaign has dramatically changed China's political ecosystem (Han and Sun, 2017). It is beyond doubt that this change in corruption governance has affected both SOEs and non-SOEs. While executives at both types of firms share similar economic interests, those at SOEs also have an interest in political promotion, which could imply differences in their motivation to engage in earnings management. The campaign has directly reduced the willingness of SOE executives to engage in self-interested, in-service consumption and rent-seeking behavior (Wang and Kong, 2016; Zhong et al., 2016). This strict external environment creates two incentives for SOE executives. First, to obtain opportunities

for political promotion, senior executives at SOEs tend to abandon accrual earnings management activities that are not well concealed and could result in their suffering a relatively large penalty. Second, the anti-corruption blitz seems likely to have activated Communist Party organizations' governance and supervision within SOEs more than in non-SOEs, thus improving the effectiveness of internal controls and helping to curb the earnings management behaviors that are likely to result in the largest penalties (Lei and Wang, 2019).

2.3. *Equity incentives and ownership structure*

A unique feature of Chinese firms is the strong influence of their ownership structures on the effectiveness of their corporate governance. Chinese SOEs and non-SOEs exhibit significant differences in terms of their ownership, monitoring and control mechanisms (Peng et al., 2010). As described in the literature, the state and parent SOEs hold sufficient shares to maintain voting control and exert significant political influence (Fan et al., 2007). Reflecting this finding, the literature has identified a tendency for lower-quality corporate governance and more serious agency problems at SOEs. Related studies have documented that in SOEs, performance evaluations, salary increases and career advancement often depend on political connections and the geographical location of the SOE (Du et al., 2012; Hass et al., 2014; Zhang et al., 2018). Furthermore, an SOE's management typically has very little power to maximize firm value or affect the firm's ownership structure. Various elements of state ownership may increase the incentive and create more opportunities to commit corporate fraud. For example, in China's political system, bureaucrats are selected through political processes; they typically have very weak incentives and limited capability to monitor firms and maximize shareholder value (Conyon and He, 2011, 2014).

In China, several other factors affecting management decision-making processes in the face of performance challenges have been discovered, including differences in the legal environment, corporate governance, competitiveness and institutions. These factors all stem from variations in the level of marketization across the Chinese mainland (Fan et al., 2007; Su and Alexiou, 2019).

3. Development of hypotheses

3.1. *Equity incentives and financial misreporting*

China's financial markets, institutions and legal environment have lagged behind the rapid development of the nation's real economy (Chen et al., 2005). Therefore, the chances of identification of and punishment for earnings manipulation may be relatively low, leaving managers with strong motivation to maximize their own wealth via such manipulation, even after allowing for the risk and costs of punishment. Becker (1968) suggests that agents commit fraud only if the benefits exceed the costs of getting caught and punished. That is, the lower the expected costs relative to the expected increase in wealth, the stronger the individual's incentive to engage in fraudulent activities. Despite major improvements in China's legal framework, accounting fraud in the country is widespread, potentially hindering economic development. Chinese-listed firms are well known for behaviors such as profit inflation, fictitious transactions and false disclosures (Chen et al., 2006).

Managers' wealth is sensitive to short-term variations in stock prices, which can motivate managers with significant equity incentives to attempt to increase stock prices in the short term. Given that the capital market uses current earnings as a basis for predicting future earnings when pricing firms' equity, these managers can manage earnings using accounting discretion, potentially boosting the stock price in the short term (Stein, 1989). The CSRC's 2018 Annual Accounting Supervision Report of Listed Companies, published in 2019, identifies several accounting supervision problems, including manipulation of earnings, selective disclosure in financial statements and profit manipulation through the fabrication of transactions. For example, Kangde Xin Composite Material Group Co., Ltd., inflated reported profits by \$1.6 billion from 2015 to 2018 using a variety of means, including inflating business income and understating operating costs; the company had in fact suffered a loss of \$900 million over that period, far exceeding the profits it had earned since its listing. In another example, Longli Bio Holdings falsely increased its profits from 2015 to 2017 through fraudulent

activities involving the modification of its financial statements. The recent Luckin Coffee accounting scandal,⁴ which caused losses exceeding \$1.1 billion by foreign investors, shocked both the US Securities Exchange Commission (SEC) and the CSRC.

Overall, however, Chinese investor protection and corporate governance have greatly improved. Since 2005, the Ministry of Finance has expressed its commitment to bringing the Chinese Accounting Standards for Business Enterprises (which contain loopholes permitting the abuse of accounting policies) in line with the International Financial Reporting Standards, thus aiming to enforce the adoption of high standards of financial reporting by domestic firms. However, the practice of firm performance misreporting remains prevalent. Thus, we hypothesize that managers may wish to influence investors' perceptions of their firms and thereby manipulate stock prices.

We use volatility of firm earnings as a mediating factor that captures a manager's motivation for financial misreporting although, unlike vega, it does not directly reflect the risk of stock options (Armstrong et al., 2013). However, as riskier corporate operations exhibit more volatile returns to capital and earnings (John et al., 2008, Boubakri et al., 2013), volatility of firm earnings is thought to be closely related to earnings management, which usually has no cash flow-in. Following the Sobel intermediate factor test method of Baron and Kenny (1986), we expect business risk to act as a mediator of managers' motivation to misreport; thus, our main hypothesis is as follows:

H1. Managers' equity incentives have a positive association with corporate financial misreporting; the risk effect of business involves impact mechanisms.

3.2. Ownership structure and anti-corruption

Since the anti-corruption campaign began, government departments, other institutions and independent third-party auditors have been assigned increased supervision responsibilities, and a crackdown on enterprises' illegal and speculative activities has been instigated. In the process, relatively strict external audit requirements have made the exposure of earnings management via accruals more likely, increasing the risk that managers will incur severe punishment. Therefore, in the external governance environment created by the anti-corruption blitz, managers are likely to have become risk-averse and to have reduced their attempts to use accruals to manage earnings. The anti-corruption campaign is likely to have impacted both SOEs and non-SOEs; however, a more direct impact on executives at SOEs is expected.

Although the economic goals of executives at SOEs and non-SOEs are ultimately similar (namely, to do well in their performance evaluations and maximize personal rewards), SOE executives have the additional, more attractive goal of political promotion. The effect of an SOE's performance on its executives' promotion prospects therefore determines the degree of attention paid by SOE executives to their firms' performance. The effect of firm performance on managers' performance evaluations may mean that firm performance also affects managers' choices regarding accounting policies and procedures, as well as their production, operation, investment and financing decisions (Zeng and Ye, 2005). To achieve political promotion, SOE executives have largely abandoned the use of earnings management to embellish their enterprises' business performance (Lei and Wang, 2019).

Political promotion aside, economic interests continue to affect the behavior of SOE executives. First, even successful misreporting inflates a company's stock price only temporarily; once it is detected, there is typically a significant decline in the price (e.g. Feroz et al., 1991; Dechow et al., 1996; Palmrose et al., 2004; Karpoff et al., 2008; Bardos et al., 2011). Second, misreporting may increase the market's uncertainty concerning a firm's share price (e.g. Kravet and Shevlin, 2010; Bhattacharya et al., 2012).

⁴ According to The Wall Street Journal, on 2 April 2020, Luckin Coffee, Inc., a Chinese firm listed on the Nasdaq in May 2019, revealed that it had fabricated transactions representing nearly \$700 million in revenues between the second and fourth quarters of 2019, causing its stock price to plummet. Several US law firms accused Luckin Coffee of making false and misleading statements and violating US securities laws. On 3 April 2020, the CSRC strongly condemned financial fraud, declaring that offending firms would be punished to the full extent of the law. The SEC is conducting a thorough investigation of the fraud, which is expected to have a substantial effect on Chinese firms listed in US markets.

Overall, we argue that the anti-corruption campaign has created a stricter external governance environment, which in turn has made SOE executives more risk-averse and thus more cautious about equity risk. This risk effect should exert a constraining effect on SOE executives' self-interested behavior and weaken their motivation to engage in the manipulation of corporate performance. Therefore, we presume that managers of SOEs are more risk-averse than their non-SOE counterparts. In view of the above, we expect business risk to act as a mediator of managers' motivation to misreport, and thus we propose the following hypotheses.

H2a. The positive association between managers' equity incentives and financial misreporting is stronger in non-SOEs than in SOEs.

H2b. The positive association between managers' equity incentives and financial misreporting in SOEs was suppressed after the 2012 anti-corruption campaign.

4. Empirical investigation

4.1. Data

Following the studies of [Firth et al. \(2007, 2010, 2011\)](#), [Hou and Moore \(2010\)](#), [Canyon and He \(2011, 2014\)](#) and [Canyon et al. \(2013\)](#), we obtain data on managers' equity incentives from China Stock Market & Accounting Research (CSMAR), a leading Chinese business data and information services company. We collect accounting restatement samples from the website of Dibo Enterprise Risk Management Technology Co., Ltd (DIB),⁵ an internal control services provider in China. These samples include all accounting restatements by firms listed on the Chinese stock market and contain admissions of earnings manipulation, fabrication of assets, postponements of disclosure, false statements and failure to disclose information subject to enforcement actions taken by the CSRC or the Shanghai and Shenzhen stock exchanges. The reasons for restatement are also listed and include price manipulation, fraudulent listings, provision of illegal guarantees, illegal related-party transactions and involvement in litigation. We also collect most of the required firm characteristics from the CSMAR data, excluding observations from firms in the financial services sector. We remove certain extreme values, thus eliminating executives with a shareholding ratio higher than one or with a negative value. All of the variables are winsorised at the 1st and 99th percentiles. Our final sample consists of an unbalanced panel, with 2,708 firms and 21,216 firm-year observations for the 2007–2017 period.

Following [Rosenbaum and Rubin \(1983\)](#), we apply PSM instead of matched-pair sampling, as the matched-pair design may not reveal correlations, and we adopt a matching score based on firm size, leverage, return on assets and free cash flow. We conduct a regression analysis robustness test on the matched samples. From the restatement sample, we select 245 firms engaged in the false presentation of earnings and 155 firms engaged in the inflation of profits. We then use earnings manipulation and profit inflation as alternative variables for restatement in robustness tests.

4.2. Variables

In the literature, financial misreporting is usually measured by the following three proxies: financial restatement, earnings management and corporate fraud. Although these activities share certain traits, they are not the same. According to [Erickson et al. \(2006\)](#), financial restatements and earnings management do not necessarily reflect an intent to deceive, whereas corporate fraud does by definition. We want our investigation to fall within GAAP. Thus, we use restatements and earnings management as proxies for financial misreporting, as both are closely related to managers' misreporting motivation.

We examine the relationship between equity incentives and two measures of financial misreporting, namely, financial restatement and earnings management. We adopt financial restatement as a measure of managers'

⁵ DIB is China's first specialist internal control and risk management-focused company and its first professional risk management technology company. Since 2008, DIB has released an annual internal control index report on China's listed companies, available at <http://www.dibdata.cn>.

attempts to intentionally misreport financial information and earnings management as a measure of managers' attempts to manipulate their firms' reported performance. By using two distinct measures of financial misreporting, we aim to ensure that our inferences are applicable to misreporting in general rather than specific to any one measure.

4.2.1. Measures of incentives

As our primary goal is to examine how managers' equity incentives affect corporate financial misreporting, we focus on management teams' equity incentives⁶ (e.g. Erickson et al., 2006; Jiang et al., 2010; Feng et al., 2011;). In our initial tests, we define the management's incentives as their total equity shareholding (*Shareholding*, i.e. the shares held by the management, including the president, CEO, vice president, deputy managers, assistant managers, company secretary and other directors, as a percentage of the firm's total equity).

4.2.2. Control variables

In addition to the main independent variables of interest, we also control for certain firm characteristics. Specifically, to control for characteristics of firms' internal governance mechanisms, we use the following variables: number of board members (*Board*); number in the top management team (*Num*) (Chen et al., 2006); whether the firm was audited by a Big 4 auditor (*Big4*) (Zhang et al., 2018); market-adjusted annual return, on a monthly basis, as a measure of past stock performance (*Returns*) (Armstrong et al., 2013); the book-to-market ratio (*Btm*) to control for firms' growth potential; and leverage (*Lev*), the ratio of a firm's total long-term debt to total assets, as a measure of firms' financial risk (Erickson et al., 2006). To control for corporate performance and proxy for the risk of financial distress, following Dechow et al. (1996) and Erickson et al. (2006), we use the return on assets (*Roa*), the natural logarithm of the ratio of cash to total assets (*Cash*), Altman's (1968) Z-score measure (*Z*) and the firm's age (*Age*). Furthermore, in line with Hass et al. (2016), we include firm size, measured by the natural logarithm of total assets (*Size*) and the change in sales scaled by prior-period sales (*Growth*). Intangible assets (*Intangible*), inventory (*Inventory*) and accounts receivable (*Receivable*) are all important determinants of discretionary accruals; thus, we take them into account as control variables. We set the variable *SOE* equal to 1 if a firm is state owned, and 0 otherwise.

4.3. Methodology

Following Bergstresser and Philippon (2006), Burns and Kedia (2006) and Armstrong et al. (2013), we examine the relationship between management shareholdings and specific proxies of financial misreporting. In particular, we use a logit and ordinary least squares (OLS) regression analysis, with financial restatement and earnings management serving as dependent variables. We use the value of discretionary accruals based on the modified Jones model (Dechow and Sloan, 1995). Subsequently, we use the Sobel intermediate factor test method of Baron and Kenny (1986) to explore the role of business risk as a mediator of managers' motivation to engage in misreporting. We also examine whether this relationship changes when the following are taken into account: firms' ownership structure, the degree of competition at their headquarters, the proportion of ownership held by institutional investors and whether the observation is from before 2012 or from 2012 onward.

We estimate a series of regressions of the following form:

$$Restatement_{i,t} = \alpha + \beta Shareholdings_{i,t} + \gamma Controls_{i,t} + Industry + Year + \varepsilon_{i,t} \quad (1)$$

$$DA_{i,t} = \alpha + \beta Shareholdings_{i,t} + \gamma Controls_{i,t} + Industry + Year + \varepsilon_{i,t} \quad (2)$$

We then estimate a series of regressions in mechanism test form as follows:

$$Restatement_{i,t} \text{ or } DA_{i,t} = \alpha + \beta Shareholdings_{i,t} + \gamma Controls_{i,t} + Industry + Year + \varepsilon_{i,t} \quad (3)$$

⁶ Firm decisions are usually made by teams (Aggarwal and Samwick, 2003). Due to the anti-corruption campaign in China, the State-owned Assets Supervision and Administration Commission (SASAC) has required SOEs' important policy decisions to be made by management teams instead of a single person. We therefore examine the equity incentives of the entire top management team.

$$Risk_{i,t} = \alpha + \beta Shareholdings_{i,t} + \gamma Controls_{i,t} + Industry + Year + \varepsilon_{i,t} \quad (4)$$

$$Restatement_{i,t} \text{ or } DA_{i,t} = \alpha + \beta Shareholdings_{i,t} + \delta Risk_{i,t} + \gamma Controls_{i,t} + Industry + Year + \varepsilon_{i,t} \quad (5)$$

where

$$Risk_i = \sqrt{\frac{1}{T-1} \sum_{t=1}^T (E_{it} - \frac{1}{T} \sum_{t=1}^T E_{it})^2} \quad |T = 5$$

$$E_{it} = \frac{EBITDA_{it}}{ASSET_{it}} - \frac{1}{X_t} \sum_{k=1}^X \frac{EBITDA_{kt}}{ASSET_{kt}}$$

where *Restatement* is the measure of financial restatement, *DA* is the measure of the value of earnings management (discretionary accruals), *Risk* is the measure of the effects of business risk and *Controls* is a vector of control variables (all of the variables are defined in Appendix A).^{7,8} We also control for industry (*Industry*) and year (*Year*) fixed effects in our model. We compute the statistical significance levels of heteroscedasticity tests based on adjusted standard errors. We also check for multicollinearity using variance inflation factors (VIFs). The VIFs are below 3, which is much lower than the threshold of 10 suggested by Kennedy (2008).

4.4. Descriptive statistics and correlations

Table 1 presents the descriptive statistics for our sample. It shows that 12% of our sample is related to financial restatement and that the mean and median of discretionary accruals (DA) are 0.00 and 0.01, respectively. The mean and median of *Shareholding* are 6% and 0.00%, respectively. For several firm characteristics, the average book-to-market ratio (*Btm*) is 0.5, and the average debt-to-asset ratio (*Lev*) is 0.45. The average firm is approximately 10.38 years old and has an annual sales growth of 13%.

Table 2 reports the Pearson's correlation coefficients of the variables involved in our study from columns 1 to 17 in the lower box, and the Spearman's correlation coefficients from columns 2 to 18 in the upper box. This correlation analysis provides the first preliminary evidence on the positive relationship between management shareholdings and earnings management.

5. Results

5.1. Logit and OLS regression analysis

5.1.1. Equity incentives and financial misreporting

We use a logit regression model to examine the relationship between restatement and equity incentives, an OLS regression model to explore the relationship between *DA* and equity incentives and an OLS regression model to review the mechanism between *Risk* and financial misreporting.

Table 3 presents the results from the logit/OLS regressions with financial misreporting serving as the dependent variable (proxied by restatement and *DA*) and the results of the mechanism tests on financial restatement and earnings management based on the full sample.

In columns 1 and 2, a positive relationship between restatement/earnings management and shareholding is established, and the results in both columns are significant at the 1% level. These results suggest that equity incentives encourage managers to misreport their performance by using discretionary accounting. The effects of manager shareholding on financial restatement and discretionary accruals are not only statistically significant but also economically large. A one-standard deviation increase in manager shareholdings is associated with an

⁷ Here, *i* and *t* represent firm and year, respectively. *T* represents an observation period of five years. *Risk* represents the rolling standard deviation of volatility of firm earning within five years (John et al., 2008).

⁸ *X* represents the total number of firms in a certain industry, and *k* represents the *k*th firm in the industry. *E* represents industry adjusted earnings (EBIT/ASSET).

Table 1
Descriptive statistics.

Variable Name	Obs	Mean	SD	Min	Median	Max
<i>Restatement</i>	21,216	0.12	0.33	0.00	0.00	1.00
<i>DA</i>	21,216	0.00	0.09	-0.59	0.01	0.48
<i>Shareholding</i>	21,216	0.05	0.11	0.00	0.00	0.58
<i>Board</i>	21,216	8.83	1.77	5.00	9.00	15.00
<i>Z</i>	21,216	6.64	9.22	-0.44	3.66	63.42
<i>Num</i>	21,216	14.97	4.17	7.00	14.00	28.00
<i>Big4</i>	21,216	0.06	0.23	0.00	0.00	1.00
<i>Btm</i>	21,216	0.51	0.25	0.07	0.48	1.09
<i>Return</i>	21,216	0.07	0.52	-1.05	-0.03	2.55
<i>Inventory</i>	21,216	0.16	0.15	0.00	0.12	0.75
<i>Receivable</i>	21,216	0.11	0.10	0.00	0.08	0.45
<i>Size</i>	21,216	22.00	1.29	19.19	21.84	25.82
<i>Lev</i>	21,216	0.46	0.22	0.05	0.46	1.03
<i>Roa</i>	21,216	0.04	0.06	-0.21	0.04	0.23
<i>Cash</i>	21,216	0.18	0.13	0.01	0.14	0.69
<i>Growth</i>	21,216	0.13	0.34	-0.97	0.11	1.67
<i>Age</i>	21,216	10.95	6.23	2.00	11.00	28.00
<i>Intangible</i>	21,216	0.05	0.07	0.00	0.03	0.90

Note. This table presents descriptive statistics for the firms in our sample from the 2007–2017 period with 21,216 observations. All of the variables are defined in Appendix A.

increase of 2.267% in the standard deviation of financial restatement and 2.567% in the standard deviation of discretionary accruals.

In column 3, the coefficient of managerial shareholdings is significant and positively associated with *Risk*, suggesting that a higher level of managerial shareholdings leads to a higher level of business risk. Column 4 shows that *Risk* is positively associated with financial restatement, i.e. significant at the 10% level, whereas in column 5, the *Risk* is also significant at the 5% level and positively associated with earnings management.

In the full sample, the Sobel Z values for restatement and earnings management are 1.706 and 1.960, respectively, which are significant at the 10% and 5% levels, respectively. This indicates that *Risk* acts as a mediator between managers' motivation to manipulate earnings and restatement, implying that the business risk associated with shareholding exerts an influence on financial misreporting. This provides evidence of a risk effect.

Regarding the control variables, our results show significant negative relationships between *Big 4* and restatement, suggesting that the probability of financial restatement is lower for firms audited by Big 4 audit firms, consistent with the results of Zhang et al. (2018). Financial leverage (*Lev*) is positively related to restatement, suggesting that firms with high financial risk are more likely to issue financial restatements. The age of the firm is positively related to restatement, possibly because firms with long track records have an incentive to engage in earnings manipulation to protect those track records. These findings are consistent with Erickson et al. (2006) and Feng et al. (2011). Returns (*Roa*) are strongly negatively related to restatement, suggesting that poor performance may be an important driver of firms' misreporting of performance; this is consistent with the results of Armstrong et al. (2013). Growth in sales is strongly positively related to restatement, which is not consistent with Armstrong et al. (2013), who found a significantly negative relationship between growth of sales and restatement. Accounts receivable (*Receivable*) are negatively related to restatement, suggesting that firms may use accounts receivable to manipulate performance. Other control variables are mostly consistent with the literature (e.g. Dechow et al., 1996; Chen et al., 2006; Hass et al., 2016).

Overall, the results indicate significant positive associations between shareholding and restatement and between shareholding and discretionary accruals, suggesting that managers' equity incentives are positively associated with corporate financial misreporting. Further evidence suggests that *Risk* acts as a mediator between managers' motivation to manipulate earnings and restatement. The fact that the business risk associated with shareholding exerts an influence on financial misreporting implies that the risk effect of business is one of the mechanisms that influences corporate misreporting. H1 is therefore confirmed.

Table 2
Pearson/Spearman correlation coefficient matrix.

	1	2	3	4	5	6	7	8	9	10
1. <i>Restatement</i>		0.01**	0.01**	-0.02**	-0.02***	0.00	-0.03***	-0.00	-0.02***	0.00
2. <i>DA</i>	0.01**		0.10***	-0.01	0.14***	0.03***	-0.04***	-0.04***	-0.00	0.08***
3. <i>Shareholdings</i>	0.02***	0.07***		-0.14***	0.30***	0.13***	-0.10***	-0.19***	-0.03***	-0.02***
4. <i>Board</i>	-0.01*	-0.01	-0.15***		-0.18***	0.26***	0.10***	0.19***	0.00	-0.02***
5. <i>Z</i>	-0.01	0.06***	0.22***	-0.16***		-0.09***	-0.13***	-0.54***	0.11***	-0.14***
6. <i>Num</i>	0.00	0.03***	0.02**	0.31***	-0.09***		0.09***	0.11***	-0.02***	0.01
7. <i>Big4</i>	-0.03***	-0.03***	-0.08***	0.12***	-0.08***	0.11***		0.16***	-0.01*	-0.04***
8. <i>Btm</i>	-0.01	-0.02**	-0.20***	0.20***	-0.51***	0.12***	0.18***		-0.25***	0.11***
9. <i>Return</i>	-0.01**	-0.00	-0.01**	-0.01	0.12***	-0.02***	-0.02***	-0.27***		0.02***
10. <i>Inventory</i>	-0.01	0.13***	-0.08***	-0.03***	-0.19***	-0.01	-0.03***	0.16***	0.02**	
11. <i>Receivable</i>	0.01	0.13***	0.21***	-0.11***	0.02***	0.05***	-0.07***	-0.18***	-0.01	-0.10***
12. <i>Size</i>	-0.01**	0.06***	-0.19***	0.26***	-0.36***	0.26***	0.36***	0.61***	-0.07***	0.10***
13. <i>lev</i>	0.03***	-0.13***	-0.26***	0.16***	-0.51***	0.08***	0.09***	0.40***	0.04***	0.30***
14. <i>Roa</i>	-0.06***	0.33***	0.12***	0.01	0.29***	0.02***	0.04***	-0.22***	0.11***	-0.08***
15. <i>Cash</i>	-0.03***	-0.02***	0.17***	-0.06***	0.38***	-0.05***	-0.06***	-0.22***	0.01**	-0.17***
16. <i>Growth</i>	0.01	0.04***	0.07***	-0.00	0.01	0.03***	-0.01	-0.05***	0.11***	0.02***
17. <i>Age</i>	0.02**	-0.07***	-0.41***	0.07***	-0.22***	-0.04***	0.05***	0.21***	-0.01	0.13***
18. <i>Intangible</i>	0.01*	-0.11***	-0.04***	0.03***	-0.03***	0.03***	0.06***	-0.02***	0.01	-0.20***
	11	12	13	14	15	16	17	18		
1. <i>Restatement</i>	0.01	-0.01	0.03***	-0.07***	-0.02***	0.00	0.02**	0.03***		
2. <i>DA</i>	0.11***	0.05***	-0.14***	0.29***	0.01	0.05***	-0.09***	-0.11***		
3. <i>Shareholdings</i>	0.29***	-0.11***	-0.28***	0.21***	0.17***	0.12***	-0.43***	0.02***		
4. <i>Board</i>	-0.11***	0.23***	0.15***	0.01	-0.05***	-0.00	0.08***	0.01**		
5. <i>Z</i>	0.21***	-0.50***	-0.84***	0.49***	0.39***	0.09***	-0.34***	0.05***		
6. <i>Num</i>	0.05***	0.23***	0.07***	0.01	-0.02**	0.04***	-0.06***	0.08***		
7. <i>Big4</i>	-0.08***	0.29***	0.10***	0.04***	-0.07***	-0.00	0.05***	0.02***		
8. <i>Btm</i>	-0.19***	0.58***	0.42***	-0.30***	-0.20***	-0.08***	0.22***	-0.07***		
9. <i>Return</i>	-0.01	-0.06***	0.03***	0.13***	0.02***	0.11***	0.01*	-0.00		
10. <i>Inventory</i>	0.06***	0.04***	0.25***	-0.10***	-0.08***	0.02**	0.04***	-0.15***		
11. <i>Receivable</i>		-0.19***	-0.12***	0.06***	0.10***	0.09***	-0.31***	0.03***		
12. <i>Size</i>	-0.16***		0.41***	0.01	-0.16***	0.08***	0.30***	-0.09***		
13. <i>lev</i>	-0.05***	0.38***		-0.40***	-0.33***	-0.00	0.35***	-0.09***		
14. <i>Roa</i>	0.04***	0.05***	-0.38***		0.28***	0.35***	-0.22***	-0.03***		
15. <i>Cash</i>	0.00	-0.18***	-0.37***	0.26***		0.06***	-0.20***	-0.08***		
16. <i>Growth</i>	0.07***	0.08***	0.01	0.31***	0.03***		-0.15***	-0.03***		
17. <i>Age</i>	-0.25***	0.26***	0.33***	-0.16***	-0.20***	-0.08***		-0.06***		
18. <i>Intangible</i>	-0.11***	-0.03***	-0.00	-0.05***	-0.13***	-0.02**	0.02***			

Note. Lower box reports Pearson's correlation coefficients; upper box reports Spearman's correlation coefficients.

*** p < 0.01, ** p < 0.05, * p < 0.1.

5.1.2. Equity incentives, ownership structure and anti-corruption

Table 4 reports the results of the regression and mechanism test of the relationship between shareholding and financial restatement based on subsamples of SOEs and non-SOEs before and after 2012, which were conducted to gauge the impact of the anti-corruption campaign. As shown in column 1, in the non-SOE sample, the coefficient of managerial shareholdings is positive and significant at the 1% level. Columns 3 and 4 suggest that, in the non-SOE sample, the coefficients of managerial shareholdings are positive and significant at the 5% and 10% levels, respectively, both before and after 2012. Column 2 shows that in the SOE sample, shareholding does not have a significant effect on restatement. However, in column 5 for the pre-2012 SOE sample, the coefficient of managerial shareholdings is positive and significant at the 10% level, suggesting that before the anti-corruption campaign, SOEs managers had a strong motivation to falsify their financial reports.

As shown in column 6, in the post-2012 SOE sample, the coefficient of managerial shareholdings is insignificant, indicating that SOE managers have had less motivation to misinform their financial reports since the anti-corruption campaign began. Column 7 shows the results of the mechanism test on column 5. *Risk* is

Table 3
Mechanism tests for financial restatement and earnings management on equity incentives.

Variable	(1) Restatement	(2) DA	(3) Risk	(4) Restatement	(5) DA
<i>Shareholding</i>	0.647*** (2.91)	0.021*** (3.94)	3.368*** (2.65)	0.640** (2.37)	0.021*** (3.28)
<i>Risk</i>				0.003* (1.89)	0.005** (2.26)
<i>Board</i>	0.010 (0.70)	-0.000 (-0.33)	0.034 (0.42)	0.010 (0.70)	-0.000 (-0.27)
<i>Z</i>	0.000 (0.44)	0.000* (1.77)	-0.012** (-2.24)	0.000 (0.39)	0.000* (1.75)
<i>Num</i>	-0.002 (-0.32)	0.000** (2.27)	0.031 (0.94)	-0.002 (-0.31)	0.000** (2.26)
<i>Big4</i>	-0.289** (-2.51)	-0.022*** (-9.59)	0.514 (1.24)	-0.288** (-2.50)	-0.022*** (-9.59)
<i>Btm</i>	-0.194 (-1.31)	0.002 (0.62)	2.013*** (2.84)	-0.189 (-1.28)	0.004 (0.99)
<i>Returns</i>	-0.038 (-0.83)	-0.001 (-1.00)	-0.450 (-1.37)	-0.039 (-0.85)	-0.002 (-1.32)
<i>Inventory</i>	-0.219 (-1.18)	0.068*** (10.32)	2.451** (2.43)	-0.214 (-1.15)	0.068*** (10.35)
<i>Receivable</i>	-0.665*** (-2.68)	0.085*** (12.53)	-1.400 (-1.08)	-0.669*** (-2.70)	0.085*** (12.55)
<i>Size</i>	-0.048 (-1.60)	0.004*** (4.81)	-0.509*** (-3.13)	-0.049* (-1.65)	0.004*** (4.60)
<i>Lev</i>	0.586*** (4.21)	-0.040*** (-8.80)	0.210 (0.28)	0.588*** (4.23)	-0.041*** (-8.94)
<i>Roa</i>	-2.450*** (-5.58)	-0.010 (-0.69)	6.037** (2.43)	-2.438*** (-5.55)	-0.010 (-0.70)
<i>Cash</i>	-0.278 (-1.41)	-0.099*** (-17.79)	2.013 (1.60)	-0.274 (-1.39)	-0.100*** (-17.83)
<i>Growth</i>	0.214*** (3.07)	-0.001 (-0.50)	-1.120*** (-3.15)	0.211*** (3.03)	-0.002 (-0.55)
<i>Age</i>	0.007* (1.73)	-0.000* (-1.81)	0.085*** (4.37)	0.007* (1.77)	-0.000* (-1.81)
<i>Intangible</i>	0.330 (0.99)	-0.073*** (-9.53)	-0.696 (-0.53)	0.329 (0.98)	-0.073*** (-9.55)
<i>Constant</i>	-0.516 (-0.87)	-0.069*** (-4.20)	13.950*** (4.35)	-0.473 (-0.79)	-0.069*** (-4.19)
Year	YES	YES	YES	YES	YES
Industry	YES	YES	YES	YES	YES
N	21,216	21,216	21,216	21,216	21,216
Adj/Pseudo R ²	0.079	0.103	0.199	0.089	0.114
Sobel Z-value				1.706*	1.960**

Note. This table presents results from logit regressions of financial restatement and OLS regressions of earnings management on equity incentives and control variables (columns 1 and 2) and the results of mechanism tests for financial restatement and earnings management. Column 3 examines the relationship between *Risk* and managerial shareholding in the subsample with restatement. Columns 4 and 5 examine the relationship between *Risk*, financial restatement and earnings management, estimated using logit and OLS regression. All variables are defined in Appendix A. t (z)-statistics appear in curved brackets and are based on standard errors clustered by firm and year. ***, ** and * indicate 1%, 5% and 10% significance levels, respectively.

positively associated with financial restatement and significant at the 10% level. The Sobel Z value for restatement is 1.660 and weakly significant at the 10% level, indicating that before the anti-corruption campaign, SOE managers were also less risk-averse, implying that they have been more risk-averse and cautious about equity risk than their non-SOE counterparts since the anti-corruption campaign began.

Table 5 reports the results of the regression and mechanism test between shareholding and earnings management based on the same subsamples as in Table 4. As shown in column 1, in the non-SOE sample,

Table 4
Equity incentives, anti-corruption and financial restatement.

Variable	(1) Restatement SOE = 0	(2) Restatement SOE = 1	(3) Restatement SOE = 0 Year < 2012	(4) Restatement SOE = 0 Year ≥ 2012	(5) Restatement SOE = 1 Year < 2012	(6) Restatement SOE = 1 Year ≥ 2012	(7) Restatement SOE = 1 Year < 2012
<i>Shareholding</i>	0.640*** (2.73)	1.677 (0.72)	0.986** (2.23)	0.484* (1.74)	4.377* (1.66)	-6.880 (-0.92)	0.575 (0.15)
<i>Risk</i>							0.007* (1.83)
<i>Board</i>	0.006 (0.31)	0.030 (1.53)	-0.007 (-0.19)	0.016 (0.66)	0.032 (1.31)	0.017 (0.50)	0.016 (0.57)
<i>Z</i>	-0.000 (-0.42)	0.004 (1.55)	0.001 (0.49)	-0.001 (-0.70)	0.007** (2.13)	-0.003 (-0.34)	-0.003 (-0.40)
<i>Num</i>	-0.007 (-0.95)	-0.001 (-0.15)	-0.027* (-1.79)	0.000 (0.01)	-0.003 (-0.30)	-0.002 (-0.13)	0.006 (0.46)
<i>Big4</i>	0.014 (0.08)	-0.459*** (-2.96)	0.300 (1.02)	-0.108 (-0.52)	-0.777*** (-3.72)	0.067 (0.27)	-0.251 (-1.11)
<i>Btm</i>	-0.380* (-1.80)	0.012 (0.06)	-0.406 (-1.16)	-0.490* (-1.82)	0.311 (1.09)	-0.364 (-0.95)	-0.072 (-0.22)
<i>Returns</i>	-0.044 (-0.76)	-0.066 (-0.88)	0.067 (0.72)	-0.113 (-1.50)	-0.069 (-0.60)	-0.034 (-0.36)	-0.096 (-1.04)
<i>Inventory</i>	0.291 (1.18)	-0.899*** (-3.10)	-0.098 (-0.24)	0.586* (1.92)	-1.091*** (-2.92)	-0.508 (-0.97)	-0.634 (-1.42)
<i>Receivable</i>	-0.878*** (-2.71)	-0.171 (-0.44)	-1.890*** (-2.75)	-0.580 (-1.56)	-0.196 (-0.43)	-0.096 (-0.12)	-0.004 (-0.01)
<i>Size</i>	0.038 (0.90)	-0.102** (-2.36)	-0.003 (-0.04)	0.058 (1.12)	-0.139** (-2.51)	-0.063 (-0.89)	-0.123** (-1.96)
<i>Lev</i>	0.308* (1.65)	0.878*** (3.99)	0.083 (0.27)	0.372 (1.58)	1.001*** (3.76)	0.654 (1.63)	0.902*** (2.64)
<i>Roa</i>	-2.908*** (-5.08)	-1.819*** (-2.62)	-1.314 (-1.34)	-3.788*** (-5.58)	-1.883** (-2.06)	-1.507 (-1.34)	-1.005 (-1.00)
<i>Cash</i>	-0.262 (-1.06)	-0.477 (-1.41)	-0.707 (-1.63)	-0.174 (-0.57)	-0.570 (-1.36)	-0.086 (-0.15)	-0.379 (-0.75)
<i>Growth</i>	0.205** (2.31)	0.182 (1.63)	-0.109 (-0.64)	0.352*** (3.45)	0.282** (2.14)	-0.044 (-0.23)	-0.024 (-0.14)
<i>Age</i>	0.009* (1.65)	0.007 (1.09)	0.005 (0.42)	0.008 (1.22)	0.016* (1.92)	-0.017 (-1.11)	-0.019 (-1.55)
<i>Intangible</i>	0.677 (1.41)	-0.032 (-0.06)	-0.121 (-0.15)	1.250** (2.07)	0.039 (0.06)	0.126 (0.15)	0.175 (0.25)
<i>Constant</i>	-2.217*** (-2.59)	0.509 (0.59)	-1.537 (-0.98)	-2.835*** (-2.76)	1.365 (1.28)	-0.131 (-0.09)	0.682 (0.54)
<i>Year</i>	YES	YES	YES	YES	YES	YES	YES
<i>Industry</i>	YES	YES	YES	YES	YES	YES	YES
<i>N</i>	11,596	9,620	4,260	7,336	4,540	5,080	4,540
<i>Pseudo R²</i>	0.076	0.095	0.103	0.068	0.082	0.093	0.090
<i>Empirical P-value</i>		0.657		0.247		0.041**	
<i>Sobel Z-value</i>							1.660*

Note. This table presents a comparison of the results and mechanism tests for SOEs' and non-SOEs' financial restatement as a function of equity incentives and control variables. Column 1 examines the relationship between restatement and managerial shareholding in the subsample of non-SOEs. Column 2 examines the relationship between restatement and managerial shareholding in the subsample of SOEs. Columns 3 and 4 examine the subsample of non-SOEs before 2012 and in the years after and including 2012, respectively. Columns 5 and 6 examine the subsample of SOEs before 2012 and in the years after and including 2012, respectively. Column 7 shows the results of the mechanism tests for column 5, estimated using logit and OLS regression. All of the variables are defined in Appendix A. z-statistics appear in curved brackets and are based on standard errors clustered by firm and year. ***, ** and * indicate 1%, 5% and 10% significance levels, respectively.

the coefficient of managerial shareholdings is positive and significant at the 1% level. Columns 3 and 4 in the non-SOE sample indicate that the coefficients of managerial shareholdings are positive and significant at the 1% and 5% levels, respectively. Column 2 shows that in the SOE sample, shareholding does not affect earnings

Table 5
Equity incentives, anti-corruption and earnings management.

Variable	(1) DA SOE = 0	(2) DA SOE = 1	(3) DA SOE = 0 Year < 2012	(4) DA SOE = 0 Year ≥ 2012	(5) DA SOE = 1 Year < 2012	(6) DA SOE = 1 Year ≥ 2012	(7) DA SOE = 1 Year < 2012
<i>Shareholding</i>	0.018*** (3.20)	0.052 (0.92)	0.030*** (2.89)	0.009** (2.18)	0.120* (1.73)	0.086 (0.96)	0.112 (1.41)
<i>Risk</i>							0.002* (1.81)
<i>Board</i>	-0.000 (-0.33)	0.000 (0.28)	-0.000 (-0.39)	-0.000 (-0.39)	0.000 (0.06)	0.000 (0.56)	0.000 (0.02)
<i>Z</i>	0.000 (1.55)	0.000 (0.97)	0.000 (1.00)	0.000* (1.88)	0.000 (0.15)	0.000 (0.17)	0.000 (0.18)
<i>Num</i>	0.000 (0.73)	0.000** (2.14)	-0.000 (-0.44)	0.000 (0.94)	0.000 (1.60)	0.000 (1.43)	0.000 (1.35)
<i>Big4</i>	-0.026*** (-5.60)	-0.019*** (-7.20)	-0.024*** (-2.74)	-0.028*** (-5.09)	-0.023*** (-6.51)	-0.015*** (-4.26)	-0.023*** (-5.14)
<i>Btm</i>	0.002 (0.39)	-0.002 (-0.43)	-0.002 (-0.24)	-0.002 (-0.21)	0.000 (0.01)	0.003 (0.35)	0.000 (0.03)
<i>Returns</i>	0.000 (0.09)	-0.004* (-1.77)	0.003 (0.97)	-0.002 (-0.93)	-0.005** (-2.15)	-0.005 (-1.53)	-0.005** (-2.07)
<i>Inventory</i>	0.080*** (8.71)	0.054*** (5.57)	0.128*** (8.98)	0.036*** (3.17)	0.090*** (7.74)	0.025* (1.74)	0.090*** (6.82)
<i>Receivable</i>	0.105*** (11.11)	0.056*** (5.53)	0.099*** (5.57)	0.103*** (9.37)	0.118*** (8.70)	0.029** (2.12)	0.117*** (7.36)
<i>Size</i>	0.007*** (4.77)	0.002** (2.34)	0.008*** (3.55)	0.005*** (2.80)	0.005*** (3.94)	-0.000 (-0.09)	0.005*** (3.26)
<i>Lev</i>	-0.050*** (-7.23)	-0.028*** (-4.71)	-0.081*** (-6.76)	-0.024*** (-2.99)	-0.047*** (-6.29)	-0.013 (-1.35)	-0.047*** (-5.19)
<i>Roa</i>	-0.038* (-1.83)	0.023 (1.09)	-0.061* (-1.77)	-0.018 (-0.73)	0.561*** (21.92)	0.046 (1.33)	0.561*** (18.44)
<i>Cash</i>	-0.089*** (-11.89)	-0.119*** (-13.34)	-0.120*** (-9.25)	-0.085*** (-9.00)	-0.116*** (-10.21)	-0.095*** (-7.09)	-0.116*** (-8.32)
<i>Growth</i>	0.006* (1.67)	-0.012*** (-2.59)	0.004 (0.58)	0.007 (1.53)	-0.043*** (-7.26)	-0.021*** (-2.80)	-0.043*** (-6.63)
<i>Age</i>	-0.000 (-0.66)	-0.000* (-1.74)	-0.001*** (-4.07)	0.000 (1.62)	-0.001** (-2.30)	0.000 (0.72)	-0.001* (-1.85)
<i>Intangible</i>	-0.085*** (-5.55)	-0.065*** (-8.01)	-0.064** (-2.49)	-0.099*** (-5.18)	-0.060*** (-5.55)	-0.065*** (-5.55)	-0.059*** (-4.29)
<i>Constant</i>	-0.113*** (-4.23)	-0.040* (-1.87)	-0.128*** (-2.91)	-0.087*** (-2.68)	-0.106*** (-4.00)	-0.003 (-0.09)	-0.106*** (-3.23)
Year	YES	YES	YES	YES	YES	YES	YES
Industry	YES	YES	YES	YES	YES	YES	YES
N	11,596	9,620	4,260	7,336	4,540	5,080	4,540
Adj R ²	0.064	0.050	0.105	0.053	0.205	0.043	0.205
Empirical P-value		0.551		0.186		0.070*	
Sobel Z-value							1.652*

Note. This table presents a comparison of results and mechanism tests for SOEs' and non-SOEs' earnings management as a function of equity incentives and control variables. Column 1 examines the relationship between earnings management and managerial shareholding in the subsample of non-SOEs. Column 2 examines the relationship between earnings management and managerial shareholding in the subsample of SOEs. Columns 3 and 4 examine the subsample of non-SOEs before 2012 and in the years after and including 2012, respectively. Columns 5 and 6 examine the subsample of SOEs before 2012 and in the years after and including 2012, respectively. Column 7 shows the results of mechanism tests for column 5, estimated using logit and OLS regression. All of the variables are defined in Appendix A. t-statistics appear in curved brackets and are based on standard errors clustered by firm and year. ***, ** and * indicate 1%, 5% and 10% significance levels, respectively.

management. However, as presented in column 5, in the pre-2012 SOE sample, the coefficient of managerial shareholdings is positive and significant at the 10% level, suggesting that before the anti-corruption campaign, SOE managers had strong motivation to manipulate corporate performance. In column 6, in the post-2012

sample, the coefficient of managerial shareholdings is insignificant, indicating that SOEs' managers have not had the motivation to manage their earnings since the anti-corruption campaign began.

Column 7 shows the results of the mechanism test on column 5. *Risk* is positively associated with earnings management and significant at the 10% level. The Sobel Z value for restatement is 1.652 and significant at the 10% level, indicating that before the anti-corruption campaign, SOE managers were less risk-averse. Consistent with Table 4, this implies that SOE managers have been more risk-averse and more cautious about equity risk than their non-SOE counterparts since the anti-corruption campaign began.

From the results in Tables 4 and 5, we can establish that managers in non-SOEs are more likely to manipulate financial performance than those in SOEs, which is consistent with H2a, suggesting that the positive association between managers' equity incentives and financial misreporting is stronger in non-SOEs than in SOEs. The anti-corruption campaign had a significant influence on SOEs' corporate governance by making their managers more risk-averse, which is consistent with H2b and supports the view that the positive association between managers' equity incentives and financial misreporting in SOEs has become less pronounced since 2012.

It should be emphasized that any inconsistency between our findings and those of previous studies (e.g. Hass et al., 2016) may be due to the following reasons. First, the sample data in Hass et al. (2016) spans from 2000 to 2010, thereby excluding significant reforms that have since taken place in China and have altered the Chinese corporate governance regime, such as the anti-corruption campaign. Second, Hass et al. (2016) use different proxy measures and a different data source. They use corporate fraud as a proxy for misreporting, and their data on fraudulent firms are from the CSRC Enforcement Actions Research Database. In contrast, we use restatement and earnings management as proxies for misreporting, which are more closely related to GAAP, and our data sources are DIB (for accounting restatement samples) and CSMAR (for earnings management). As Erickson et al. (2006) suggest, although corporate fraud and restatement and earnings management may share certain traits, they differ in that financial restatement and earnings management do not necessarily reflect an intent to deceive, whereas corporate fraud does, by definition.

5.2. Additional analysis

5.2.1. Moderating role of competition

Competition in firms' product markets can act as an external corporate governance enforcement mechanism (Giroud and Mueller, 2010, 2011). The more competitive the market, the more difficult it is to achieve performance targets. Thus, in more competitive markets, managers may be willing to take more risks to manipulate financial performance. Similarly, the lower the level of competition, the lower the pressure on performance, reducing managers' incentives to take the risks involved in managing performance. Following Hass et al. (2016), we use the Herfindahl–Hirschman index (HHI) of industrial market concentration as a proxy for market competitiveness. A low HHI value implies below-median industrial concentration and a market closer to perfect competition, whereas a high HHI value indicates above-median industrial concentration and market conditions closer to monopoly. We expect managers whose firms are in highly competitive markets to face greater challenges meeting performance targets, encouraging these managers to engage in earnings manipulation.

Table 6 reports the regression results and mechanism test results for financial restatement and earnings management based on competition. Column 2 shows that in the high-competition sample, management shareholdings are positively associated with financial restatement and significant at the 1% level. This association is not significant when there is low competition. Columns 4 and 5 show that in both the low- and high-competition industry samples, shareholdings are positively associated with earnings management, and both results are significant at the 1% level. Columns 3 and 6 show that *Risk* is positively associated with financial restatement and earnings management, and both results are significant at the 10% level.

The Sobel Z value for restatement, reported at the foot of Table 6, is 1.638 and significant at the 10% level, while the Sobel Z value for earnings management is 1.645 and also significant at the 10% level. This finding implies that managers in low-competition industries are more risk-averse than those in high-competition industries, suggesting that the latter are more likely to manipulate financial performance than the former when facing performance challenges. This finding is inconsistent with Hass et al. (2016), according to whom equity

Table 6
Mechanism tests for financial restatement and earnings management: Competition.

Variable	(1) Restatement High-HHI	(2) Restatement Low-HHI	(3) Restatement Low-HHI	(4) DA High-HHI	(5) DA Low-HHI	(6) DA Low-HHI
<i>Shareholding</i>	0.565 (1.59)	0.726*** (2.71)	0.507** (1.72)	0.021*** (2.70)	0.017*** (2.64)	0.016** (2.21)
<i>Risk</i>			0.120* (1.67)			0.006* (1.77)
<i>Board</i>	0.020 (1.06)	-0.002 (-0.11)	-0.002 (-0.10)	0.000 (0.04)	-0.001 (-1.04)	0.000 (0.06)
<i>Z</i>	-0.000 (-0.02)	0.003 (1.31)	0.003 (1.22)	-0.000 (-0.38)	0.000** (2.17)	-0.000 (-0.47)
<i>Num</i>	0.001 (0.16)	-0.005 (-0.63)	-0.005 (-0.67)	0.001** (2.43)	-0.000 (-0.06)	0.001** (2.39)
<i>Big4</i>	-0.246 (-1.53)	-0.329** (-2.03)	-0.331** (-2.04)	-0.023*** (-4.79)	-0.027*** (-5.97)	-0.023*** (-4.78)
<i>Btm</i>	-0.079 (-0.35)	-0.199 (-0.99)	-0.180 (-0.89)	0.007 (1.05)	0.012 (1.53)	0.008 (1.18)
<i>Returns</i>	-0.095 (-1.44)	0.011 (0.18)	-0.012 (-0.20)	-0.001 (-0.66)	-0.003 (-1.27)	-0.002 (-1.18)
<i>Inventory</i>	-0.292 (-1.20)	-0.049 (-0.15)	-0.041 (-0.13)	0.070*** (5.47)	0.100*** (9.84)	0.071*** (5.50)
<i>Receivable</i>	-0.444 (-1.11)	-0.668** (-2.07)	-0.671** (-2.08)	0.127*** (10.79)	0.166*** (10.06)	0.127*** (10.81)
<i>Size</i>	-0.130*** (-3.00)	0.022 (0.53)	0.019 (0.47)	0.006*** (4.04)	0.007*** (4.19)	0.006*** (3.95)
<i>Lev</i>	0.635*** (3.06)	0.576*** (3.08)	0.561*** (2.99)	-0.043*** (-5.80)	-0.065*** (-6.97)	-0.044*** (-5.88)
<i>Roa</i>	-2.099*** (-3.20)	-2.739*** (-4.89)	-2.747*** (-4.91)	0.538*** (23.11)	0.524*** (18.03)	0.538*** (23.14)
<i>Cash</i>	-0.710** (-2.44)	0.071 (0.27)	0.059 (0.22)	-0.070*** (-8.37)	-0.113*** (-10.33)	-0.071*** (-8.39)
<i>Growth</i>	0.281*** (3.13)	0.148 (1.54)	0.142 (1.47)	-0.026*** (-5.13)	-0.023*** (-5.60)	-0.026*** (-5.18)
<i>Age</i>	0.001 (0.13)	0.010* (1.78)	0.010* (1.80)	-0.000* (-1.88)	-0.000 (-0.54)	-0.000* (-1.86)
<i>Intangible</i>	0.162 (0.39)	0.868 (1.46)	0.826 (1.38)	-0.088*** (-4.11)	-0.062*** (-5.26)	-0.089*** (-4.17)
<i>Constant</i>	1.164 (1.36)	-2.271*** (-2.89)	-2.294*** (-2.92)	-0.138*** (-4.79)	-0.129*** (-4.10)	-0.139*** (-4.83)
Year	YES	YES	YES	YES	YES	YES
Industry	YES	YES	YES	YES	YES	YES
N	9,689	11,527	11,527	9,689	11,527	11,527
Adj/Pseudo R ²	0.090	0.077	0.075	0.207	0.176	0.208
Empirical P-value		0.073*			0.227	
Sobel Z-value			1.638*			1.645*

Note. This table presents a comparison of mechanism tests for financial restatement and earnings management for firms in high- and low-competition environments as a function of equity incentives and control variables. All of the variables are defined in Appendix A. t (z)-statistics appear in curved brackets and are based on standard errors clustered by firm and year. ***, ** and * indicate 1%, 5% and 10% significance levels, respectively.

incentives have a significantly positive effect on corporate fraud in both competitive and non-competitive industries. As mentioned above, this divergence may be due to differences in sample size, measurement proxies and/or data sources.

5.2.2. Moderating role of institutions

Institutional investors play a central role in accounting choices (Cumming and Walz, 2010; Bird and Karolyi, 2016). In the context of earnings management, studies show that institutional ownership is negatively

related to earnings management (e.g. Bushee, 1998; Chung et al., 2002). We expect that managers whose firms are owned to a greater extent by institutional investors may face greater monitoring intensity, which may discourage them from engaging in earnings manipulation.

Table 7 reports the regression and mechanism test results for financial restatement and earnings management based on institutional ownership. Column 1 indicates that in the low institutional ownership sample, management shareholdings are positively associated with financial restatement, which is significant at the

Table 7
Mechanism tests for financial restatement and earnings management: Institutional ownership.

Variable	(1) Restatement High- Inst	(2) Restatement Low- Inst	(3) Restatement Low- Inst	(4) DA High- Inst	(5) DA Low- Inst	(6) DA Low- Inst
<i>Shareholding</i>	0.004 (0.01)	0.847** (3.35)	0.532** (2.21)	0.013* (1.71)	0.045*** (3.63)	0.044*** (2.97)
<i>Risk</i>			0.133* (1.89)			0.007* (1.76)
<i>Board</i>	0.046** (2.44)	-0.024 (-1.21)	-0.026 (-1.22)	-0.000 (-0.09)	-0.001 (-1.19)	-0.001 (-0.88)
<i>Z</i>	0.004 (1.51)	-0.000 (-0.03)	-0.000 (-0.13)	0.000* (1.81)	0.000* (1.65)	0.000 (0.99)
<i>Num</i>	-0.017** (-2.11)	0.011 (1.33)	0.011 (1.31)	-0.000 (-0.32)	0.001*** (2.77)	0.001** (2.24)
<i>Big4</i>	-0.199 (-1.50)	-0.433* (-1.87)	-0.491* (-1.92)	-0.029*** (-5.04)	-0.023*** (-7.62)	-0.023*** (-6.25)
<i>Btm</i>	-0.131 (-0.61)	-0.195 (-0.89)	-0.171 (-0.71)	0.003 (0.47)	0.006 (1.07)	0.007 (1.02)
<i>Returns</i>	0.011 (0.16)	-0.076 (-1.25)	-0.078 (-1.27)	-0.001 (-0.31)	-0.004** (-2.56)	-0.005*** (-2.64)
<i>Inventory</i>	-0.165 (-0.60)	-0.279 (-1.05)	-0.341 (-1.21)	0.100*** (13.12)	0.077*** (10.89)	0.077*** (7.38)
<i>Receivable</i>	-0.452 (-1.27)	-0.802** (-2.32)	-0.849** (-2.23)	0.151*** (15.11)	0.138*** (15.21)	0.138*** (11.55)
<i>Size</i>	-0.073* (-1.78)	-0.008 (-0.19)	-0.020 (-0.40)	0.010*** (7.87)	0.006*** (5.61)	0.006*** (3.90)
<i>Lev</i>	0.684*** (3.15)	0.602*** (3.38)	0.654*** (3.40)	-0.057*** (-10.88)	-0.045*** (-8.03)	-0.046*** (-5.95)
<i>Roa</i>	-1.816*** (-2.68)	-2.607*** (-4.72)	-2.837*** (-4.81)	0.566*** (34.30)	0.491*** (27.60)	0.491*** (19.56)
<i>Cash</i>	-0.404 (-1.37)	-0.172 (-0.65)	-0.199 (-0.70)	-0.083*** (-11.18)	-0.097*** (-13.46)	-0.097*** (-10.05)
<i>Growth</i>	0.224** (2.21)	0.203** (2.34)	0.193** (2.05)	-0.025*** (-9.73)	-0.025*** (-9.34)	-0.025*** (-5.19)
<i>Age</i>	-0.002 (-0.26)	0.015** (2.48)	0.006 (0.89)	-0.000** (-1.97)	-0.000 (-0.23)	-0.000 (-0.18)
<i>Intangible</i>	0.668 (1.49)	0.122 (0.24)	0.002 (0.00)	-0.072*** (-4.86)	-0.066*** (-5.76)	-0.066*** (-5.36)
<i>Constant</i>	0.058 (0.07)	-1.522* (-1.69)	-1.345 (-1.38)	-0.202*** (-7.88)	-0.120*** (-5.67)	-0.120*** (-4.35)
<i>Year</i>	YES	YES	YES	YES	YES	YES
<i>Industry</i>	YES	YES	YES	YES	YES	YES
<i>N</i>	10,714	10,502	10,502	10,714	10,502	10,502
<i>Adj/Pseudo R²</i>	0.084	0.081	0.081	0.211	0.172	0.172
<i>Empirical P-value</i>	0.038**		0.029**			
<i>Sobel Z-value</i>			1.704*			1.660*

Note. This table presents a comparison of mechanism tests for financial restatement and earnings management for firms with high and low institutional ownership ratios as a function of equity incentives and control variables. All of the variables are defined in Appendix A. t (z)-statistics appear in curved brackets and are based on standard errors clustered by firm and year. ***, ** and * indicate 1%, 5% and 10% significance levels, respectively.

1% level; however, this association is insignificant when there is high institutional ownership. Columns 4 and 5 show that in both the low and high institutional ownership samples, shareholdings are positively associated with earnings management and significant at the 1% and 10% levels, respectively. Columns 3 and 6 show that *Risk* is weakly significant (i.e. at the 10% level) and positively associated with financial restatement and earnings management. The Sobel Z value for restatement, reported at the foot of the table, is 1.704 and significant at the 10% level, while the Sobel Z value for earnings management is 1.660 and also significant at the 10% level. This finding implies that managers in high institutional ownership firms are more risk-averse than those in low institutional ownership firms, suggesting that the latter are more likely to manipulate financial performance than the former when facing performance challenges.

5.3. Robustness tests

5.3.1. Alternative measures

To test the robustness of our results, we use alternative proxies to replace restatement, earnings management and the measure of shareholding. First, we limit the sample of financial restatements to review the impact of equity incentives on profit restatements. The total sample observation thus becomes 2,546 ($21,216 \times 0.12$). For this test, we replace the original financial restatement with a dummy variable to indicate whether a profit restatement occurred and a dummy variable to indicate whether there was an increase in profit. We use *Restate_p* (a dummy variable set to 1 for restatements involving earnings manipulation only) and *Restate_up* (which is identical to *Restate_p* but set to 1 only if profits are overstated) as alternatives to *Restatement*.

Table 8 presents the results of the robustness tests focusing on financial restatement. Columns 2 and 4 show that managers' shareholdings are significantly positively associated with restatement.

Second, we use an alternative definition to measure managers' shareholdings and earnings management. First, to mitigate the concern of skewness of shareholding, we use a log-transformed measure to address this issue. We define *Shareholding_log* as the logarithm of 1 plus *Shareholding*. The second alternative measure is based on discretionary accruals (*DA_DD* and *DA_Perf*) as described by Dechow and Dichev (2002) and Kothari et al. (2005). Table 9 presents this analysis and demonstrates that our main results continue to hold.

5.3.2. Tests using PSM analysis

In this subsection, we use PSM analysis to control for observed differences between firms with different levels of equity incentive. Specifically, to obtain propensity scores, we set an indicator variable, *Shareholding_dum*, which equals 1 if the firm implements an equity incentive plan, and 0 otherwise. We run a logit regression to calculate the likelihood of a firm's having an equity incentive plan (*Shareholding_dum* = 1), which estimates the function on firm-level financial characteristics. Following Rosenbaum and Rubin (1983), Efendi et al. (2005) and Erickson et al. (2006), the variables used in the PSM approach include *Big4*, *Size*, *Lev*, *Roa*, *Cash* and *Growth*. Thereafter, we construct a one-to-one match with no replacement, using a caliber distance of 0.03 from those firms without equity incentive plans (*Shareholding_dum* = 0) to form the control group. In Panel A of Table 10, the results show that after using PSM, the difference in all of the control variables between the two groups becomes smaller and not significant.

Panel B of Table 10 presents results from the PSM tests, focusing on financial restatement and discretionary accruals (14,748 observations). Columns 1 and 2 show that managers' shareholdings are significantly positively associated with restatement and discretionary accruals, consistent with the regression results reported in our main findings.

5.3.3. Heckman tests

Although we document a significant and positive association between manager shareholdings and financial misreporting, our results may suffer from selection bias. For example, managers of firms with lower profits have greater incentive to misreport. To improve firm performance, shareholders are more likely to implement equity incentives for managers, which can cause self-selection bias. Accordingly, in this subsection, we use the Heckman two-stage test to mitigate this endogeneity concern.

In the first stage, we construct a probit model to estimate the probability of firms' having equity incentive plans. We consider the following firms' factors in the estimation: *Big4*, *Size*, *Lev*, *Roa*, *Cash* and *Growth*. As

Table 8
Robustness tests for financial restatement involving earnings manipulation and profit inflation.

Variable	(1) <i>Restate_p</i>	(2) <i>Restate_p</i>	(3) <i>Restate_up</i>	(4) <i>Restate_up</i>
<i>Shareholding</i>	0.995** (2.08)	1.176* (1.96)	1.661*** (2.89)	2.210*** (3.06)
<i>Board</i>		0.017 (0.37)		0.033 (0.53)
<i>Z</i>		0.009*** (2.94)		-0.003 (-0.48)
<i>Num</i>		0.045** (2.39)		0.053** (2.25)
<i>Big4</i>		-1.509* (-1.88)		-1.281 (-1.16)
<i>Btm</i>		-0.088 (-0.14)		0.748 (0.92)
<i>Returns</i>		-0.253 (-1.58)		-0.081 (-0.34)
<i>Inventory</i>		-0.552 (-0.70)		-0.319 (-0.29)
<i>Receivable</i>		-0.474 (-0.52)		1.184 (1.02)
<i>Size</i>		0.222* (1.86)		0.081 (0.50)
<i>Lev</i>		-0.454 (-0.85)		-1.400** (-2.01)
<i>Roa</i>		-6.381*** (-4.40)		-5.931*** (-3.16)
<i>Cash</i>		-0.129 (-0.18)		0.068 (0.07)
<i>Growth</i>		0.047 (0.21)		-0.177 (-0.69)
<i>Age</i>		-0.014 (-0.96)		-0.014 (-0.70)
<i>Intangible</i>		0.181 (0.16)		1.812 (1.26)
<i>Constant</i>	-2.031*** (-5.40)	-8.107*** (-3.45)	-4.743*** (-4.22)	-6.767** (-2.05)
<i>Year</i>	YES	YES	YES	YES
<i>Industry</i>	YES	YES	YES	YES
<i>N</i>	2,546	2,546	2,546	2,546
<i>Pseudo R²</i>	0.080	0.132	0.149	0.138

Note. This table presents the results of robustness tests using logit model regressions separately estimated on samples featuring earnings manipulation and profit inflation as a function of equity incentives and control variables. All of the variables are defined in Appendix A. z-statistics appear in curved brackets and are based on standard errors clustered by firm and year. ***, ** and * indicate 1%, 5% and 10% significance levels, respectively.

the Heckman model requires an exogeneous variable, we use the industry average value of *Shareholding*, excluding the firm concerned (*Shareholding_avg*), to satisfy this requirement. Firms with similar industry conditions may share a common incentive to implement an equity incentive plan; thus, *Shareholding_avg* is likely to be positively associated with *Shareholding*. However, a firm's own incentive may not be correlated with other firms' decisions on equity incentives.

The results of the first stage regression are reported in Panel A of Table 11. We find that the coefficient of *Shareholding_avg* is positively significant at the 1% level, suggesting that the exogenous variables are valid. The first stage regression generates the inverse Mills ratio (*IMR*), and we include this in the second stage regression to control for self-selection bias. The other control variables in the second stage model are the same as those in Eq. (1) and Eq. (2). We report the results of the second stage regression in Panel B of Table 11. The

Table 9
Alternative measures of shareholding and discretionary accruals.

Variable	(1) <i>Restatement</i>	(2) <i>DA</i>	(3) <i>DA_DD</i>	(4) <i>DA_Perf</i>
<i>Shareholding_log</i>	0.694^{***} (2.60)	0.025^{***} (3.76)		
<i>Shareholding</i>			0.011^{***} (2.74)	0.027^{***} (3.82)
<i>Board</i>	0.010 (0.68)	-0.000 (-0.34)	-0.000 (-0.91)	-0.000 (-0.80)
<i>Z</i>	0.000 (0.44)	0.000* (1.77)	0.000 (0.80)	0.000** (2.18)
<i>Num</i>	-0.002 (-0.32)	0.000** (2.26)	0.000** (2.16)	0.000 (1.57)
<i>Big4</i>	-0.289** (-2.51)	-0.022 ^{***} (-9.58)	-0.013 ^{***} (-6.15)	-0.025 ^{***} (-7.72)
<i>Btm</i>	-0.195 (-1.32)	0.002 (0.62)	0.014 ^{***} (4.16)	0.010** (1.99)
<i>Returns</i>	-0.038 (-0.84)	-0.001 (-1.00)	0.002** (2.01)	-0.002 (-1.35)
<i>Inventory</i>	-0.220 (-1.18)	0.068 ^{***} (10.32)	0.021 ^{***} (3.87)	0.088 ^{***} (11.16)
<i>Receivable</i>	-0.663 ^{***} (-2.67)	0.085 ^{***} (12.53)	0.034 ^{***} (6.02)	0.144 ^{***} (15.16)
<i>Size</i>	-0.048 (-1.61)	0.004 ^{***} (4.80)	0.003 ^{***} (3.33)	0.007 ^{***} (5.95)
<i>Lev</i>	0.585 ^{***} (4.21)	-0.040 ^{***} (-8.80)	-0.036 ^{***} (-7.55)	-0.052 ^{***} (-9.15)
<i>Roa</i>	-2.447 ^{***} (-5.58)	-0.010 (-0.69)	0.702 ^{***} (42.50)	0.531 ^{***} (29.04)
<i>Cash</i>	-0.275 (-1.40)	-0.099 ^{***} (-17.79)	-0.043 ^{***} (-10.53)	-0.091 ^{***} (-13.34)
<i>Growth</i>	0.215 ^{***} (3.08)	-0.001 (-0.50)	-0.027 ^{***} (-12.44)	-0.024 ^{***} (-7.70)
<i>Age</i>	0.007* (1.65)	-0.000* (-1.81)	-0.000** (-2.11)	-0.000 (-1.50)
<i>Intangible</i>	0.330 (0.99)	-0.073 ^{***} (-9.53)	-0.039 ^{***} (-5.24)	-0.069 ^{***} (-6.51)
<i>Constant</i>	-0.504 (-0.85)	-0.069 ^{***} (-4.19)	-0.052 ^{***} (-3.26)	-0.135 ^{***} (-6.11)
Year	YES	YES	YES	YES
Industry	YES	YES	YES	YES
N	21,216	21,216	21,216	21,216
Adj/Pseudo R ²	0.029	0.053	0.466	0.189

Note. This table presents the results of robustness tests using different measures of shareholding and discretionary accruals (modified Jones model, Dechow and Dichev, 2002; Kothari et al., 2005). All of the variables are defined in Appendix A. t-statistics appear in curved brackets and are based on standard errors clustered by firm and year. ***, ** and * indicate 1%, 5% and 10% significance levels, respectively.

results show that the coefficients on *Shareholding* remain positive and statistically significant, consistent with our main findings.

5.3.4. Lagged values analysis

Our findings suggest that increased managers' shareholdings are associated with increased levels of earnings management. However, there is a possibility of reverse causation in our regression models. To mitigate this, we estimate our models using lagged values of the dependent variable and all of the control variables. Table 12 presents the results of these tests, which verify the primary findings.

Table 10
Robustness tests for financial restatement using PSM methods.

Panel A				
Variable	Matched-sample mean		%bias	t-test
	Treated	Control		
<i>Big4</i>	0.067	0.064	1.3	0.73
<i>Size</i>	22.016	21.989	2.1	1.25
<i>Lev</i>	0.502	0.486	7.2	4.53
<i>Roa</i>	0.032	0.034	-3.6	-1.65
<i>Cash</i>	0.166	0.169	-2.3	-1.47
<i>Growth</i>	0.117	0.120	-1.0	-0.64
Panel B				
	(1)	(2)		
	Restatement	DA	PSM	
	PSM	PSM		
<i>Shareholding</i>	0.633**	0.029***		
	(2.02)	(3.64)		
<i>Board</i>	0.005	-0.000		
	(0.27)	(-0.10)		
<i>Z</i>	0.003	0.000		
	(1.45)	(0.44)		
<i>Num</i>	0.003	0.000**		
	(0.45)	(2.36)		
<i>Big4</i>	-0.325**	-0.024***		
	(-2.11)	(-8.90)		
<i>Btm</i>	-0.177	-0.002		
	(-0.89)	(-0.34)		
<i>Returns</i>	-0.064	-0.001		
	(-1.16)	(-0.72)		
<i>Inventory</i>	-0.100	0.067***		
	(-0.40)	(8.69)		
<i>Receivable</i>	-0.584*	0.070***		
	(-1.70)	(8.19)		
<i>Size</i>	-0.049	0.005***		
	(-1.17)	(4.58)		
<i>Lev</i>	0.504**	-0.041***		
	(2.51)	(-6.63)		
<i>Roa</i>	-2.167***	0.013		
	(-3.86)	(0.71)		
<i>Cash</i>	-0.670**	-0.111***		
	(-2.47)	(-14.76)		
<i>Growth</i>	0.076	-0.004		
	(0.89)	(-1.24)		
<i>Age</i>	0.004	-0.000**		
	(0.76)	(-2.52)		
<i>Intangible</i>	0.456	-0.071***		
	(1.13)	(-8.26)		
<i>Constant</i>	-0.480	-0.080***		
	(-0.57)	(-3.99)		
<i>Year</i>	YES	YES		
<i>Industry</i>	YES	YES		
<i>N</i>	14,748	14,748		
<i>Adj/Pseudo R²</i>	0.084	0.188		

Note. This table presents results of the PSM analysis related to financial restatement (5,276 observations). For the PSM method, matching with non-restating firms was based on firm size, leverage, ROA and cash flow. All of the variables are defined in Appendix A. t (z)-statistics appear in curved brackets and are based on standard errors clustered by firm and year. ***, ** and * indicate 1%, 5% and 10% significance levels, respectively.

Table 11
Robustness tests: Heckman test.

Variable	(1)		(2)	(3)
	First-stage <i>Shareholding</i>		Second-stage	
			<i>Restatement</i>	<i>DA</i>
<i>Big4</i>	-0.409*** (-4.17)	<i>Shareholding</i>	0.509*** (4.03)	0.021*** (3.25)
<i>Size</i>	0.147*** (7.81)	<i>Board</i>	-0.005 (-0.56)	-0.000 (-0.27)
<i>Lev</i>	-0.873*** (-8.03)	<i>Z</i>	0.000 (0.65)	0.000** (1.99)
<i>Roa</i>	0.897*** (3.10)	<i>Num</i>	0.002 (0.71)	0.000* (1.88)
<i>Cash</i>	0.071 (0.48)	<i>Big4</i>	-0.192*** (-2.79)	-0.022*** (-7.28)
<i>Growth</i>	0.048* (1.72)	<i>Btm</i>	-0.102 (-1.42)	0.002 (0.50)
<i>Shareholding_avg</i>	8.941*** (9.56)	<i>Returns</i>	-0.047** (-1.97)	-0.001 (-0.97)
		<i>Inventory</i>	-0.183 (-1.55)	0.068*** (9.03)
		<i>Receivable</i>	-0.152 (-1.02)	0.085*** (9.85)
		<i>Size</i>	-0.004 (-0.07)	0.004 (1.13)
		<i>Lev</i>	0.236 (0.36)	-0.040 (-0.97)
		<i>Roa</i>	-1.549** (-2.52)	-0.011 (-0.28)
		<i>Cash</i>	-0.242 (-1.22)	-0.100*** (-8.43)
		<i>Growth</i>	0.102 (1.60)	-0.001 (-0.35)
		<i>Age</i>	0.007*** (2.84)	-0.000 (-1.45)
		<i>Intangible</i>	0.182 (0.94)	-0.073*** (-7.43)
		<i>IMR</i>	-0.134 (-0.12)	-0.001 (-0.02)
<i>Constant</i>	-2.965*** (-7.19)	<i>Constant</i>	-0.849 (-0.50)	-0.068 (-0.65)
<i>Year</i>	YES	<i>Year</i>	YES	YES
<i>Industry</i>	YES	<i>Industry</i>	YES	YES
N	21,216	N	21,216	21,216
Pseudo R ²	0.099	Adj/Pseudo R ²	0.062	0.113

Note. This table presents the results of the Heckman test derived from the estimation of financial restatement as a function of equity incentives and control variables. Column 3 presents the results of a probit model regression. All of the variables are defined in Appendix A. t (z)-statistics appear in curved brackets and are based on standard errors clustered by firm and year. ***, ** and * indicate 1%, 5% and 10% significance levels, respectively.

In summary, the regression, PSM, Heckman test analyses and endogeneity test all yield consistent results, supporting the conclusion that shareholdings motivate managers to misreport firm performance. These results are consistent with H1, which states that managers' equity incentives encourage financial misreporting and that the risk effect of business is one of the main mechanisms that motivate managers to manipulate corporate performance.

Table 12
Robustness tests using lagged values of control variables.

Variable	(1) <i>Restatement</i>	(2) <i>Risk</i>	(3) <i>Restatement</i>	(4) <i>DA</i>	(5) <i>DA</i>
<i>Shareholding</i>	0.732^{***} (3.24)	2.072^{**} (2.14)	0.619^{***} (2.83)	0.027^{***} (4.58)	0.021^{***} (4.10)
<i>Risk</i>			0.003^{**} (2.12)		0.006^{**} (2.31)
<i>Board</i>	0.016 (1.09)	0.046 (0.63)	0.016 (1.09)	-0.000 (-0.87)	-0.000 (-0.84)
<i>Z</i>	0.000 (0.15)	-0.005 (-0.85)	0.000 (0.14)	0.000 (1.57)	0.000 (1.50)
<i>Num</i>	-0.005 (-0.85)	0.024 (0.81)	-0.005 (-0.85)	0.000* (1.72)	0.000* (1.69)
<i>Big4</i>	-0.433 ^{***} (-3.37)	0.305 (0.85)	-0.432 ^{***} (-3.37)	-0.026 ^{***} (-10.39)	-0.026 ^{***} (-10.46)
<i>Btm</i>	-0.221 (-1.37)	1.621 ^{***} (2.96)	-0.219 (-1.36)	0.008* (1.80)	0.010 ^{**} (2.09)
<i>Returns</i>	-0.070 (-1.25)	-0.138 (-0.50)	-0.071 (-1.26)	-0.001 (-0.47)	-0.002 (-1.13)
<i>Inventory</i>	-0.296 (-1.47)	1.496* (1.74)	-0.294 (-1.47)	0.072 ^{***} (10.14)	0.073 ^{***} (10.16)
<i>Receivable</i>	-0.622 ^{**} (-2.40)	0.013 (0.01)	-0.622 ^{**} (-2.40)	0.143 ^{***} (18.81)	0.143 ^{***} (18.82)
<i>Size</i>	-0.034 (-1.06)	-0.358 ^{***} (-2.58)	-0.035 (-1.08)	0.007 ^{***} (7.05)	0.006 ^{***} (6.87)
<i>Lev</i>	0.554 ^{***} (3.71)	-0.412 (-0.61)	0.554 ^{***} (3.70)	-0.046 ^{***} (-8.96)	-0.046 ^{***} (-9.10)
<i>Roa</i>	-2.828 ^{***} (-5.95)	3.096 (1.38)	-2.825 ^{***} (-5.95)	0.516 ^{***} (29.34)	0.517 ^{***} (29.36)
<i>Cash</i>	-0.275 (-1.34)	1.926* (1.80)	-0.272 (-1.32)	-0.089 ^{***} (-15.01)	-0.089 ^{***} (-15.04)
<i>Growth</i>	0.317 ^{***} (4.34)	-0.667 ^{**} (-2.09)	0.316 ^{***} (4.32)	-0.022 ^{***} (-6.84)	-0.022 ^{***} (-6.90)
<i>Age</i>	0.010 ^{**} (2.32)	0.053 ^{***} (3.32)	0.010 ^{**} (2.34)	-0.000 (-1.61)	-0.000 (-1.57)
<i>Intangible</i>	0.465 (1.31)	-0.827 (-0.73)	0.464 (1.30)	-0.075 ^{***} (-8.75)	-0.075 ^{***} (-8.74)
<i>Constant</i>	-1.623 ^{**} (-2.54)	11.341 ^{***} (4.10)	-1.596 ^{**} (-2.50)	-0.141 ^{***} (-7.57)	-0.140 ^{***} (-7.52)
<i>Year</i>	YES	YES	YES	YES	YES
<i>Industry</i>	YES	YES	YES	YES	YES
<i>N</i>	18,671	18,671	18,671	18,671	18,671
<i>Adj/Pseudo R²</i>	0.083	0.122	0.086	0.179	0.185
<i>Sobel Z-value</i>			1.866*		1.993 ^{**}

Note. This table presents the results of the robustness test using the lagged values of control variables. All of the variables are defined in Appendix A. t (z)-statistics appear in curved brackets and are based on standard errors clustered by firm and year. ***, ** and * indicate 1%, 5% and 10% significance levels, respectively.

These findings indicate that aversion to business risk alters managers' motivations in a way that is dependent on differences in firms' structure, competition and institutional ownership. SOE managers are more risk-averse than non-SOE managers due to the higher costs associated with equity risk. Risk imposes an additional burden on SOE managers, who must contend with not only market pressures but also pressures coming from the external governance environment, including local governments, State Asset Supervision and Administration Commission (SASAC), third-party supervision and the firms' certified public accountants and employees. Their motivation to manipulate performance is therefore blunted.

Furthermore, the more competitive the market, the more difficult it is to achieve performance targets. Thus, managers in more competitive markets may be willing to assume greater risk to manipulate financial performance, while those in less competitive markets, facing reduced performance pressures, have weaker incentives to take the risk of managing reported performance. The managers whose firms are more heavily owned by institutional investors face greater monitoring intensity than those in low institutional ownership firms, which makes them more risk-averse. When facing performance challenges, the risk effect of equity incentives may discourage these managers from engaging in earnings manipulation.

Our findings explain why performance misreporting by firms remains prevalent in the context of the anti-corruption campaign and a stricter corporate governance environment. Namely, the managers of non-SOEs, of firms in highly competitive industries and of firms with low institutional ownership may be less risk-averse in relation to equity incentives than their respective peers. This finding also suggests that the risk effects associated with equity incentives can help to mitigate SOEs' "absence of ownership" problem.

6. Concluding remarks

This study explores the relationship between equity incentives and financial misreporting in 2,708 cases of financial restatement for the 2007–2017 period. Our results show a significant positive association between managers' shareholdings and the manipulation of their firms' reported performance. Based on the unique ownership structures and corporate governance regime prevailing in China and taking the risk effect associated with equity incentives into consideration, our findings suggest that the motivation of managers to manipulate firms' reported performance is more significant in non-SOEs (vs. SOEs), highly competitive (vs. less competitive) industries and low (vs. high) institutional ownership firms. These findings are attributed to the potential for risk aversion-related mechanisms to mitigate managers' motivation to manipulate firms' performance in SOEs, less competitive industries and high institutional ownership firms. Our results present empirical evidence suggesting that the anti-corruption campaign in China has increased managers' risk-aversion. However, much of the evidence is in line with findings in the literature and consistent with the observation that the number of cases of financial misreporting in China has been increasing. The robustness tests in our study yield estimates consistent with our hypotheses.

Important policy implications for enhancing the efficiency of the Chinese stock market can be derived from these results. For example, the CSRC should adjust provisions regarding equity incentives to restrict managers' ability to engage in self-interested behavior through earnings manipulation. This restriction should be imposed on managers of non-SOEs, of firms in highly competitive industries and of firms with low institutional ownership, possibly by exploiting their aversion to business risk. Tougher regulation of equity incentives could better align the interests of managers and their shareholders.

This study presents empirical evidence on the relationship between equity incentives and financial misreporting in China, especially the influence of shareholding and differences in levels of competition and institutional ownership. However, to overcome the limitations of this study, future research should further clarify differences in the influences on managers' motivation regarding fraudulent activity, restatement and earnings manipulation. The study uses *Risk* as a proxy for business risk, capturing mediation effects in the analysis between equity incentives and misreporting, which means that the results should be interpreted with caution, as other stakeholders, such as the CEO or CFO, may also exert influence on a firm's business risk. The risk effect associated with equity incentives should be examined in greater detail and in consideration of the characteristics of the Chinese stock market.

Declaration of Competing Interest

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

Appendix A. Definitions of variables

Dependent variable	Definition	Source
<i>Restatement</i>	Dummy variable. Equals 1 for any year in which a firm issues a financial restatement, and 0 otherwise.	http://www.dibdata.cn/#/product/2/risk ; http://www.csrc.gov.cn/pub/zjhpublic/index.htm?/channel/3300/3313 .
<i>Restate_p</i>	Dummy variable. Equals 1 for any year in which a firm issues a financial restatement that affects earnings, and 0 otherwise.	http://www.dibdata.cn/#/product/2/risk ; http://www.csrc.gov.cn/pub/zjhpublic/index.htm?/channel/3300/3313 .
<i>Restate_up</i>	Dummy variable. Equals 1 for any year in which a firm issues a financial restatement correcting an overstatement of profit, and 0 otherwise.	http://www.dibdata.cn/#/product/2/risk ; http://www.csrc.gov.cn/pub/zjhpublic/index.htm?/channel/3300/3313 .
<i>DA</i>	The value of discretionary accruals, based on the modified Jones model (Dechow and Sloan, 1995).	http://www.dibdata.cn/#/product/2/risk ; CSMAR; firm annual reports
Independent variable	Definition	Source
<i>Shareholding</i>	Percentage of equity shares held by the top management members, multiplied by 100.	CSMAR
Control variable	Definition	Source
<i>Board</i>	Number of board members.	CSMAR
<i>Z</i>	Z score (Altman, 1968)	CSMAR
<i>Num</i>	Number of top management team members.	CSMAR
<i>Big4</i>	Dummy variable. Equal to 1 if the firm is audited by a Big 4 auditor, and 0 otherwise.	CSMAR
<i>Btm</i>	Ratio of book value of equity to market value of equity.	CSMAR
<i>Returns</i>	Market-adjusted annual returns on a monthly basis.	CSMAR
<i>Inventory</i>	Ratio of inventory to total assets.	CSMAR; firm annual reports
<i>Receivable</i>	Ratio of accounts receivable to total assets.	CSMAR; firm annual reports
<i>Size</i>	Natural logarithm of assets.	CSMAR
<i>Lev</i>	Ratio of total liabilities to total assets.	CSMAR
<i>Roa</i>	Return on assets.	CSMAR
<i>Cash</i>	Natural logarithm of ratio of cash to total assets.	CSMAR
<i>Risk</i>	The rolling standard deviation of volatility of firm earnings within 5 years.	
<i>Age</i>	Number of years the firm has been listed on the stock market.	CSMAR
<i>Intangible</i>	Ratio of research and development and advertising expenditure to sales.	CSMAR; firm annual reports
<i>Growth</i>	Change in sales scaled by previous-period sales.	CSMAR
Other variables	Definition	Source

<i>SOE</i>	Dummy variable. Equals 1 if enterprise is owned by the state, and 0 otherwise.	CSMAR
<i>HHI</i>	Below-median HHI industrial concentration indicates high competition, and above-median indicates low competition.	CSMAR
<i>Inst</i>	Ratio of ownership held by institutional investors in a firm.	CSMAR

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