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Essays on equity incentive and share pledging in China

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Essays on Equity Incentive and Share Pledging in China

ZILI SU

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Zili Su

Essays on Equity Incentive and Share Pledging in China

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China, Sept. 2023

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Introduction

This PhD thesis consists of three independent chapters that aim to improve our understanding of equity incentives and share pledging in China. China is one of the largest emerging economies in the world, the success of its economy acts as a magnet for international inflows of capital, thus raising expectations for future returns. However, despite the booming of the real economy in the past decades, the performance of the Chinese stock market has been poor. The law enforcement which protects investors' interests has been relatively weak which ultimately resulted in lower payout (Li et al. 2014; Lv et al. 2012; Chen and Guo 2017), while the number of financial misreporting cases from listed firms has also increased (Hass et al. 2016; Zhang et al. 2018).

Equity incentives can alleviate agency problems, but also provide managers with a channel to promote their own self-interest by increasing payouts. In China, although all provinces are formally required to implement nationally promulgated laws and regulations, in practice the enforcement and effect of these legal provisions differs from region to region, depending on regional legal environments. Thus, regional levels of investor protection also differ. However, the interactive effects between equity incentives and regional investor protection on firm payouts and performance is missing in the existing literature.

Equity incentives facing risk-averse executives comprise two countervailing effects, a positive "reward effect" and a negative "risk effect" (Armstrong et al. 2013). The anti-corruption campaign since 2012 in China, may have made executives more

risk-averse, this may especially be true for state-owned enterprises (SOEs) management (Wang and Kong, 2016; Zhong et al. 2016). However, very few studies have explored the risk effect in the context of the relationship between equity incentives and financial misreporting.

Share pledging is a significant supporting practice for China's economic growth, especially from the private sector (Brandt and Li, 2003; Song et al. 2011). Most previous studies used the 2013 loose regulatory change as a quasi-natural experiment and documented that share pledging impairs firm value (Li et al. 2020; Meng et al. 2019). In 2018, the China Securities Regulatory Commission (CSRC) began reinforcing the regulations on share pledging, which is aimed at preventing systemic risks to the Chinese capital market from share pledging. However, the impact of the tightened regulatory reform on firm value are unclear.

In chapter 1, I examine the impact of equity incentives and regional investor protection on corporate payout policies and corporate performance. I utilize one component from China Marketization Index – legal intermediaries and law enforcement environment – as an index of regional investor protection. By analyzing the interaction between equity incentives and regional investor protection, I find that the managers of firms adopting equity incentives tend to act in their own interests, increasing their cash receipts by increasing dividend distributions, as measured by cash dividend payout ratios, and regional investor protection has a significant restraining effect on this self-interested behavior. The stronger the degree of regional investor protection, the greater of this effect. I also incorporate factors reflecting growth in the model equations, the

result suggests that this restraining effect depends crucially on firms' growth opportunities. That is, the effect on cash (stock) dividends is weaker (stronger) in high-growth firms – whose ability to pay cash dividends is limited by their appetite for cash for expansion – and stronger (weaker) in low-growth firms with lower cash appetites. Finally, I further analyze the restraining effect on corporate performance, the results suggest that this restraining effect can have a positive effect on corporate growth and performance.

In chapter 2, I investigate the impact of anti-corruption and risk effects on equity incentive and financial misreporting in the context of China's unique corporate ownership structure and governance regime. I 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; also use both restatements and earnings management as proxies for financial misreporting. I find that managers' shareholdings are significantly and positively correlated with financial misreporting, suggesting that equity incentives strongly motivate managers to manipulate firms' performance. In a further analysis, I find that the levels of industry competition and institutional ownership exert a strong positive (resp. negative) influence on managers' motivation to manage earnings.

In chapter 3, I utilize the 2018 regulatory reforms as a quasi-natural experiment and investigate the effect of tightened regulations on firm value as well as the mechanism through which the new pledging regulation affects value. My findings show that tighter regulatory requirements, such as the cap in share pledge ratio, restricting

the usage of pledged funds, banning small-value pledges, and prohibiting share pledges involved in performance commitments, can effectively reduce firms' crash risk, relax financial constraints, reduce bankruptcy risk, and mitigate controlling shareholder expropriation of minority shareholders wealth via tunnelling. These effects significantly alleviate the destructive effect of controlling shareholders' activities on firm and increase firm value. I also demonstrate that these regulatory reforms relax firm's financial constraints, as well as drive controlling shareholders flow to more pledged funds back to listed firms, which in turn, foster firm capital investment and R&D expenditure, benefit firm growth and competitiveness and ultimately increase firm long-term value.

Chapter 1

Equity Incentive Schemes, Investor Protection and Corporate Performance Evidence from China

Abstract

We explore the impact of equity incentives and regional investor protection on corporate payout policies and corporate performance. Despite the fact that some managers appear to abuse equity incentives by increasing dividend payouts, we provide evidence suggesting that regional investor protection can potentially restrain such behavior. In all likelihood, the restraining effect depends on the firms' growth opportunities, on the basis of which the effect on cash (stock) dividends is found to be weaker (stronger) in high-growth firms – whose ability to pay cash dividends is limited by their appetite for cash for expansion – and stronger (weaker) in low-growth firms with a lower cash appetite. Further evidence indicates that the restraining effect of regional investor protection on selfish dividend-related behavior encouraged by equity incentives may also prove valuable in encouraging adoption of these incentives so as to enhance corporate performance.

Keywords: Equity Incentive; Payouts; Investor Protection; Corporate Performance

1.1 Introduction

Equity incentives can alleviate agency problems but also provide managers with a channel to promote their own self-interest, without benefiting shareholders, by increasing payouts (Lambert et al. 1989; Jolls 1998; Bartov et al. 1998; Weisbenner 1998; Fenn & Liang 2001; Kahle 2002). The links between equity incentives and “high sending and transferring chaos”¹ in firms' dividend distributions are well documented

¹ “High sending and transferring chaos” refer to a large proportion of listed firms awarding bonus shares or a large proportion of capital reserve funds to increase stocks, such as 10 shares for every

in the existing literature (see, for instance, Lv et al. 2012; Xiao et al. 2012; Li et al. 2014; Chen & Guo 2017. In this context, the quality of investor protection and corporate governance are also positively related to both corporate dividends and corporate performance (La Porta et al. (hereafter LLSV) 2000; Kalcheva & Lins 2007; Jiraporn et al. 2011). While both equity incentives and investor protection can reduce agency costs, the mechanism through which this is manifested is totally different in each case. In the existing literature, the joint effect between equity incentives and investor protection on firm payouts and performance – especially in the same country, but different regions and under different investor protection levels – is totally ignored. However, although all provinces in China are formally required to implement nationally promulgated laws and regulations, in practice, the local governments have options to consider these legal provisions more efficiently and effectively or not. This may affect the local economy development. For example, Guangdong ranks first of GDP and has the largest quantity of listed firms; however, its neighbor province, Guangxi, has a significantly less developed economy and fewer listed firms. There are some convincing explanations for the large economic gap; for example, Guangdong Province has adopted more open policies and attracted more global investors to set up enterprises in their region. However, few studies investigate this issue from the perspective of regional investor protection differences. In view of the lacuna in the existing literature, this paper therefore aims to examine the interaction effects between equity incentives and regional investor protection on corporate payout policy and corporate performance.

Consistent with previous research including Wang et al. (2008), Shen et al. (2009) and Tang & Chen (2010), we utilize an indicator from Fan et al. (2015) *China*

10 shares or even 30 shares for every 10 shares. The “high sending and transferring” program in the Chinese stock market causes the CSRC to pay close attention. This is because those firms have no actual performance support, and are simply using the program to transfer benefits. For example, insiders, such as executives, are the decision-makers who decide whether the firm performs “high sending and transferring”. They have the right to draw the “high sending and transferring” plan, and they can use their information advantages to formulate the company’s “high sending and transferring” policy for their own stock exercise. Therefore, if there is a correlation between the stock reduction of executives and the firm’s “high sending and transferring” policy, it is likely that executives consciously use the irrational investment behavior of investors to achieve self-interest purposes.

Marketization Index. This marketization index consists of five sub-indicators, out of which we focus on the fifth, that we believe is closely related to the degree of protection given to investors in various regions, and to the variables incorporated in this study. We envisage the following channels being captured by this index: the more developed are intermediaries in a region, the higher the efficiency of law enforcement; and the better the legal environment, the more likely, timely and severe will be the punishment imposed by the local authorities for illegal behavior. Firms fearing punishment should therefore be more strongly deterred from harming minority shareholders' interests, and thus behave more consistently with those interests, where the legal environment is well developed.

Our estimates show that, while managers of some firms that have adopted equity incentives can abuse them by selfishly increasing dividend payouts, regional investor protection can restrain such behavior. Additional analysis suggests that this restraining effect depends crucially on firms' growth opportunities. That is, the effect on cash (stock) dividends is weaker (stronger) in high-growth firms – whose ability to pay cash dividends is limited by their appetite for cash for expansion – and stronger (weaker) in low-growth firms with lower cash appetites. Further evidence indicates that the restraining effect of regional investor protection on selfish dividend-related behavior encouraged by equity incentives may also prove valuable in encouraging the exploitation of these incentives to enhance corporate performance. Our paper contributes to the existing literature that touches on the equity incentive effect on firm payout policy by exploring the role of investor protection, and the effect that this might have on corporate payouts and corporate performance.

This study focuses on the Chinese market for three main reasons. First, China is one of the largest emerging economies in the world, and a place where firms expand at a prodigious rate, reaching unprecedented levels of performance. The success of the Chinese economy acts as a magnet for international inflows of capital, thus raising expectations for future returns. Given the idiosyncratic nature of the Chinese stock market, it is also intended that this study will inform potential global investors of the inherent functional aspects of the stock market.

Second, according to the World Bank's *Doing Business Database*², China's investor protection is weak. Investor protection, however, varies regionally across the 31 provinces of mainland China. China Securities Investor Protection Fund Corporation's (SIPF's)³ *2010-2017 Investor Protection Report for Listed Firms in China* indicates that different levels of investor protection are significantly higher in economically developed southeast coastal areas like Guangdong, Zhejiang, and Beijing than in less developed western regions, such as Gansu and Tibet, which ranked the lowest. In China, although all provinces are formally required to implement nationally promulgated laws and regulations, in practice the enforcement and effect of these legal provisions differs from region to region, depending on regional legal environments. Thus, regional levels of investor protection also differ. This paper therefore seeks to take advantage of the great disparity in regional levels of investor protection across China, by examining whether this has different impacts on corporate payout policies and performance than the country-level investor protection and firm-level corporate governance factors, which have already been studied in the existing literature.

Thirdly, given that other emerging economies share the same characteristics as China, like Vietnam, Philippines and Brazil, this study can provide a blueprint on how taking effective measures to strengthen the regional investor protection level can also promote the development of the local economy. In countries where investor protection is weak overall, policies designed to improve regional investor protection that improving the efficiency of legal systems should remain a priority item on regional policy makers' agendas. Because improving regional levels of investor protection would be more feasible and effective than reforming the legal mechanisms at a country level.

This paper makes three main contributions. First, we study the association of the interaction between equity incentives and regional investor protection with corporate dividends and performance, whereas previous research has mostly studied the impact

² <https://datacatalog.worldbank.org/dataset/doing-business>.

³ <http://www.sipf.com.cn/dcpj/tbzkpj/>.

of these items on dividends and performance separately. We find that regional investor protection has a restraining effect on self-interested managerial behavior encouraged by equity incentives *vis a vis* dividend policy, and on performance. This study thus enriches the extant literature. Second, we use a regional index of investor protection to study the impact this factor has on corporate dividends and performance, in contrast with most previous studies, which have examined these issues at country or individual firm levels. Our index is also different from those adopted in most of the earlier research. LLSV's (2000) "Anti-director-rights index" and Djankov et al. (2008) "Anti-self-dealing index" mainly reflect the protection of investors in terms of the voting rights of majority investors or boards of directors, subscription rights of preferred shares, legal levels of compensation, and private legal enforcement mechanisms. By contrast, the regional investor protection index mainly reflects protection for investors stemming from the legal system/environment prevailing in their region. The use of a regional-level investor protection index in this paper therefore fills a gap by coming in between the country- and firm-level indicators typically used in previous research, thus providing a new perspective on investor protection issues. Third, this paper has important policy implications, since reforming investor protection laws and improving judicial quality is difficult and lengthy at a country level. Improving regional levels of investor protection, however, seems more feasible and effective. Through measures encouraging the development of intermediaries, increases in the number of lawyers, improvements in the efficiency of law enforcement and so on – all of which seem likely to constrain behavior harmful to the interests of investors – the provincial administrations can reasonably expect to contribute towards improvements in the performance of firms and the development of the economy in their region. We hope this paper provides encouragement to regional policy makers, in this regard, in China and in other developing countries where investor protection is weak overall.

The remainder of the paper is organized as follows: Section 2 reviews the relevant literature and section 3 touches on the development of the research questions. Section 4 elaborates on the empirical framework of analysis whilst section 5 presents and discusses the results. Finally, section 6 provides some concluding remarks.

1.2 Brief literature review

1.2.1 Equity incentives, payouts and corporate performance

In the extant literature, there is ample evidence to suggest that there is a relationship between equity incentives and payouts, with many studies establishing a strong negative (positive) influence of executive stock options on dividends (repurchases) in US firms (Lambert et al. 1989; Jolls 1998; Bartov et al. 1998; Weisbenner 1998; Fenn & Liang 2001; Kahle 2002). In Europe, however, dividend protection of stock options is common. Liljeblom & Pasternack (2006), De Cesari & Ozkan (2014) and Burns et al. (2015) find that firms with executive stock options, in countries where these are dividend protected, tend to pay higher – not lower – dividends, and managers' total compensation is insignificantly associated with repurchases. In China, where options are dividend protected, evidence indicates that equity incentive schemes have a *positive* impact on dividend payouts (Lv et al. 2012; Xiao & Yu 2012 ; Chen & Guo 2017).

Equity incentives have restricted stock and stock options in two main ways. Aboody & Kasnik (2008) find that equity incentives in the forms of restricted stock and stock options may have different effects on payout policy. They argue that individual income tax plays a more important role for dividend-protected restricted stock, with managers being interested in improving the dividend payment rate and offering more choices of restricted stock. In China, share repurchases is not a common practice. Executives holding stock options rather than restricted shares do not directly receive cash dividends on them. In contrast, with restricted stock, cash dividends are paid directly to executives, increasing their cash assets. Furthermore, China's income tax rate on cash dividends is much lower than that on gains resulting from the exercise of stock options. Therefore, other things being equal, the use of restricted stock can significantly increase firms' levels of cash dividend distribution relative to stock options.

Executives can leverage the market's "price illusion" to gain further benefits from stock dividends or splits. McNichols & Dravid (1990), Ikenberry et al. (1996) and Desai

& Jain (1997) find that, in US stock markets, stock dividends and stock splits can bring about long-run abnormal excess returns.

On the issue of whether equity incentives affect corporate performance, Morgan & Poulsen (2001) indicate that the returns on assets of firms introducing equity incentives increase after one year, whilst Core & Larcker (2002) and Kato et al. (2005) suggest that firms' operating performance and dividend yields increase significantly after the adoption of equity incentive plans.

1.2.2 Investor protection, payouts and corporate performance

LLSV (2000) find that stronger investor protection has a positive influence on dividend payouts at a country level. In the same spirit, Kalcheva & Lins (2007) and Jiraporn et al. (2011) provide evidence suggesting that the quality of investor protection has a significant impact on dividend policy at the individual firm level. Klapper & Love (2002) find that firm-level corporate governance matters more in countries where shareholder protection is weak and judicial efficiency is poor.

When considering growth opportunities, LLSV (1997) find that, where investor protection is weak, investors are less willing to provide financing. This may pose a problem for high-growth firms in such regions, and firms with high-growth potential, which are more likely to need external funds, may pay higher dividends to maintain a favorable reputation (Durnev & Kim, 2005). Finally, Lombardo & Pagano, (2000); La Porta et al. (1999); Daines, (2001) found that firms' performance is related to their legal environment at international, country and state levels.

1.3 Research question development

1.3.1 Equity incentives, regional investor protection and payouts

The Measures for the Administration of Equity Incentive Plans of Listed Firms issued on 31 December, 2005, symbolizes the actual start of the equity incentive plan in Chinese firms. Lv et al. (2012), Xiao et al. (2012), Li et al. (2014), and Chen and Guo (2017) investigated the impact of the implementation of the equity incentive in Chinese listed firms and suggested that managers purposefully use a high dividend and

reserve transfer to lower the exercise price and increase the benefits from their equity incentive plan.

Benefits from equity incentives should be the difference between the selling price of the underlying stocks after the exercise of managers and exercise price. The original design intention of the equity incentive plan is to align the interests of managers with those of the shareholders. Managers work hard to improve the stock price, which will make both shareholders and managers benefit simultaneously. However, the change of the stock price does not solely depend on the efforts of managers owing to the incomplete corporate governance with the information asymmetry and imperfect market.

The capital market of China is weak and ineffective, and the efforts of managers will not always be reflected on the increase of the stock price. The long-term interests are not apparent; however, the short-term interests are considerably obvious: the cash and stock dividends and reserve transfer can satisfy the immediate interests of managers, thus, reducing the exercise price of stock options as much as possible. Conversely, the stock dividend and reserve transfer have the characteristic of excess returns, which will effectively stimulate the stock price, such that managers maximize the benefits from the stock options.

High-growth firms will reduce cash dividends to support their development. Stock dividend and stock split behavior convey information regarding the optimism of firms' management— it is argued that the long-run positive excess returns for Chinese firms announcing stock dividends, confirm that stock dividends serve as a positive signal regarding firms' prospects. The greater investors' preference for low unit stock prices, the more managers can increase their firms' market capitalization via stock dividends or splits (Baker et al. 2009). High-growth firms thus face incentives to increase stock dividends, leveraging "price illusion" to boost market capitalization and managers' compensation, while low-growth firms do not face such strong incentives.

In China, options are dividend protected. When Chinese firms distribute cash dividends, the exercise prices of their stock options are adjusted according to the following formula:

$$P = P_0 - V$$

where P_0 is the option exercise price before adjustment, P is the exercise price after adjustment, and V is the cash dividend per share. Thus, the distribution of dividends does not reduce the value of protected options, and Chinese firms' executives owning dividend-protected options face different incentives regarding profit distribution schemes than do the executives of firms in the US.

Agency theory suggests that those who control firms take into account their own interests, as well as those of their principals. Investor protection is therefore necessary to protect investors from expropriation by firm insiders. Empirical research indicates that, where firms provide equity incentives as part of executive compensation packages, executives can maximize their own benefits through manipulation of payout policies (Lv et al. 2012; Xiao & Yu 2012; Chen & Guo 2017). Where legislation exists to protect minority shareholders, its deterrent effect is dependent on both the efficiency of its enforcement and the severity of its penalties. In regions with strong investor protection, firms' executives may be effectively deterred by minority shareholder protection legislation; their self-interested use of payout policies may therefore be somewhat restricted. Thus, we might expect firms with equity incentive schemes, from regions with strong investor protection, to have relatively lower dividend payouts. This forms the basis of **Hypothesis 1**:

Regional investor protection has a restricting effect on managers' tendency to raise payouts in the form of cash dividends and buybacks. The stronger the investor protection in a region, the lower the propensity for firms offering equity incentives to make payouts.

1.3.2 Equity incentives, regional investor protection and growth opportunities

When we take into account the growth opportunities of firms, will this restrictive effect of investor protection lead to differentiation in dividend payout policies? Will the effects on cash and stock dividends be the same? High-growth firms will reduce cash dividends to support their development. Therefore, we suggest that the restrictive effect of investor protection on cash dividends will be weaker in high-growth firms than in

low-growth firms. This is **Hypothesis 2a**:

The restricting effect of investor protection on payouts will differ depending upon firms' growth potential, decreasing where growth potential is stronger, and increasing where growth potential is weaker.

Because stock dividend and stock split behavior convey information regarding the optimism of firms' management – i.e. they are more likely when rapid earnings growth and stock price increases are expected – it is argued that the long-run positive excess returns for Chinese firms announcing stock dividends, confirm that stock dividends serve as a positive signal regarding firms' prospects. The greater investors' preference for low unit stock prices, the more managers can increase their firms' market capitalization via stock dividends or splits (Baker et al. 2009). High-growth firms thus face incentives to increase stock dividends, leveraging "price illusion" to boost market capitalization and managers' compensation, while low-growth firms do not face such strong incentives. Therefore, the restricting effect should be stronger for high-growth firms, and weaker for low-growth firms, our **Hypothesis 2b**:

The restricting effect of strong investor protection on stock dividends is stronger under higher levels of growth potential, and weaker under lower levels of growth potential.

1.3.3 Stock options, restricted stock and regional investor protection

In China, although stock options are dividend protected, and dividends are thus reflected in the exercise prices of stock option incentives, executives holding stock options rather than restricted shares do not directly receive cash dividends on them. By contrast, with restricted stock, cash dividends are paid directly to executives, increasing their cash assets. In addition, China's income tax rate on cash dividends is far lower than that on gains resulting from the exercise of stock options. So, other things being equal, the use of restricted stock can significantly increase firms' levels of cash dividend distribution relative to stock options. However, if the level of regional investor protection has a restricting effect on managers' self-interested tendency to increase

dividends, this might mitigate the differences between firms' cash dividend payout policies in situations where restricted stock equity incentives are in place and those where stock option equity incentives are in place.

The index of regional investor protection we adopt is based on the quantity of legal intermediary organizations, and the quality of the legal environment, in different Chinese provinces. In any given region, more developed intermediary organizations, more efficient law enforcement, and a better legal environment can all act as factors deterring firms from harming the interests of shareholders. We therefore speculate that the restricting effect of investor protection via deterrence may moderate the magnitude of the effect that different forms of equity incentives – stock options versus restricted stock – have upon cash dividends. Thus, we propose research **Hypothesis 3**:

Use of restricted stock equity incentives results in higher cash dividend payout ratios relative to the use of stock options. This difference does not exist in the case of stock dividends, and where it exists it is moderated by the restricting effects of strong regional investor protection.

1.3.4 Equity incentives, regional investor protection and corporate performance

An abundance of studies has investigated the effects of managerial stock ownership on firm performance. Research suggests that executive equity incentives improve firm performance.

Most of the existing literature has used firm-level corporate governance data to examine the relationship between investor protection and firm performance (Gompers et al. 2003; Klapper & Love, 2002). We therefore speculate that the regional-level quality of investor protection may have an impact on corporate performance, similar to those of the country-level quality of investor protection and corporate governance at the individual firm level. By restricting self-interested dividend-payout-related behavior among managers, higher levels of regional investor protection may permit fuller exploitation of the synergy effects of equity incentives to motivate managers to work more effectively and improve corporate performance. Therefore, we propose research **Hypothesis 4**:

Regional investor protection may improve corporate performance via its restricting effects on self-interested behavior resulting from the use of equity incentives.

1.4 Empirical investigation

We obtained data on firms' equity incentives, payouts, cash/stock dividend dates and stock prices from CSMAR, a leading business data and information service company. We also collected most of the required firm characteristics from CSMAR, except for the institutional investor shareholding ratio, which we downloaded from the WIND database, excluding observations with invalid data. To build the additional variables, we complemented this dataset with market and accounting data from the Shanghai and Shenzhen Stock Exchange websites.

We collated data for the regional investor protection index (IPI) from the China Marketization Index Report. We imputed values for years with missing data (2013, 2016 and 2017) by means of linear interpolation or a linear trend extrapolation. We determined the number of lawyers in each province in China, by hand, from the *Chinese Yearbook of Lawyers*⁴ (2006-2017).

In order to deal with possible endogeneity in terms of the impact of equity incentives on payout policies and corporate performance, we use only the lagged values of the independent variable. Consistent with previous studies, we also exclude firms from the financial services and utilities sectors, since regulatory rules and restrictions can influence the payout policies of firms in those industries. We winsorize all payout and control variables at the 1st and 99th percentiles. Our final sample consists of an unbalanced panel, with 2776 firms and 24724 firm-year observations.

1.4.1 Variables

The dependent variables reflect cash dividends, stock dividends and corporate performance. Our primary measures of firm payouts are the cash dividend to assets ratio, and the stock dividend to asset ratio. For robustness, we also use an additional proxy

⁴ Data may be downloaded from: <http://www.tjcn.org/tjnj/III/>

i.e. dividend yield (payout ratio) which is dividend scaled by stock price (earnings). Follow prior literatures, we measure corporate performance using profitability: firms' EBITDA to assets ratios (or return on assets - ROA); Tobin's Q: the market capitalization of the firm's stock plus debt, divided by total assets. We define equity incentives as a dummy variable, assigning one for firms using equity incentive schemes, and zero otherwise. We similarly encode stock options as a dummy variable: one for a stock option scheme, and zero otherwise.

For the regional IPI, we adopt the fifth component of the China Marketization Index, which is designed to capture the "development of market intermediaries and the legal system/environment". Yu & Pan (2008) and Pan et al. (2009) find that the ratio of the number of lawyers to the local population reflects the efficiency of law enforcement in different regions. We also used (the logarithm of) the number of lawyers in each province each year as a substitute IPI, to check the robustness of our regressions to the measure of investor protection, which is critical to our main hypotheses.

Given that, in the extant empirical literature, there is a relationship between payouts and a variety of firm characteristics, we include as independent control variables in our regression equations, firm size, profitability, growth opportunities, cash holdings, leverage, risk, firm age, retained earnings, and institutional ownership. Fama & French (2001) find that firm size, as measured by the logarithm of assets, is positively related to payout. We thus include a measure of firm size, the logarithm of assets (Log Assets), in our regression equations. Firms with higher profitability tend to have more free cash flow available to finance payouts (Aboody & Kasnik 2008). We thus include a measure of profitability, ROA, as defined above. We also include a proxy for growth opportunities, Tobin's Q, as defined above. It seems likely that cash holdings may also have an important influence on payout policy. We thus include the ratio of cash holdings to total assets (Cash Ratio). Since Jensen (1986) contends that higher debt reduces free cash flows, reducing the cash available to be paid out to shareholders, we include the Debt Ratio (total debt divided by assets). Kahle (2002) suggests that riskier firms tend to avoid paying large dividends, preferring instead to use repurchases as a way of returning free cash flow to investors. In view of the latter, we incorporate a measure of

risk, the standard deviation of monthly returns over the fiscal year (SD Return). In view of DeAngelo et al.(2006) findings i.e. that firm’s life cycle may affect its payouts, we also add age of firm (Age) and Retained Earnings as control variables. Institutional ownership has also been shown to be positively related to payout policy, for two possible reasons, according to Short et al. (2002): First, institutions may demand high levels of dividends to force firms to seek external funding and hence subject themselves to more rigorous external monitoring. Second, institutional shareholders may counter management’s tendency to retain excess free cash flow. We thus include the percentage of institutional ownership (Inst % Owned) as an independent variable.

Table 1 contains a summary of the definitions of payout, corporate performance, regional investor protection and the control variables used in our empirical analysis.

[INSERT TABLE 1 AROUND HERE]

1.4.2 Descriptive statistics

Table 2 lists the number of firms in each province by year.

[INSERT TABLE 2 AROUND HERE]

Following Guariglia & Yang (2016), we divide the 31 provinces into three regions: coastal, central and western. The eastern coastal provinces include Guangdong, Jiangsu, Shandong, Zhejiang, Hebei, Hainan, Fujian, Liaoning, Beijing, Shanghai, and Tianjin, the most economically developed provinces in China, which together account for over 66.9% of all the listed firms in the dataset at the end of 2017. The central region includes Jilin, Anhui, Shanxi, Jiangxi, Henan, Hubei, Hunan, Heilongjiang, and Chongqing, accounting for 18.1% of the listed firms. The western region includes Yunnan, Inner Mongolia, Sichuan, Ningxia, Guangxi, Xinjiang, Gansu, Tibet, Guizhou, Shaanxi, and Qinghai, accounting for the final 15% of the listed firms.

[INSERT FIGURE 1 AROUND HERE]

Figure 1 shows the distribution of the regional IPI, which we classify into four categories: $IPI \geq 10$ is defined as strong, $10 > IPI \geq 6$ as relatively strong, $6 > IPI \geq 3$ as general, and $IPI < 3$ as weak investor protection. In terms of distribution, Shanghai, Zhejiang, Jiangsu and Beijing are the areas with strong investor protection; Guangdong, Fujian, Anhui, Shandong, Sichuan, and Chongqing those with relatively strong investor protection; Guangxi, Yunnan, Hunan, Hubei, Jiangxi, Henan, Hebei, Shanxi, Shaanxi, Tianjin, Liaoning, Jilin, and Heilongjiang those with general investor protection; and finally, Guizhou, Inner Mongolia, Gansu, Ningxia, Tibet, Xinjiang, Qinghai, and Hainan those with weak investor protection.

[INSERT TABLE 3 AROUND HERE]

Table 3 reports summary statistics for variables used in our estimates. Panel A focuses on the payout and incentive variables of the entire dataset, giving the number of observations, mean, median, and standard deviation. Average cash and stock dividend payouts are 1.06% and 0.34% of assets respectively. The mean value for Payout ratio is 1% on stock price. 13.1% of firms in our sample used equity incentive schemes of any form between 2006 and 2017. Panel B reports these statistics for the subset of firms that used equity incentive schemes, for which options and restricted stock represent 1.26% and 0.59% of total assets on average, while payout ratio is 0.9% on average. In this equity incentive subsample, 41.9% of firms used stock options, while 58.1% used restricted stock.

[INSERT TABLE 4 AROUND HERE]

Table 4 provides summary statistics for the firm characteristics. In our full sample, the mean Cash Ratio is 18.9% of assets, mean Log Assets are 21.89 RMB, and the mean Debt Ratio is 45.3%. The mean values for Tobin's Q and ROA are 2.56% and 3.7%, respectively. The average institutional ownership of firms in our sample is 33.5%. The average age of firm is 10.28 years old. The mean values for retained earning is 0.11.

In our equity incentives subsample, the mean Cash Ratio is 20% of assets, slightly higher than that for the complete sample. The mean values of Tobin's Q and ROA are also higher than in the complete sample, by 0.57 and 1.7 percentage points, respectively. The mean Debt Ratio is 39%, 6.3 percentage points lower than in the complete dataset. Average institutional ownership of firms in the equity incentives subsample is 32.1%, 1.4 percentage points lower than in the complete dataset. Average age of firm is 8.05 and 2.23 year shorter than in the complete sample. The mean values for retained earnings is 0.197 and 8.7 percentage points higher than in the complete sample.

[INSERT FIGURE 2 AROUND HERE]

Figure 2 illustrates trends in the firms' adoption of stock option and restricted stock incentive schemes over 2006-2017. In 2010, nearly 70% of equity incentives were in the form of stock options, with the balance gradually shifting to restricted stock, which became prevalent by around 2014. By 2017, restricted stock was dominant, accounting for over 70% of equity incentives, while less than 30% of firms were using stock options.

1.5 Empirical results

We examine the relationship between incentives and regional investor protection in influencing payouts and corporate performance, in a framework controlling for firm-specific effects and regional measures. In all specifications, we report a White heteroskedastic-consistent estimator, adjusted for clustering at the firm level (Andrews 1991; Zeileis 2004), and include year, industry, firm and region fixed effects. Clustering standard errors by firm and including year fixed effects minimizes bias in standard errors due to firm and time effects (Petersen 2009). We use the following ordinary least squares (OLS) regression model:

$$\begin{aligned} \text{Payout}_{i,t+1} = & \beta_0 + \beta_1 \text{Incentive}_{i,t} + \beta_2 \text{IPI}_t + \beta_3 \text{Incentive}_{i,t} \times \text{IPI}_t \\ & + \beta_{4-14} \text{Firm Characteristics}_{i,t} + \text{year}_i + \alpha_t + \varepsilon_{i,t} \end{aligned} \tag{1}$$

Here, subscripts i and t index firm and year respectively. Our payout measure is either cash or stock dividends (divided by the total book value of assets). Our equity incentive measure (Incentive) is equity incentives or its separate components – options and restricted stock, once again divided by total assets – in the year prior to the payout. Our regional IPI measure is a score representing market intermediaries and the legal environment in each region. Firm characteristics include Log Assets, Debt Ratio, Cash Ratio, ROA, Tobin’s Q, Inst % Owned, and SD Return, Age, Retained earnings, each measured in the year prior to the payout.

1.5.1 Evidence of interaction between equity incentives’ and regional investor protection’s effects on payouts

In order to examine interactions between the effects of equity incentives and regional investor protection upon firms’ cash or stock dividend payouts, we run the following regressions:

$$\begin{aligned} \text{Cash}_{it+1} = & \beta_0 + \beta_1 \text{Incentive}_{it} + \beta_2 \text{IPI}_t + \beta_3 \text{Incentive}_{it} \times \text{IPI}_t \\ & + \beta_{4-14} \text{Firm Characteristics}_{it} + \text{year}_i + \alpha_t + \varepsilon_{it} \end{aligned} \tag{2}$$

$$\begin{aligned} \text{Stock}_{it+1} = & \beta_0 + \beta_1 \text{Incentive}_{it} + \beta_2 \text{IPI}_t + \beta_3 \text{Incentive}_{it} \times \text{IPI}_t \\ & + \beta_{4-14} \text{Firm Characteristics}_{it} + \text{year}_i + \alpha_t + \varepsilon_{it} \end{aligned} \tag{3}$$

Here, all variables are defined as in Table 1.

[INSERT TABLE 5 AROUND HERE]

Table 5 presents the results of these regressions. Columns (1)-(3) estimate the probability that firms pay cash dividends, with cash dividend payouts as the dependent variable. Each model includes equity incentives as the independent variable of primary interest, and investor protection as a further explanatory variable. In column (1), we control for region, industry and year effects, yielding a coefficient on Incentive of 0.083, with a p-value significant at the 1% level, indicating that equity incentives tend to increase the proportion of firms paying cash dividends, consistent with previous

findings in the classic literature. In column (2), controlling only for firm and year effects, the coefficient on Incentive is 0.264, significant at the 1% level. Meanwhile, the coefficient on regional IPI is 0.003, not significant. The coefficient on the interaction between equity incentives and regional investor protection (EI*IPI), although smaller at -0.024, is significant at the 1% level. In column (3), with fixed effects for region, industry and year once again, the coefficients on Incentive and IPI are 0.074 and 0.005, respectively, both insignificant, suggesting that these variables have less impact on the cash dividend policy after controlling for region. Meanwhile, however, the coefficient on the interaction between equity incentives and regional investor protection (Incentive*IPI) is -0.016, significant at the 5% level. This implies a 5.6% decrease in the cash-dividend-paying proportion of firms for every 1% increase in regional investor protection where firms have adopted equity incentives. Columns (4) through (6) repeat these regressions, but use stock dividends as the dependent variable. In column (6), the coefficient on Incentive is 0.186, significant at the 1% level. The coefficient on IPI is far smaller, at 0.002, and not significant. However, the interaction coefficient between equity incentives and regional investor protection (Incentive*IPI) is far larger (-0.013) and significant at the 5% level: where firms have adopted equity incentives, a 1% increase in regional investor protection is associated with a 14.1% decrease in the stock-dividend-paying proportion of firms. We thus conclude that strengthened regional investor protection reduces the proportion of both cash and stock dividend payouts: in terms of both statistical and economic significance, regional investor protection restrains the self-interested motivation – created by equity incentives – for management to set high levels of dividend payouts. Further, the higher the degree of regional investor protection, the larger the magnitude of this restraining effect. This is consistent with Hypothesis 1.

Our results are thus consistent with previous evidence that equity incentives have positive effects on cash and stock dividends (repurchases) if they are dividend protected (Liljebloom & Pasternack 2006; De Cesari & Ozkan 2014; Burns et al. 2015; Xiao & Yu 2012; Chen & Guo 2017). However, the fact that higher levels of regional investor protection are not associated with higher dividend payouts in our framework suggests

that the regional IPI we have used is inconsistent with the country-level index adopted by LLSV (2000), and the individual firm-level indices used by Kalcheva & Lins (2007) and Jiraporn et al. (2011). This might be due to the fact that the regional IPI reflects the efficiency of law enforcement and the law enforcement environment, and thus mainly reduces firms' behavior inimical to the interests of minority shareholders through a deterrence effect.

With respect to the control variables, our results show more profitable firms are more likely to pay cash and stock dividends, a result consistent with Aboody & Kasnik (2008). Those with higher leverage are less likely to pay cash dividends, and pay smaller stock dividends, consistent with Kahle (2002). Firms with greater risk tend to pay lower cash dividends but risk has a significantly positive impact on stock dividends, consistent with Kahle's (2002) conclusion that riskier firms tend to favor repurchases over cash dividends as a way of paying out free cash flow to investors. In our results, larger firms are less likely pay cash and stock dividends, a finding inconsistent with both Fama & French (2001) and Burns et al. (2015). This may stem from differences between capital market participants in China and those in more advanced economies, like the US and OECD countries; further research will be necessary for a deeper understanding of this point. Columns (1)-(6) all show a significantly positive relationship between cash holdings and the likelihood of dividend payouts. This is consistent with Jensen (1986), but inconsistent with Opler et al. (1999), Almeida et al. (2004) and Boyle & Guthrie (2003), who all argue that, possibly due to precautionary demands, firms with a greater need to hold cash balances are less likely to pay out dividends. Institutional ownership is associated with an increase in the likelihood of a firm paying both cash and stock dividends, consistent with Short et al. (2002). Our results show retained earnings is significant and positively correlated to both cash and stock dividends, while firm age has a negative impact on the propensity of payouts, which is consistent with DeAngelo et al.(2006).

1.5.2 Dividends, regional investor protection and growth opportunities

To explore whether the joint effects of equity incentives and regional investor

protection on payouts are altered in the presence of growth opportunities, we run the following regression:

$$\begin{aligned}
 Dividend_{it+1} = & \beta_0 + \beta_1 Incentive_{it} + \beta_2 High\ Q_t + \beta_3 IPI_t + \beta_4 Incentive_{it} \times High\ Q_t + \\
 & \beta_5 IPI_t \times High\ Q_t + \beta_6 Incentive_{it} \times IPI_t + \beta_7 Incentive_{it} \times High\ Q_t \times IPI_t + \\
 & \beta_{8-14} Firm\ Characteristics_{it} + year_i + \alpha_t + \varepsilon_{it} \quad (4)
 \end{aligned}$$

Here, dividends are either cash or stock dividends, scaled by assets. The High Q includes firms with Tobin's Q scores above the average level, based on year and province; Low Q includes those with scores below the average. Equity incentives (Incentive), regional investor protection (IPI) and the control variables (Firm Characteristics) are as defined in Table 1. The results are shown in Table 6.

[INSERT TABLE 6 AROUND HERE]

Table 6 Panel A presents the results of regressions in which cash dividends are the dependent variable. Columns (1) and (2) give the results for the subsample of low-growth firms, columns (3) and (4) those for the high-growth firms. In column (1), firm and year are treated as fixed effects; region, industry and year are treated as fixed effects in column (2). The results show that the coefficient for equity incentives (Incentive) is significant at the 5% level, regional investor protection (IPI) is not significant, the coefficient on their interaction (Incentive*IPI) is significant at the 1% level in the low-growth subsample. However, these coefficients are not significant in the high-growth subsample, suggesting that, when faced with growth opportunities, managers' interests are best served by limiting cash dividend payouts and retaining cash to fund firms' development – an observation novel to the existing literature. Columns (1) and (2) show that equity incentives and regional investor protection (Incentive*IPI) jointly have a very significant negative correlation with cash dividends at low growth levels, while there is no significant correlation in the high-growth subsample. This suggests that low-growth firms' managers have a tendency to pay out high cash dividends, but that regional investor protection has a strong restricting effect on this self-interested

behavior. The interaction coefficient implies that, for every percentage point increase in the regional IPI, the cash dividend payout proportion decreases by 2.4%, supporting Hypothesis 2A.

Table 6 Panel B presents the results of regressions in which stock dividends are the dependent variable. Based on these, the independent variables' effects on stock and cash dividends are complete opposites. Equity incentives (Incentive) and regional investor protection (IPI) are significant in the high-growth subsample, at the 1% and 5% levels respectively, their interaction with regional investor protection (Incentive*IPI) is negative correlation significant at the 10% level. A one percentage point increase in regional investor protection is associated with a 1.4% reduction in stock dividends. This result suggests that managers in firms with good growth opportunities are more inclined to increase stock dividends. There are several possible explanations for this: managers may be using stock dividends as a mechanism for signaling positive information to the capital market, which then has further beneficial effects on their firms' ability to raise external funds. Alternatively, they may be using "price illusion" to maximize market capitalization (and thus their own interests). The results indicate that regional investor protection can constrain this behavior, supporting Hypothesis 2B.

When we take growth opportunities into account, the restraining effects of regional investor protection on managers' self-interested use of equity incentives is polarized, and depends on the form of dividend distribution. For cash dividends, this restraint decreases (increases) as firm growth potential increases (decreases). For stock dividends, the restraining effect increases (decreases) with increasing (decreasing) firm growth potential.

1.5.3 Stock options, restricted stock and regional investor protection

We run regressions including payout measures for firms using stock options and restricted stock, to examine the differential effects of these two forms of equity incentives on dividend payouts under different levels of regional investor protection:

$$\begin{aligned}
\text{Cashdividends}_{it+1} &= \beta_0 + \beta_1 \text{option}_t + \beta_3 \text{IPI}_t + \beta_3 \text{option}_t \times \text{IPI}_t \\
&\quad + \beta_{5-14} \text{Firm Characteristics}_{it} + \text{year}_i + \alpha_t + \varepsilon_{it}
\end{aligned} \tag{5}$$

$$\begin{aligned}
&\text{Stockdividends}_{it+1} \\
&= \beta_0 + \beta_1 \text{option}_t + \beta_3 \text{IPI}_t + \beta_3 \text{option}_t \times \text{IPI}_t \\
&\quad + \beta_{5-14} \text{Firm Characteristics}_{it} + \text{year}_i + \alpha_t + \varepsilon_{it}
\end{aligned} \tag{6}$$

$$\begin{aligned}
\text{Cashdividends}_{it+1} &= \beta_0 + \beta_1 \text{restricted}_t + \beta_3 \text{IPI}_t + \beta_3 \text{restricted}_t \times \text{IPI}_t \\
&\quad + \beta_{5-14} \text{Firm Characteristics}_{it} + \text{year}_i + \alpha_t + \varepsilon_{it}
\end{aligned} \tag{7}$$

$$\begin{aligned}
\text{Stockdividends}_{it+1} &= \beta_0 + \beta_1 \text{restricted}_t + \beta_3 \text{IPI}_t + \beta_3 \text{restricted}_t \times \text{IPI}_t \\
&\quad + \beta_{5-14} \text{Firm Characteristics}_{it} + \text{year}_i + \alpha_t + \varepsilon_{it}
\end{aligned} \tag{8}$$

Here, cash dividends is cash distributions scaled by assets, stock dividends is stock dividends scaled by assets, and stock options is a dummy variable equal to one for stock option equity incentive schemes, and zero otherwise. The variable representing the level of regional investor protection (IPI), and other control variables, are as defined in Table 1.

[INSERT TABLE 7 AROUND HERE]

Table 7 shows the regression results. Columns (1)-(3) use cash dividends as the dependent variable. In columns (1) and (3), region, industry and year are treated as fixed effects, while in column (2) only firm and year are treated as fixed effects. In column (1), the regression coefficient for the stock options variable is -0.119, a negative correlation significant at the 10% level, indicating that the cash dividend ratio associated with stock options is lower than that for restricted stocks, consistent with Aboody & Kasnik (2008) and Chen & Guo (2017). Columns (2) and (3) show the interaction effects between stock options (option) and regional investor protection (IPI): for cash dividends, the regression coefficient for stock options is -0.435, once again negative, and here significant at the 5% level. The regression coefficient for IPI is 0.041

– not significant – but the coefficient on the interaction of the two (option*IPI) is 0.03, a positive correlation significant at the 10% level. Figure 1, above, showed that managers of Chinese firms are increasingly likely to use restricted stocks as equity incentives. The reason is obvious: the use of restricted stock, combined with payments of higher cash dividends, allows them to directly increase their own cash assets more quickly than the use of stock options. The degree of protection of regional investors also has a restraining effect on this self-interested behavior. Every percentage point increase in the regional investor protection index is associated with a reduction in the difference in cash dividends between firms using restricted stock and those using stock option equity incentives, of 3%. Columns (4)-(6) show the results when using stock dividends as the dependent variable. Here, the coefficients on stock options (option), regional investor protection (IPI), and their interaction (option*IPI) are not significant. Nor is there a significant difference between the effects of restricted stocks and stock options on stock dividends. We surmise that the main reason for this is that stock dividends do not immediately satisfy managers' interests and thus are not within the scope of their self-interested motivation.

Overall, the cash dividend ratio for firms using restricted stock equity incentives is higher than that for those using stock options – a tendency which regional investor protection can reduce – but this phenomenon is not significant with respect to stock dividend distributions. This result is therefore consistent with Hypothesis 3.

1.5.4 Equity incentives, regional investor protection and corporate performance

We use two variables as a proxy of firm performance. The first is a short-term accounting indicator—net profit to total assets (ROA); the second is a long-term market indicator—Tobin's Q (TOBINQ). Both proxies are related to firm pay-out policy in the control variables. In order to better understand the effects of interactions between equity incentives and regional investor protection on corporate performance, we run the following regressions:

$$ROA_{it+1} = \beta_0 + \beta_1 Incentive_{it} + \beta_2 IPI_t + \beta_3 Incentive_{it} \times IPI_t + \beta_{4-13} Firm\ Characteristics_{it} + year_i + \alpha_t + \epsilon_{it}$$

$$\begin{aligned}
\text{Tobin's } Q_{it+1} &= \beta_0 + \beta_1 \text{Incentive}_{it} + \beta_2 \text{IPI}_t + \beta_3 \text{Incentive}_{it} \times \text{IPI}_t & (9) \\
&+ \beta_{4-13} \text{Firm Characteristics}_{it} + \text{year}_i + \alpha_t + \varepsilon_{it} & (10)
\end{aligned}$$

Here, ROA, Tobin's Q, Incentives, IPI and other control variables are as defined in Table 1.

[INSERT TABLE 8 AROUND HERE]

Table 8 presents the results. In the first three columns, ROA is the dependent variable. In columns (1) and (3), we treat region, industry and year as fixed effects, while in column (2), we treat firm and year as fixed effects. In column (1), the coefficient for equity incentives (Incentive) is 0.011 – a positive correlation significant at the 1% level – suggesting that equity incentives tend to improve ROA, which is consistent with the classical literature. In column (3), taking the interaction effect into account, the coefficients of Incentive and IPI are 0.005 and 0.001 respectively, and not statistically significant, but the coefficient on the interaction of the two (Incentive*IPI) is 0.009, significant at the 10% level and positive. This indicates that regional investor protection can act in synergy with equity incentives, allowing them to play a positive role in improving firms' ROA. In columns (4)-(6), Q is the dependent variable. In column (4) the coefficient on Incentive is 0.470 – positive and significant at the 1% level. This suggests that equity incentives can promote corporate growth. This conclusion is consistent with the existing literature. In column (6), the coefficients on Incentive, IPI and their joint effect (Incentive*IPI) are 0.298, 0.023 and 0.017, respectively – positive correlations significant at the 1%, 1% and 10% levels respectively. This suggests that equity incentives and regional investor protection can individually promote firms' growth, and the combination of the two is most effective of all.

In sum, these regression results are consistent with our contention that regional investor protection can improve firms' ROA and Tobin's Q ratios by exerting restraining effects on the self-interested behavior that equity incentives encourage

among managers with respect to dividend payout policies. This synergistic effect allows equity incentives to be given full play, improving firms' performance overall, consistent with our fourth hypothesis.

1.5.5 Robustness

This subsection briefly describes the results of some robustness checks we performed on our findings. Referring to the previous literature, we ran regressions replacing our preferred measure of cash dividends with payout ratio (cash dividend scaled by stock price and multiplied by 100), and replacing our preferred measure of regional investor protection ("market intermediaries and legal system/environment" with a simpler measure, the natural logarithm of the number of lawyers in each province, because the number of lawyers in a region is also a reflection of that region's law enforcement environment, and the efficiency of enforcement in China. The results from these robustness tests support the contention that the main models established in this paper are robust, and the conclusions drawn from them reliable (see Appendix A).

1.6 Conclusion

This paper uses the fifth component from Fan et al. (2015) China Marketization Index – legal intermediaries and law enforcement environment – as an index of regional investor protection, in combination with panel data on Chinese firms for 2006-2017, to explore the joint effect of equity incentives and regional investor protection on corporate dividend policy and corporate performance in China, where equity incentives are generally dividend protected. The results suggest that the managers of firms adopting equity incentives tend to act in their own interests, increasing their cash receipts by increasing dividend distributions, as measured by cash dividend payout ratios. This conclusion is consistent with previous findings in the classic literature on American, European and Chinese firms. By analyzing the interaction between equity incentives and regional investor protection, we find that regional investor protection has a significant restraining effect on this self-interested behavior. The stronger the degree of regional investor protection, the greater this effect.

Incorporating factors reflecting growth in the model equations, we find that the restraining effect is different depending on firms' growth opportunities. The restraining effect on cash dividends is significant for low-growth firms. Conversely, the restraining effect on stock dividends is significant in high-growth firms. In firms adopting restricted stock equity incentives, cash dividends tend to be higher than in firms adopting stock options – a disparity not apparent for stock dividends. The results suggest that regional investor protection could also restrain this tendency, reducing the difference between cash dividend payouts in restricted stock versus stock option firms. Finally, our results suggest that this restraining effect can have a positive effect on corporate growth and performance.

These results have important policy implications. The task of reforming investor protection laws and improving judicial quality can be difficult and lengthy, and require support from politicians and other interest groups. Compared with the reform of legal mechanisms at the country level, improving regional levels of investor protection would seem to be more feasible and effective. Our paper therefore suggests that, in countries where investor protection is weak overall, policies designed to improve regional investor protection, via improvements in regional legal environments, could be adopted, and that improving the efficiency of legal systems should remain a priority item on regional policy makers' agendas – both in China and elsewhere.

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1.7 Figures and Tables

Table 1: Variable Definitions

Variable	Definition
Cash Dividends	Ratio of total cash dividends paid out in the fiscal year to the book value of the firm's total assets
Payout ratio	Cash dividend scaled by stock price and multiplied by 100
Stock Dividends	Ratio of total value of stock dividends (repurchases and reserve transfers) paid out in the fiscal year to the book value of total assets. The total value is estimated as the number of stocks repurchased or involved in reserve transfers, multiplied by the closing price on the announcement or transfer date
Equity Incentives (Dummy)	1 for firms using equity incentive schemes, and 0 otherwise
Stock Options (Dummy)	1 for stock options, and 0 otherwise
IPI	Fifth indicator of regional degree of investor protection from <i>China Marketization Index</i> (Fan et al., 2015): "the development of market intermediaries and legal system/environment"
NUM	Logarithm of number of lawyers in a province reported in <i>Chinese Yearbook of Lawyers</i> (2006-2017)
Log Assets	Logarithm of firm assets
Debt Ratio	Firm total debt divided by assets
Tobin's Q	Firm's market capitalization plus debt, divided by total assets
High Q (Dummy)	1 if firm's Tobin's Q score is greater than the average based on year and province, and 0 otherwise
ROA	Ratio of firm's Earnings before Interest, Taxes, Depreciation, and Amortization (EBITDA) to total assets
SD Return	Standard deviation of monthly returns on a firm's stock over the fiscal year
Cash Ratio	Ratio of firm's cash to total assets
Inst % Owned	Percentage of firm's stock in issue held by institutions
Age	firm age
Retained earning	retained earnings scaled total asset

Table 2: Geographical Distribution of Observations

Table 2 reports the distribution of firms in the sample, by province, annually over 2006–2017.

	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	total
Anhui	45	47	53	55	66	75	77	78	73	79	83	85	816
Beijing	79	83	91	103	160	191	218	211	224	245	258	262	2,125
Fujian	47	45	55	58	55	67	75	74	73	80	90	93	812
Gansu	18	17	20	20	17	19	20	21	22	21	25	26	246
Guangdong	138	149	176	189	246	302	338	335	343	381	416	425	3,438
Guangxi	20	22	24	23	23	25	28	29	26	32	35	31	318
Guizhou	19	19	19	19	21	23	23	24	24	24	27	27	269
Hainan	21	20	21	22	21	24	23	25	24	23	27	26	277
Hebei	30	29	32	33	37	44	46	46	45	47	48	48	485
Henan	28	33	37	39	48	57	63	62	59	68	67	68	629
Heilong	24	24	24	25	23	24	26	25	22	26	28	28	299
Hubei	56	54	57	60	67	73	78	78	76	78	86	83	846
Hunan	35	37	41	45	48	58	64	63	65	72	74	72	674
Jilin	29	28	31	32	35	40	38	40	41	40	42	41	437
Jiangsu	86	103	113	116	150	195	226	221	229	237	273	288	2,237
Jiangxi	23	24	25	24	29	30	32	32	31	33	34	35	352
Liaonin	46	43	48	51	48	53	58	57	57	65	62	60	648
Inner Mongolia	18	19	19	19	23	25	27	27	24	24	25	24	274
Ningxia	11	8	11	11	13	13	13	12	12	13	13	12	142
Qinghai	8	9	9	9	9	9	10	9	10	9	11	11	113
Shandong	71	78	89	92	118	140	148	149	143	152	162	157	1,499
Shanxi	26	25	26	26	30	30	31	32	33	35	36	34	364
Shaanxi	22	24	26	27	32	33	35	33	35	35	39	37	378

Shanghai	120	122	130	134	168	192	205	200	203	218	236	237	2,165
Sichuan	58	56	65	70	80	83	91	89	92	99	105	105	993
Tianjin	23	27	27	28	33	37	38	38	39	40	40	45	415
Tibet	8	7	8	9	8	8	8	9	8	9	11	13	106
Xinjiang	26	28	31	30	35	37	38	39	36	38	44	44	426
Yunnan	22	23	25	25	29	30	29	30	30	29	32	28	332
Zhejiang	86	104	119	127	155	189	217	212	220	245	273	291	2,238
Chongqing	26	23	24	28	26	30	32	34	35	36	40	37	371
Total	1,269	1,330	1,476	1,549	1,853	2,156	2,355	2,334	2,354	2,533	2,742	2,773	24,724

Table 3: Characteristics of Payouts and Incentives

Table 3 reports summary statistics (number of observations, mean, median, and standard deviation) for the payout and incentive variables used in our estimations. Panel A reports them for the entire dataset. Panel B reports them for the subsample of observations with non-zero incentives.

Panel A: Characteristics of payouts and incentives for whole dataset

	obs	mean	median	Std.dev
Cash Dividend to Assets	24,724	1.062%	0.422%	1.592
Payout ratio	24,724	1.0%	0.7%	0.010
Stock Dividend(Repurchase and Reserve Transfer) to Assets	24,724	0.342%	0.000%	1.070
Equity Incentives	24,724	13.1%	0.000%	0.337

Panel B: Characteristics of payouts and incentives for equity incentives subsample

	obs	mean	median	Std.dev
Cash Dividend to Assets	3,241	1.265%	0.723%	1.687
Payout ratio	3,241	0.9%	0.6%	0.009
Stock Dividend(Repurchase and Reserve Transfer) to Assets	3,241	0.598%	0.000%	1.449
Stock options	3,241	41.9%	0.000	0.494

Table 4: Analysis of Firm Characteristics

Table 4 provides summary statistics (mean, median and standard deviation) for firm characteristics, Panel A reporting them for the full dataset, and Panel B for the equity incentives subsample.

Panel A: Full dataset

	obs	mean	median	Std.dev
Cash Ratio	24,724	18.9%	14.7%	0.144
Log Assets	24,724	21.897	21.743	1.292
Debt Ratio	24,724	45.3%	44.8%	0.232
Tobin's Q	24,724	2.567	1.821	2.483
ROA	24,724	3.7%	3.6%	0.580
SD Return	24,724	14.5%	12.8%	0.074
Inst % Owned	24,724	33.5%	31.6%	0.243
Age	24,724	10.28	10.00	6.41
Retained earning	24,724	0.11	0.28	0.14

Panel B: Equity incentives subsample

	obs	mean	median	Std.dev
Cash Ratio	3,241	20.0%	16.0%	0.134
Log assets	3,241	22.097	21.952	1.150
Debt ratio	3,241	39.0%	38.1%	0.192
Q	3,241	3.145	2.420	2.551
ROA	3,241	5.4%	5.0%	0.049
SD Return	3,241	14.1%	12.4%	0.077
Inst % Owned	3,241	32.1%	28.4%	0.248
Age	3,241	8.053	7.000	5.511
Retained earning	3,241	0.197	0.185	0.116

Figure 1: Regional IPI Distribution (2006-2017)



Figure1: Regional IPI Distribution

Figure 2: Equity Incentives Subsample: Proportion of Firms using Stock Options and Restricted Stock (2006-2017)

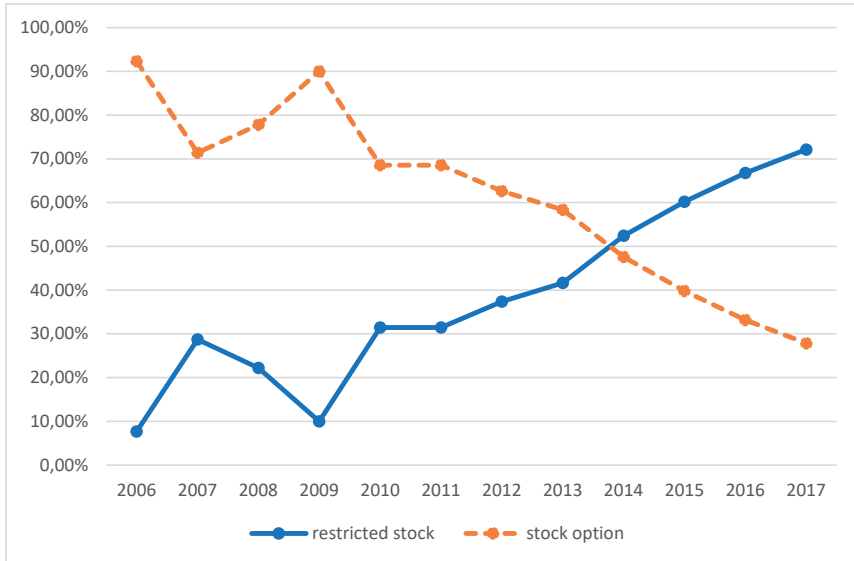


Table 5: Analysis of Cash and Stock Dividend Payouts

Table 5 reports coefficients from OLS regressions in which the dependent variables were the ratios of cash or stock dividends to total assets. We used robust standard errors clustered by firm, and included fixed effects for region, industry and year. IPI measures province-level investor protection, based on scores for “market intermediaries and legal system/environment”. All other variables are as defined in Table 1.

	Cash dividend			Stock dividend		
	(1)	(2)	(3)	(4)	(5)	(6)
Incentive	0.083*** (2.77)	0.264*** (3.39)	0.074 (1.02)	0.061** (2.31)	0.169** (2.39)	0.186*** (2.93)
Incentive*IPI		-0.024*** (-3.37)	-0.016** (-2.36)		-0.017*** (-2.58)	-0.013** (-2.16)
IPI		0.003 (0.57)	-0.005 (-0.76)		-0.003 (-0.55)	0.002 (0.32)
Log Assets	-0.065*** (-5.06)	-0.051*** (-2.75)	-0.064*** (-5.03)	-0.071*** (-6.20)	-0.042** (-2.49)	-0.071*** (-6.20)
Debt Ratio	-0.519*** (-7.97)	-0.527*** (-7.23)	-0.518*** (-7.96)	-0.176*** (-3.08)	-0.190*** (-2.88)	-0.176*** (-3.06)
ROA	7.397*** (43.15)	6.192*** (35.37)	7.400*** (43.17)	1.688*** (11.26)	1.426*** (8.99)	1.689*** (11.27)
SD Return	-0.604*** (-4.68)	-0.412*** (-3.04)	-0.601*** (-4.65)	1.244*** (11.02)	1.000*** (8.14)	1.244*** (11.01)
Cash Ratio	1.674*** (22.58)	1.738*** (21.75)	1.665*** (22.43)	1.107*** (17.01)	1.172*** (16.18)	1.103*** (16.92)
Inst% Owned	0.386*** (8.87)	0.102** (2.18)	0.384*** (8.83)	0.331*** (8.68)	0.470*** (11.07)	0.330*** (8.66)
Age	-0.060*** (-23.91)	-0.127*** (-25.71)	-0.060*** (-23.87)	-0.036*** (-15.82)	-0.027*** (-5.96)	-0.036*** (-15.81)
Retained earning	0.271*** (5.11)	0.195*** (3.20)	0.269*** (5.08)	0.085* (1.83)	0.024 (0.43)	0.084* (1.80)
constant	2.653*** (8.82)	2.710*** (6.99)	2.665*** (8.83)	1.640*** (6.10)	1.033*** (2.94)	1.627*** (6.03)
Firm FE	No	Yes	No	No	Yes	No
Region FE	Yes	No	Yes	Yes	No	Yes
Industry FE	Yes	No	Yes	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	24724	24724	24724	24724	24724	24724
Adj R ²	0.3283	0.2269	0.3284	0.1716	0.1483	0.1715

Note: t-values are reported in parentheses below the regression coefficients. The superscripts ***, **, and * indicate two-tailed statistical significance at the 1, 5, and 10% levels, respectively.

Table 6: Analysis of Dividends, Regional Investor Protection and Growth

Opportunities

Table 6 reports coefficients from OLS regressions in which the ratios of cash and stock dividends to total assets are the dependent variables. We use robust standard errors clustered by firm, and include region, industry and year fixed effects. Columns (1) and (2) use the “Low Q” subsample (Tobin’s Q below the average) based on year and province). Columns (3) and (4) use the “High Q” subsample (Tobin’s Q above average). IPI measures province-level investor protection based on scores for “market intermediaries and legal system/environment”. All other variables are as defined in Table 1.

Panel A: Cash dividend as dependent variable

	Low Q		High Q	
	(1)	(2)	(3)	(4)
Incentive	0.362*** (4.28)	0.180** (2.36)	-0.017 (-0.10)	-0.243* (-1.67)
Incentive*IPI	-0.027*** (-3.39)	-0.024*** (-3.38)	-0.001 (-0.06)	0.005 (0.35)
IPI	-0.001 (-0.21)	0.001 (0.15)	-0.001 (-0.04)	-0.000 (-0.03)
Log Assets	-0.057*** (-2.83)	-0.063*** (-4.84)	-0.042 (-0.85)	0.055* (1.94)
Debt Ratio	-0.846*** (-9.12)	-0.756*** (-9.74)	-0.241 (-1.55)	-0.375*** (-3.01)
ROA	6.633*** (31.28)	7.464*** (36.52)	4.533*** (12.71)	7.395*** (22.75)
SD Return	-0.268 (-1.59)	-0.253 (-1.55)	-0.495* (-1.88)	-0.984*** (-4.33)
Cash Ratio	1.466*** (14.55)	1.329*** (15.19)	1.571*** (9.98)	1.519*** (11.43)
Inst % Owned	0.124** (2.55)	0.391*** (8.78)	0.068 (0.58)	0.541*** (5.71)
Age	-0.099*** (-20.53)	-0.046*** (-18.31)	-0.217*** (-12.89)	-0.064*** (-14.33)
Retained earning	0.042 (0.41)	0.108 (1.25)	0.383*** (3.17)	0.319*** (3.66)
constant	2.927*** (7.29)	2.410*** (9.00)	3.131*** (3.14)	-0.516 (-0.85)
Firm FE	Yes	No	Yes	No
Region FE	No	Yes	No	Yes
Industry FE	No	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes
<i>N</i>	12362	12362	12362	12362
<i>Diff</i> (1)-(3) =0.379*** (t=2.76)				
<i>Diff</i> (2)-(4) =0.423*** (t=3.10)				
Adj R ²	0.2161	0.2930	0.1573	0.3156

Panel B: Stock dividend as dependent variable

	Low Q		High Q	
	(1)	(2)	(3)	(4)
Incentive	0.016 (0.63)	0.009 (0.43)	0.280*** (2.66)	0.279*** (3.27)
Incentive*IPI	-0.003 (-1.16)	-0.000 (-0.21)	-0.022** (-2.31)	-0.014* (-1.88)
IPI	0.001 (0.54)	0.000 (0.26)	-0.001 (-0.14)	0.008** (2.26)
Log Assets	-0.002 (-0.33)	-0.005* (-1.96)	-0.072** (-2.53)	-0.115*** (-7.45)
Debt Ratio	-0.043 (-1.43)	-0.029 (-1.39)	-0.310*** (-3.16)	-0.213*** (-2.81)
ROA	0.355*** (5.56)	0.375*** (6.71)	1.887*** (8.08)	2.342*** (11.37)
SD Return	-0.005 (-0.11)	-0.003 (-0.07)	1.175*** (6.60)	1.555*** (10.22)
Cash Ratio	0.163*** (4.84)	0.161*** (6.42)	1.336*** (13.01)	1.190*** (14.24)
Inst % Owned	0.062*** (4.51)	0.020* (1.75)	0.715*** (10.68)	0.451*** (8.36)
Age	-0.003** (-2.19)	-0.004*** (-7.61)	-0.041*** (-4.98)	-0.046*** (-18.05)
Retained earning	-0.034 (-1.00)	-0.044* (-1.73)	0.016 (0.19)	0.025 (0.44)
constant	0.088 (0.77)	0.185*** (3.21)	1.620*** (2.81)	2.442*** (7.48)
Firm FE	Yes	No	Yes	No
Region FE	No	Yes	No	Yes
Industry FE	No	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes
<i>N</i>	12362	12362	12362	12362
<i>Diff (1)-(3)</i>	=-0.264** (t=-2.02)			
<i>Diff (2)-(4)</i>	=-0.270** (t=-2.26)			
Adj R ²	0.0638	0.0748	0.1474	0.1600

Note: t-values are reported in parentheses below the regression coefficients. The superscripts ***, **, and * indicate two-tailed statistical significance at the 1, 5, and 10% levels, respectively.

Table 7: Analysis of Stock Options and Restricted Stock

Table 7 reports coefficients from OLS regressions in which the ratios of cash and stock dividends to total assets are the dependent variables. We use robust standard errors clustered by firm, and include region, industry and year fixed effects. IPI measures province-level investor protection, based on scores for “market intermediaries and legal system/environment”. Stock options are captured with a dummy variable set to one for firms using stock option equity incentive schemes, and zero otherwise. All other variables are as defined in Table 1.

	Cash dividend			Stock dividend		
	(1)	(2)	(3)	(4)	(5)	(6)
Option	-0.119*	-0.729***	-0.435**	-0.061	-0.434	-0.222
	(-1.73)	(-2.76)	(-2.46)	(-0.94)	(-1.27)	(-1.32)
Option*IPI		0.054**	0.030*		0.025	0.015
		(2.37)	(1.92)		(0.86)	(1.02)
IPI		-0.020	-0.041		-0.054	-0.046
		(-0.54)	(-1.20)		(-1.12)	(-1.11)
Log Assets	0.027	0.091	0.031	-0.078**	-0.239**	-0.075*
	(0.64)	(1.02)	(0.72)	(-1.96)	(-2.07)	(-1.89)
Debt Ratio	-0.704***	-0.495	-0.709***	-0.583**	-1.296***	-0.585**
	(-3.09)	(-1.60)	(-3.11)	(-2.50)	(-3.26)	(-2.51)
ROA	10.829***	8.940***	10.800***	4.816***	4.064***	4.788***
	(14.33)	(9.86)	(14.29)	(5.71)	(3.48)	(5.67)
SD Return	-1.280***	-0.796*	-1.274***	2.500***	2.021***	2.518***
	(-3.18)	(-1.77)	(-3.16)	(5.28)	(3.49)	(5.32)
Cash Ratio	1.329***	1.275***	1.307***	1.396***	1.964***	1.378***
	(5.75)	(4.38)	(5.65)	(5.71)	(5.24)	(5.63)
Inst% Owned	0.412***	0.231	0.408***	0.374***	0.872***	0.372***
	(3.13)	(1.44)	(3.10)	(2.67)	(4.20)	(2.66)
Age	-0.023***	-0.077*	-0.024***	-0.036***	-0.052	-0.036***
	(-2.77)	(-1.65)	(-2.79)	(-5.00)	(-0.86)	(-5.02)
Retained earning	1.703***	1.774***	1.731***	-0.938**	-2.616***	-0.918**
	(4.49)	(2.95)	(4.56)	(-2.46)	(-3.38)	(-2.41)
constant	-1.173	-1.470	-0.923	1.969**	6.519**	2.231**
	(-1.07)	(-0.68)	(-0.83)	(2.03)	(2.34)	(2.25)
Firm FE	No	Yes	No	No	Yes	No
Region FE	Yes	No	Yes	Yes	No	Yes
Industry FE	Yes	No	Yes	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
<i>N</i>	3241	3241	3241	3241	3241	3241
Adj R ²	0.3805	0.3031	0.3814	0.1759	0.0922	0.1764

Note: t-values are reported in parentheses below the regression coefficients. The superscripts ***, **, and * indicate two-tailed statistical significance at the 1, 5, and 10% levels, respectively.

Table 8: Analysis of Joint Effects of Incentives and Regional Investor Protection on Corporate Performance

Table 8 reports coefficients from OLS regressions in which ROA and Tobin's Q ratio are the dependent variables. We use robust standard errors clustered by firm and include region, industry and year fixed effects. IPI measures province-level investor protection, based on scores for "market intermediaries and legal system/environment". All other variables are defined as in Table 1.

	ROA			Tobin's Q		
	(1)	(2)	(3)	(4)	(5)	(6)
Incentive	0.011*** (9.96)	0.029 (0.47)	0.005 (0.12)	0.470*** (11.60)	0.079 (0.79)	0.298*** (3.09)
Incentive*IPI		0.011* (1.96)	0.009* (1.80)		0.020** (2.14)	0.017* (1.87)
IPI		0.003 (0.74)	0.001 (0.17)		-0.003 (-0.47)	0.023*** (2.77)
Log Assets	0.003*** (6.83)	0.048*** (3.28)	0.020*** (3.44)	-0.621*** (-34.46)	-0.824*** (-34.20)	-0.622*** (-34.54)
Debt Ratio	-0.069*** (-29.51)	-0.716*** (-12.79)	-0.269*** (-7.51)	-3.416*** (-39.69)	-2.787*** (-30.16)	-3.415*** (-39.69)
SD Return	0.034*** (6.79)	0.169 (1.60)	0.129 (1.43)	6.414*** (37.66)	6.160*** (35.23)	6.400*** (37.57)
Cash Ratio	0.053*** (19.08)	0.241*** (3.87)	0.181*** (4.08)	-0.049 (-0.50)	-0.338*** (-3.29)	-0.028 (-0.29)
Inst% Owned	0.024*** (14.49)	0.044 (1.20)	0.050* (1.88)	0.846*** (14.65)	1.161*** (19.26)	0.850*** (14.73)
Age	-0.000** (-2.27)	-0.006 (-1.47)	0.003** (2.47)	0.032*** (8.81)	0.195*** (30.69)	0.032*** (8.70)
Retained earning	0.070*** (37.79)	-0.171*** (-3.67)	-0.050* (-1.84)	-2.860*** (-40.79)	-2.820*** (-36.56)	-2.860*** (-40.79)
constant	-0.022** (-2.24)	-0.670** (-2.21)	-0.346*** (-2.58)	16.063*** (37.54)	18.832*** (37.61)	15.984*** (37.25)
Firm FE	No	Yes	No	No	Yes	No
Region FE	Yes	No	Yes	Yes	No	Yes
Industry FE	Yes	No	Yes	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes	Yes	Yes
N	24724	24724	24724	24724	24724	24724
Adj R ²	0.3308	0.0241	0.0690	0.4895	0.2367	0.4902

Note: t-values are reported in parentheses below the regression coefficients. The superscripts ***, **, and * indicate two-tailed statistical significance at the 1, 5, and 10% levels, respectively.

1.8 Appendix A

1. Robust test for table 5, use Payout ratio as the dependent variable

	Payout ratio		
	(1)	(2)	(3)
Incentive	0.227** (2.19)	0.209*** (4.25)	0.107** (2.47)
Incentive*NUM		-0.015*** (-3.27)	-0.013*** (-3.28)
NUM		-0.007* (-1.86)	-0.012*** (-2.90)
Log Assets	0.188*** (26.28)	0.108*** (9.18)	0.189*** (26.34)
Debt Ratio	-0.271*** (-6.98)	-0.247*** (-5.36)	-0.271*** (-6.98)
ROA	3.369*** (31.86)	2.850*** (25.73)	3.373*** (31.91)
SD Return	-1.118*** (-14.00)	-0.924*** (-10.77)	-1.111*** (-13.92)
Cash Ratio	0.543*** (12.11)	0.667*** (13.19)	0.532*** (11.87)
Inst% Owned	-0.048* (-1.81)	-0.252*** (-8.49)	-0.051* (-1.92)
Age	-0.013*** (-9.75)	-0.030*** (-9.64)	-0.013*** (-9.67)
Retained earning	0.013 (0.42)	0.058 (1.51)	0.012 (0.38)
constant	-3.011*** (-18.07)	-1.166*** (-4.76)	-2.965*** (-17.71)
Firm FE	No	Yes	No
Region FE	Yes	No	Yes
Industry FE	Yes	No	Yes
Year FE	Yes	Yes	Yes
<i>N</i>	24724	24724	24724
Adj R ²	0.2960	0.1673	0.2969

Note: t-values are reported in parentheses below the regression coefficients. The superscripts ***, **, and * indicate two-tailed statistical significance at the 1, 5, and 10% levels, respectively.

2. Robust test for table 6 panel A, use Payout ratio as the dependent variable

	Low Q		High Q	
	(1)	(2)	(3)	(4)
Incentive	0.250*** (3.48)	0.139** (2.26)	0.051 (0.94)	-0.012 (-0.27)
Incentive*NUM	-0.016** (-2.32)	-0.016*** (-2.78)	-0.005 (-1.12)	-0.003 (-0.79)
NUM	-0.008* (-1.79)	0.005* (1.82)	-0.003 (-0.60)	0.001 (0.62)
Log Assets	0.111*** (6.55)	0.184*** (19.08)	0.060*** (3.89)	0.118*** (13.53)
Debt Ratio	-0.250*** (-3.18)	-0.240*** (-3.95)	-0.081* (-1.69)	-0.131*** (-3.43)
ROA	4.611*** (25.60)	5.375*** (31.71)	0.937*** (8.48)	1.652*** (16.58)
SD Return	-1.261*** (-8.82)	-1.486*** (-10.88)	-0.391*** (-4.80)	-0.617*** (-8.85)
Cash Ratio	0.809*** (9.45)	0.625*** (9.00)	0.427*** (8.75)	0.346*** (8.50)
Inst % Owned	-0.226*** (-5.46)	0.001 (0.02)	-0.137*** (-3.79)	0.003 (0.09)
Age	-0.033*** (-7.95)	-0.017*** (-9.46)	-0.022*** (-4.18)	-0.011*** (-8.03)
Retained earning	0.308*** (3.58)	0.307*** (4.50)	0.093** (2.48)	0.072*** (2.72)
constant	-1.071*** (-3.14)	-2.964*** (-14.93)	-0.515* (-1.67)	-1.892*** (-10.22)
Firm FE	Yes	No	Yes	No
Region FE	No	Yes	No	Yes
Industry FE	No	Yes	No	Yes
Year FE	Yes	Yes	Yes	Yes
<i>N</i>	12362	12362	12362	12362
<i>Diff (1)-(3)</i>	=0.199* (t=1.72)			
<i>Diff (2)-(4)</i>	=0.127** (t=1.98)			
Adj R ²	0.2210	0.2969	0.1910	0.2804

Note: t-values are reported in parentheses below the regression coefficients. The superscripts ***, **, and * indicate two-tailed statistical significance at the 1, 5, and 10% levels, respectively.

3. Robust test for table7, use Payout ratio as the dependent variable

	Payout ratio		
	(1)	(2)	(3)
Option	-0.004 (-0.10)	-0.347** (-2.55)	-0.120 (-1.20)
Option*NUM		0.034*** (2.92)	0.011* (1.82)
NUM		-0.035* (-1.85)	-0.034* (-1.94)
Log Assets	0.299*** (11.52)	0.335*** (6.19)	0.302*** (11.62)
Debt Ratio	-0.293** (-2.21)	-0.284* (-1.65)	-0.294** (-2.23)
ROA	4.032*** (8.15)	3.187*** (5.52)	4.013*** (8.11)
SD Return	-0.842*** (-3.97)	-0.773*** (-3.34)	-0.833*** (-3.93)
Cash Ratio	0.234* (1.88)	0.295** (1.97)	0.219* (1.75)
Inst% Owned	-0.208*** (-2.93)	-0.301*** (-3.64)	-0.212*** (-2.99)
Age	0.009 (1.64)	0.031 (1.26)	0.009 (1.63)
Retained earning	0.953*** (4.01)	1.497*** (4.05)	0.974*** (4.09)
constant	-6.425*** (-9.37)	-7.108*** (-5.49)	-6.242*** (-9.04)
Firm FE	No	Yes	No
Region FE	Yes	No	Yes
Industry FE	Yes	No	Yes
Year FE	Yes	Yes	Yes
<i>N</i>	3241	3241	3241
Adj R ²	0.3210	0.2550	0.3210

Note: t-values are reported in parentheses below the regression coefficients. The superscripts ***, **, and * indicate two-tailed statistical significance at the 1, 5, and 10% levels, respectively.

Pearson Correlation Matrix (Complete Sample)

	Cash dividend	Stock dividend	Incentive	IPI	Ratio	Log Assets	Debt Ratio	ROA	Q	SD Return	Cash Ratio	Inst% Owned	Age	Retained earning
Cash dividend	1													
Stock dividend	0.211***	1												
Incentive	0.049***	0.093***	1											
IPI	0.076***	0.075***	0.175***	1										
Ratio	0.625***	-0.038***	0.034***	0.070***	1									
Log Assets	-0.038***	-0.143***	0.060***	0.046***	0.298***	1								
Debt Ratio	-0.365***	-0.225***	-0.105***	-0.140***	-0.116***	0.328***	1							
ROA	0.495***	0.204***	0.114***	0.102***	0.346***	0.044***	-0.414***	1						
Q	0.173***	0.290***	0.090***	0.069***	-0.205***	-0.465***	-0.318***	0.178***	1					
SD Return	-0.015**	0.167***	-0.021***	0.001	-0.214***	-0.194***	0.005	-0.041***	0.339***	1				
Cash Ratio	0.315***	0.242***	0.029***	0.080***	0.103***	-0.207***	-0.409***	0.278***	0.208***	0.007	1			
Inst% Owned	0.114***	-0.01	-0.022***	-0.002	0.111***	0.325***	0.108***	0.098***	-0.068***	-0.110***	-0.044***	1		
Age	-0.258***	-0.269***	-0.135***	-0.097***	-0.062***	0.286***	0.346***	-0.191***	-0.148***	-0.116***	-0.274***	0.205***	1	
Retained earning	0.310***	0.110***	0.118***	0.145***	0.269***	0.240***	-0.482***	0.474***	-0.211***	-0.085***	0.145***	0.110***	-0.198***	1

Pearson Correlation Matrix (Incentive Sample)

	Cash dividend	Stock dividend	Option	IPI	Ratio	Log Assets	Debt Ratio	ROA	Q	SD Return	Cash Ratio	Inst% Owned	Age	Retained earning
Cash dividend	1													
Stock dividend	0.216***	1												
Option	-0.049***	-0.015**	1											
IPI	0.023	0.035**	-0.059***	1										
Ratio	0.426***	-0.158***	0.016	-0.048**	1									
Log Assets	-0.138***	-0.202***	0.089***	-0.041**	0.307***	1								
Debt Ratio	-0.304***	-0.201***	0.131***	-0.069***	0.062***	0.593***	1							
ROA	0.486***	0.190***	-0.088***	0.063***	0.247***	-0.070***	-0.367***	1						
Q	0.203***	0.371***	-0.086***	0.092***	-0.315***	-0.435***	-0.449***	0.287***	1					
SD Return	0.019	0.230***	0.007	0.005	-0.274***	-0.217***	-0.058***	-0.054***	0.427***	1				
Cash Ratio	0.257***	0.210***	-0.014	0.046***	0.003	-0.235***	-0.353***	0.261***	0.196***	0.028	1			
Inst% Owned	0.207***	0.058***	0.138***	-0.047**	0.124***	0.130***	0.094***	0.109***	-0.02	0.036*	0.021	1		
Age	-0.149***	-0.222***	0.070***	-0.129***	0.187***	0.515***	0.337***	-0.120***	-0.236***	-0.157***	-0.240***	0.084***	1	
Retained earning	0.390***	0.112***	-0.124***	0.076***	0.151***	-0.172***	-0.484***	0.694***	0.252***	-0.064***	0.245***	0.034*	-0.089***	1

Chapter 2

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

Abstract

This study examines the effects of anti-corruption regulation 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 incentive risk factors after the anti-corruption campaign in 2012 drastically 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.

Keywords: Equity Incentives; Anti-Corruption; SOEs, non-SOEs; Financial Misreporting; Risk Effects

2.1 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 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 campaign⁵ 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

⁵ Corruption has become a common phenomenon in the transition from traditional society to modern society. Since the policy of reform and opening up was established in 1980s, China has entered a period of economic transformation. With the rapid development of its economy, the problem of corruption is aggravating. On 8 November, 2012, the report to the 18th National Congress of the Communist Party of China clearly stated that the Chinese government will combat corruption. 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 and corporate governance drastically (Han and Sun, 2017). On the one hand, anti-corruption will reduce the room for government officials to rent the power. On the other hand, anti-corruption will also reduce firm executive's willingness to seek rent, and correct the distorted relationship between government and enterprise. Therefore, executives can focus on improving firm performance.

(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, very 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 year⁶.

Therefore, there is need for a comprehensive investigation of financial misreporting that considers the characteristics of the structure of the Chinese business

⁶ From the annual report on the work of CSRC,
http://www.csrc.gov.cn/pub/zjhpublic/G00306201/ndbg/201903/t20190329_353507.htm.

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 restrictions⁷," 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.

⁷ 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 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. 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 industry competition 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.

2.2 Literature review

2.2.1 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.

2.2.2 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, 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).

2.2.3 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).

2.3 Development of hypotheses

2.3.1 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,⁸ which caused losses exceeding \$1.1 billion by foreign investors, shocked both the US Securities Exchange Commission (SEC) and the CSRC.

⁸ 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, 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.

2.3.2 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).

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.

2.4 Empirical Investigation

2.4.1 Data.

Following the studies of Firth et al. (2007, 2010, 2011), Hou and Moore (2010),

Conyon and He (2011, 2014) and Conyon 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),⁹ 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

⁹ 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>.

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.

2.4.2 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' 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.

2.4.2.1 Measures of incentives.

As our primary goal is to examine how managers' equity incentives affect corporate financial misreporting, we focus on management teams' equity incentives¹⁰ (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).

2.4.2.2 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

¹⁰ 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.

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.

2.4.3 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:

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

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

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

where

$$Risk_i = \sqrt{\frac{1}{T-1} \sum_{t=1}^T (E_{it} - \frac{1}{T} \sum_{t=1}^T E_{it})^2 | T = 5^{11}}$$

$$E_{it} = \frac{EBITDA_{it}}{ASSET_{it}} - \frac{1}{X_t} \sum_{k=1}^X \frac{EBITDA_{kt}}{ASSET_{kt}}^{12}$$

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

¹¹ 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).

¹² *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).

effects of business risk, we expect business risk as a mediator of managers' motivation to engage in misreporting, *Controls* is a vector of control variables (all of the variables are defined in Appendix B). 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).

2.4.4 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 5% and 0.00%, respectively. For several firm characteristics, the average book-to-market ratio (*Btm*) is 0.51, and the average debt-to-asset ratio (*Lev*) is 0.46. The average firm is approximately 10.95 years old and has an annual sales growth of 13%.

INSERT TABLE 1 HERE

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.

INSERT TABLE 2 HERE

2.5 Results

2.5.1 Logit and OLS regression analysis.

2.5.1.1 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.

INSERT TABLE 3 HERE

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 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.

2.5.1.2 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, a one-standard deviation increase in manager shareholdings is associated with a 2.395% increase in the standard deviation of financial restatement. 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 3, a one-standard deviation increase in manager shareholdings is associated with a 3.651% increase in the standard deviation of discretionary accruals; Column 4, a one-standard deviation increase in manager shareholdings is associated with a 1.075% increase in the standard deviation of discretionary accruals. 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. Column 5, a one-standard deviation increase in manager shareholdings is associated with a 14.724% increase in the standard deviation of discretionary accruals.

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 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.

INSERT TABLE 4 HERE

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, the coefficient of managerial shareholdings is positive and significant at the 1% level. Column 1, a one-standard deviation increase in manager shareholdings is associated with a 2.246% increase in the standard deviation of discretionary accruals. 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 3, a one-standard deviation increase in manager shareholdings is associated with a 3.651% increase in the standard deviation of discretionary accruals. Column 4, a one-standard deviation increase in manager shareholdings is associated with a 1.075% increase in the standard deviation of discretionary accruals. Column 2 shows that in the SOE sample, shareholding does not affect earnings 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. Column 5, a one-standard deviation increase in manager shareholdings is associated with a 14.724% increase in

the standard deviation of discretionary accruals. 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.

INSERT TABLE 5 HERE

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.

2.5.2 Additional Analysis.

2.5.2.1 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.

INSERT TABLE 6 HERE

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 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.

2.5.2.2 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.

INSERT TABLE 7 HERE

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 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.

2.5.3 Robustness Tests.

2.5.3.1 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.

INSERT TABLE 8 HERE

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.

INSERT TABLE 9 HERE

2.5.3.2 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.

INSERT TABLE 10 HERE

2.5.3.3 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 the Heckman model requires an exogenous 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 results show that the coefficients on *Shareholding* remain positive and statistically significant, consistent with our main findings.

INSERT TABLE 11 HERE

2.5.3.4 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.

INSERT TABLE 12 HERE

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.

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.

2.6 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.

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2.7 Appendix B. 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/zjhp-public/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/zjhp-public/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/zjhp-public/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

2.8 Figures and Tables

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 B.

Table 2. Pearson/Spearman correlation coefficient matrix

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

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

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

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)
<i>Year</i>	YES	YES	YES	YES	YES
<i>Industry</i>	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 B. 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 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) 0.007* (1.83)
<i>Risk</i>							
<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* (0.007)	0.007 (0.007)	0.005 (0.005)	0.008 (0.008)	0.016* (0.016)	-0.017 (-0.017)	-0.019 (-0.019)

<i>Intangible</i>	(1.65)	(1.09)	(0.42)	(1.22)	(1.92)	(-1.11)	(-1.55)
	0.677	-0.032	-0.121	1.250**	0.039	0.126	0.175
<i>Constant</i>	(1.41)	(-0.06)	(-0.15)	(2.07)	(0.06)	(0.15)	(0.25)
	-2.217***	0.509	-1.537	-2.835***	1.365	-0.131	0.682
Year	(-2.59)	(0.59)	(-0.98)	(-2.76)	(1.28)	(-0.09)	(0.54)
Industry	YES	YES	YES	YES	YES	YES	YES
	YES	YES	YES	YES	YES	YES	YES
N	11,596	9,620	4,260	7,336	4,540	5,080	4,540
Pseudo R ²	0.076	0.095	0.103	0.068	0.082	0.093	0.090
Empirical P-value		0.657					
Sobel Z-value				0.247		0.041**	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 B. 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 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) 0.002* (1.81)
<i>Risk</i>							
<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*** (-7.74)	-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)	-0.024*** (-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*** (-2.26)	-0.021*** (-2.80)	-0.043*** (-6.63)
<i>Age</i>	-0.000	-0.000*	-0.001***	0.000	-0.001**	0.000	-0.001*

<i>Intangible</i>	(-0.66)	(-1.74)	(-4.07)	(1.62)	(-2.30)	(0.72)	(-1.85)
	-0.085***	-0.065***	-0.064**	-0.099***	-0.060***	-0.065***	-0.059***
<i>Constant</i>	(-5.55)	(-8.01)	(-2.49)	(-5.18)	(-5.55)	(-5.55)	(-4.29)
	-0.113***	-0.040*	-0.128***	-0.087***	-0.106***	-0.003	-0.106***
<i>Year</i>	(-4.23)	(-1.87)	(-2.91)	(-2.68)	(-4.00)	(-0.09)	(-3.23)
	YES	YES	YES	YES	YES	YES	YES
<i>Industry</i>	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					
Sobel Z-value			0.186			0.070*	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 B. 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.

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)
<i>Year</i>	YES	YES	YES	YES	YES	YES
<i>Industry</i>	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 B. 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 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)
Year	YES	YES	YES	YES	YES	YES
Industry	YES	YES	YES	YES	YES	YES
N	10,714	10,502	10,502	10,714	10,502	10,502
Adj/Pseudo R ²	0.084	0.081	0.081	0.211	0.172	0.172
Empirical P-value		0.038**		0.029**		
Sobel Z-value			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 B. 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 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
N	2,546	2,546	2,546	2,546
Pseudo R ²	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 B. 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 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)
<i>Year</i>	YES	YES	YES	YES
<i>Industry</i>	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 B. 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.

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 PSM	DA PSM
<i>Shareholding</i>	0.633** (2.02)	0.029*** (3.64)
<i>Board</i>	0.005 (0.27)	-0.000 (-0.10)
<i>Z</i>	0.003 (1.45)	0.000 (0.44)
<i>Num</i>	0.003 (0.45)	0.000** (2.36)
<i>Big4</i>	-0.325** (-2.11)	-0.024*** (-8.90)
<i>Btm</i>	-0.177 (-0.89)	-0.002 (-0.34)
<i>Returns</i>	-0.064 (-1.16)	-0.001 (-0.72)
<i>Inventory</i>	-0.100 (-0.40)	0.067*** (8.69)
<i>Receivable</i>	-0.584* (-1.70)	0.070*** (8.19)
<i>Size</i>	-0.049 (-1.17)	0.005*** (4.58)
<i>Lev</i>	0.504** (2.51)	-0.041*** (-6.63)
<i>Roa</i>	-2.167*** (-3.86)	0.013 (0.71)
<i>Cash</i>	-0.670** (-2.47)	-0.111*** (-14.76)
<i>Growth</i>	0.076 (0.89)	-0.004 (-1.24)
<i>Age</i>	0.004 (0.76)	-0.000** (-2.52)
<i>Intangible</i>	0.456 (1.13)	-0.071*** (-8.26)
<i>Constant</i>	-0.480 (-0.57)	-0.080*** (-3.99)
Year	YES	YES
Industry	YES	YES
N	14,748	14,748
Adj/Pseudo R ²	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 B. 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 B. 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 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
N	18,671	18,671	18,671	18,671	18,671
Adj/Pseudo R ²	0.083	0.122	0.086	0.179	0.185
Sobel Z-value			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 B. 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.

Chapter 3

Impact of Share Pledging by Controlling Shareholders on Firm Value in the Context of China's Tightened Regulatory Reforms

Abstract

This study investigates the effect of the 2018 regulatory reforms of share pledging by a controlling shareholder on firm value in China. Using a data set spanning the period 2015 to 2020, we provide robust results suggesting that tighter regulations effectively reduce firms' crash risk, relax financial constraints, reduce bankruptcy risk, and mitigate the controlling shareholder expropriation of minority shareholders' wealth via tunnelling. Additionally, controlling shareholders by investing more pledged funds in the listed firm after reforms, foster capital investment and R&D expenditure, which benefit firm growth and competitiveness and ultimately increase firm long-term value.

Keywords: Share Pledging; Regulatory Reforms; Firm Value; R&D

3.1 Introduction

Share pledges afford insiders with the opportunity to purchase investment assets and/or consumption goods with funds borrowed against their ownership stakes (Anderson and Puleo, 2020). For example, in April 2022, Elon Musk announced his intention to acquire Twitter for \$44 billion, of which \$12.5 billion would be from his Tesla share pledges. In recent years, share pledges have become a serious corporate governance concern amongst regulators and institutional investors globally¹³. On 12 March 2018, the

¹³ For example, in 2006, the Securities and Exchange Commission (SEC) forced publicly listed firms to disclose in their proxy statements the count of shares that were pledged by their directors and named executive officers. Similarly, in 2011, the regulator in Taiwan restricted the voting rights associated with the shares pledged by insiders. The regulator in India has enforced multiple disclosure requirements since 2009. In 2013, the Institutional Shareholder Services responded to institutional investor concerns over

China Securities Regulatory Commission (CSRC) approved the ‘strictest’ regulatory reforms on share pledging in history (hereafter referred to as ‘regulatory reforms’)¹⁴, which is aimed at preventing systemic risks to the Chinese capital market from share pledging¹⁵. However, the existing studies on share pledging in China mostly focused on the regulatory change on 24 May 2013, which was reported to likely adversely affect firm value. Considering the comprehensive measures for regulatory reforms and the unique characteristics of Chinese governance, we posit that an assessment of the effect of reforms on firm value offers valuable insights to academics and practitioners.

First, in China, most listed firms have controlling shareholders that are either government entities or wealthy individuals/families (Chen *et al.*, 2013; Guan *et al.*, 2016)¹⁶. As the real decision-makers of the firm, controlling shareholders’ motivation and behaviour are the most important determinants of firm value and are comprehensively impacted by regulation changes, therefore, our study focuses on firm controlling shareholders rather than other shareholders. Several notorious examples in the Chinese stock market, such as Yao Zhenhua, the controller of Baoneng, which is a local real estate firm in Shenzhen, illustrate how the controlling shareholder brings risks to listed firms by share pledging. Yao used Baoneng and other companies he controlled to raise money through share pledging and insurance funding and acquired a 25.4% stake in Vanke, a famous Fortune 500 company and became the largest shareholder by the end of 2016.

pledging by including it as a new criterion in its governance rating system. See: <https://www.issgovernance.com/file/2013-policies/2013ExecutiveSummary.pdf> (Dou *et al.*, 2019).

¹⁴ Here, we refer to ‘The Guidance on Stock Pledge Repurchase Transactions, Registration and Settlement’ (Revised in 2018) issued by the Shanghai Stock Exchange and China Securities Depository and Clearing Corporation Limited (CSDC). Available from: http://www.sse.com.cn/lawandrules/sserules/trading/stock/c/c_20180112_4449493.shtml

¹⁵ See Appendix (B).

¹⁶ Several studies exclude state-owned companies (SOE) from their research samples, because controlling shareholders of SOEs is the government (e.g., Guo *et al.*, 2020; He *et al.*, 2022). We do not exclude SOEs in our research as 32.9% of our samples are SOEs. Moreover, many of them engage in share pledging business. However, a regulation issued by the Ministry of Finance of China in 2002 requires that SOEs be pledged only for loans to listed firms or to their subsidiaries (Wang *et al.*, 2020), http://www.gov.cn/gongbao/content/2002/content_61623.htm.

This hostile merger caused a strong counterattack from Vanke's management, to fight for the controlling rights of the company, which alerted the CSRC and the China Insurance Regulatory Commission (CIRC). Although Yao failed to acquire Vanke eventually, this situation reflects the big loopholes in the share pledge regulations¹⁷. Given these negative effects and the lack of positive evidence, the question on the legalisation of share pledges seems an important issue in China and many other economies¹⁸. Therefore, to examine how the tighter regulatory requirements may potentially affect controlling shareholders' motivation, it seems meaningful to better understand the legalisation of share pledges.

Second, in the past several decades, the Chinese economy has undergone an upsurge in entrepreneurship in the private sector¹⁹. However, the tremendous growth of the private sector is unlikely to have been financed by the banking system, which is largely owned by the state (Brandt and Li, 2003; Song *et al.*, 2011). As a unique financing vehicle at the intersection of the banking system and the stock market, share pledging is a significant supporting practice for China's economic growth, especially from the private sector. Therefore, regulators and investors would benefit from examining whether tighter regulatory reforms can prevent controlling shareholders from engaging in activities that reduce firm value while relaxing the financial constraints of firms to support their operations and increase their value.

Third, most previous Chinese studies used the 2013 regulatory shock as a quasi-natural experiment and documented that share pledging impairs firm value (Li *et al.*, 2020; Meng *et al.*, 2019; Xie *et al.*, 2016; Zheng *et al.*, 2014). In early 2018, the CSRC began

¹⁷ See Appendix (C) for a detailed account.

¹⁸ For example, in US, skeptics suggested a blanket prohibition on pledging, while advocates argued that permitting it through recourse loans could alleviate the adverse incentives it creates (Scott and Seelig, 2013).

¹⁹ For example, by the end of 2017, privately owned enterprises contributed more than 50% of tax revenue, 60% of GDP, 70% of technological innovation, 80% of urban employment, and 90% of new jobs and firms to the Chinese economy. Source: President Xi Jinping's speech at the Privately Owned Enterprises Symposium on 1 November 2018. Available at: http://www.xinhuanet.com/politics/2018-11/01/c_1123649488.htm (He *et al.*, 2022).

reinforcing the regulations on share pledging. Although Dou *et al.* (2019); Wang and Chou (2018) examined changes in laws on governing directors' voting rights in Taiwan, they documented that firms' Tobin's Q improves significantly²⁰. However, in China, besides the ceiling on the ratio of shares pledged, other measures, such as restricting the usage of pledged funds, banning small-value pledges, and prohibiting pledges involved performance commitments. Moreover, the impact of these measures on controlling shareholders' motivation to expropriate minority shareholders and how to restrict their activities that damage firm value, are still unclear.

Therefore, this study attempts to fill this gap. To the best of our knowledge, this study is the first to explore such aspects of pledging regulation. To accurately capture the effect of the new share pledging regulatory reforms, we restricted our sample to three years before and after the reform (2015–2020). We synthesised two variables as a proxy of firm value, the first is a short-term accounting indicator—net profit to total assets (*ROA*)—to measure firm performance (Xie, et al., 2016; Zheng, *et al.*, 2014); the second is a long-term market indicator—Tobin's Q (*TOBINQ*)—to measure the growth of firm value in the long run (Dou *et al.*, 2019; Singh, 2018; Wang and Chou, 2018)²¹. Following Wang and Chou (2018), we apply the difference-in-differences (DID) approach to examine the difference in performance/value between the pledging firms (treatment group) and the non-pledging firms (control group), since non-share pledging firms theoretically should not be affected by new regulatory reforms.

²⁰ Refer to the passage of the 2011 amendment to the Company Act in Taiwan (Wang and Chou, 2018). In 2011, the Taiwanese legislature introduced and passed a new statute that abolished the voting rights of a portion of an insider's pledged shareholdings that exceeds 50% of their total beneficial ownership (Dou *et al.*, 2019).

²¹ Dou *et al.* (2019); Wang and Chou (2018) use cumulative abnormal return (CARs) to measure the market reaction; we did not adopt CARs as a proxy, mainly because since the outbreak of COVID-19 from December 2019 in China, stocks exhibit extreme asymmetric volatility that correlates negatively with stock returns (Ramelli and Wagner, 2020). Therefore, using CARs as a proxy may underestimate the firm value.

We first examine the interaction effect between share pledging and regulatory reforms on firm value. The results show that new regulatory reforms positively affect firm performance and value. We further conduct a channel analysis to illustrate how regulatory reforms transform the negative effect of controlling shareholders' activities on firm value into a positive one. The analysis shows how tighter regulatory requirements reverse controlling shareholders' motivation and behaviour by reducing firm crash risk, relaxing financial constraints, reducing bankruptcy risk, and mitigating controlling shareholder expropriation of wealth via tunnelling.

Finally, we explore the effects of relaxing financial constraints and find that the average pledged funds invested in listed firms by controlling shareholders increased 3.2% more than before the establishment of regulatory reforms. Driven by the tighter requirements, controlling shareholders generate more personal loans²² back to the listed firm, which fosters firm capital investment and R&D expenditure, and positively affects firm growth and competitiveness.

This study contributes to the literature in two ways. First, our findings empirically support the assertion that by adjusting the regulations, share pledging can be an effective external financial vehicle, positively affect firm growth, benefit real economics, especially from the private sector, and further support the legality of share pledges in China's capital market²³. This study enriches the literature by filling the existing research gaps and may, therefore, provide a complete perception of the share pledging business in

²² Share pledges are used by controlling shareholders either to offer collateral for their personal loans or to provide additional collateral for loans availed by the firm. Here, we refer to 'personal loans' as the former.

²³ On Sept. 6 2021, the director of the listing department of the CSRC announced at the *2021 Beijing Financial Street Forum*, that "after more than three years implement of the new regulatory, as of the end of June 2021, the financing balance dropped to RMB 1.7 trillion, a decrease of 59% and 36% from the peak respectively. Percentage of market value of share pledge from 10.86% in 2017, 9.75% in 2018, fall to 7.97% in 2019, 5.66% in 2020, the risk of share pledges has been substantially mitigated". (Source: China Financial Stability Report (2020); Oriental Fortune Network).

China.

Second, previous studies argue that share pledging stifles firm innovations because pledges lead controlling shareholders to a potential risk of losing control right, as well as reduce the risk tolerance of investments (Pang and Wang, 2020; Wang et al., 2020). Wang et al., (2020) called on policy-makers to introduce effective regulatory reforms on share pledging. Our findings partially answer their call, as restricting the usage of pledged funds reduces controlling shareholders' potential risk of losing the control rights of their firm, and driving controlling shareholders to plough more pledged funds back to listed firms, which fosters firm capital investment and R&D expenditure, and increases firm long-term value. As such, our study extends the literature on finance, capital investment, and R&D expenditure.

This paper proceeds as follows. Section 2 reviews the related literature, and institutional background and develops the hypotheses tested in the study. Section 3 discusses the sample selection and data, while Section 4 reports the empirical analysis. Section 5 presents the robustness tests, Section 6 presents further analysis, and Section 7 concludes the study.

3.2 Related Literature, Institutional Background, and Hypothesis Development

3.2.1 Related Literature

Using the Taiwanese reform in 'restricted voting rights' in 2011 that exogenously decreased pledging, Dou *et al.* (2019) documented a negative causal effect of pledging on shareholder wealth. They found that share pledging causes severe price falls, which triggers margin calls and exacerbates the crash risk of pledging firms, and that insider pledging is associated with reduced firm risk-taking. Moreover, they reported that risk reduction incentives can destroy shareholder value as they can create an under-investment problem whereby insiders cause the firm to forego risky but profitable investment projects.

Dou *et al.* (2019) and Wang and Chou (2018) also showed that after the changes in the law governing directors' voting rights, Tobin's Q for firms with share pledging showed considerable improvements. Anderson and Puleo (2020), using data of randomly selected S&P 1500 firms, documented an economically and statistically significant positive relation between insider pledging and equity risk, suggesting that corporate insiders appear to be extracting private benefits through pledging activities at the expense of outside shareholders. Using data from India, Singh (2018) found that share pledges for personal loans reduce the effective ownership of controlling shareholders and destroy firm value. In contrast, share pledges for firm loans can mitigate problems associated with the limited pledgeability of cash flows and may increase firm value. Anderson and Puleo (2020) and Singh (2018) also suggested that stricter disclosure requirements for insider pledges in the US and India may improve governance quality.

Chinese studies on share pledging are mostly focused on its causes and economic consequences. Regarding causes, Li *et al.* (2020) suggested that the largest shareholders pledge greater fractions of their holdings when their firms belong to growth industries, are less profitable, are non-SOEs, or have higher leverage. Guo *et al.* (2020) found that shareholders pledge shares to reduce the financial constraints of their non-listed holdings. Regarding consequences, pledging shareholders who fear the loss of their control rights over listed firms are likely to alter their decisions, through earnings management (DeJong *et al.*, 2020), corporate innovation (Pang and Wang, 2020; Wang *et al.*, 2020), and mergers and acquisitions (Zhu *et al.*, 2021). Share pledging is also believed to destroy firm value because of large shareholders' expropriation (Li *et al.*, 2020; Xie *et al.*, 2016; Zheng *et al.*, 2014) and reduced corporate risk-taking (Meng *et al.*, 2019). The negative returns have also been found to be contagious amongst highly pledged stocks in adverse market circumstances (Li *et al.*, 2020). An exception to this trend is that

reported by Pan and Qian (2019), who documented a positive shareholder wealth effect in China. As mentioned earlier, most of these studies explored the situation before the 2018 share pledging regulatory reforms and only partially depicted the share pledging business.

3.2.2 Institutional background

In 1995, the Guarantee Law clarified the legality of share pledges, thus prompting a few companies to engage in share pledging. The business experienced growth after the 2007 Property Law consolidated the legality of share pledges. Table 1 shows the annual distribution of share pledges from 2007 to 2020²⁴. Before 2013, share pledging was organised in the over-the-counter (OTC) market, which was relatively small. Commercial banks and trust firms were the major lenders in this market. In 2013, as a major financial innovation encouraged by the CSRC, the Shanghai Stock Exchange, Shenzhen Stock Exchange, and China Securities Depository and Clearing Corporation Limited (CSDC) jointly launched a centralised pledging system in the two stock exchanges. In the exchange market, securities firms became the dominant lender²⁵. Before 2013, only banks and trust firms were qualified to grant share pledging loans to pledgors (borrowers); however, the guidance allowed securities firms to engage in the business of share pledging transactions. Compared with banks and trust firms, security firms set fewer restrictions on the use of loans and approved transactions more rapidly. Consequently, since the issuance of the guidance, share pledging transactions have grown rapidly (Meng *et al.*, 2019). Panel A of Figure 1 shows the trend in the number of controlling

²⁴ For the data selection process and source, see Section 3.1 (Sample Selection).

²⁵ On 24 May 2013, the Shanghai Stock Exchange and CSDC issued ‘The Guidance on Stock Pledge Repurchase Transactions, Registration and Settlement’. Issuing the guidance was aimed at improving the efficiency of the registration and settlement process of share pledging transactions and reducing the cost of pledging.

shareholders' share pledging transactions during the period from 2007 through 2020. The year-on-year increases in the ratio based on 2013 stood at 4.7% (2014), 11.6% (2015), 11.77% (2016), and 15.76% (2017).

The risk associated with share pledging drew increasing attention from regulators and investors as it grew into a huge market. In the 2015 A-share market crash, many pledging shareholders received margin calls owing to the significant drops in share prices and collateral values (Bian *et al.*, 2021). Many of them were unable to fulfil the margin requirements and were forced to sell their shares. This caused even more significant price drops for the pledged shares and other shares they held, resulting in widespread panic across the market. Since then, the seemingly oversized share pledging market has been believed to be a new source of systemic risk in the Chinese financial system.

In March 2018, the CSRC began reinforcing the regulations on share pledging²⁶. Since then, the Chinese share pledging market shrank gradually. In 2018, 2019, and 2020, the year-on-year increase ratios decreased to 0.43%, -0.31%, and -0.83%, respectively. Panel B of Figure 1 shows the trends in the number and percentage of controlling shareholders' share pledging transactions from 2015 to 2020. The mean of the percentage of share pledging declined after 2016.

INSERT TABLE 1 HERE

INSERT FIGURE 1 Panel A and Panel B HERE

3.2.3 Hypothesis Development

One of the most important provisions of the new regulation is as follows: 'For a listed firm, the total number of shares pledged could not exceed 50% of its total shares; for a single pledgor, the overall shares pledged could not exceed 60% of this pledgor's

²⁶ For details of reinforced regulations on share pledging, see appendix (D).

total holdings'. Although this provision is more binding on controlling shareholders whose current share pledge ratio is close to 50%, the reinforcing of relevant regulatory requirements, including the upper limit of the pledge ratio, usually has policy spillover effects, which will also affect the pledging willingness of controlling shareholders with a low pledge ratio (Boehmer *et al.*, 2020). Consequently, they are more cautious in reducing the pledge ratio and reserving more space for maintaining the stability of the stock price in future (Xu *et al.*, 2021). As the controller is the real decision maker of a listed firm, the controlling shareholders face not only the immense pressure brought by debt repayment but also the possibility of losing control over the firm if price declines worsen and if they fail to meet the margin call. Therefore, controlling shareholders are most concerned about keeping the stock price of their pledged shares above the margin call line to protect their control rights. As the share pledge ratio drops for both firms and a single pledgor, controlling shareholders' motivation to maintain the stability of the stock price is reinforced on the one hand, and the possibility of default risk in share pledging is lower on the other hand, as controlling shareholders retain more unpledged shares. Therefore, we presume that imposing a ceiling on the ratio of shares pledged may effectively decrease the possibility of triggering margin calls by the lender; hence, crash risk and the possibility of forced liquidation are reduced, and firm value increases.

As another important provision, 'share pledging funds were only allowed to be used in the real economy. Moreover, investments in obsolete industries²⁷ and the stock market were prohibited'. Before the reinforcing of regulatory reforms, shareholders can use pledged funds in various flexible ways, including making investments, paying off debts, and/or spending on other personal expenses, such as home decoration, college tuition, or

²⁷ Obsolete Industries refer to investing in projects listed in the catalogue of eliminated industries or in violation of national macro-control policies and environmental protection policies; http://www.sse.com.cn/lawandrules/sserules/trading/stock/c/c_20180112_4449493.shtml.

large purchases (Larcker and Tayan, 2010). Currently, this restriction on the usage of pledged funds implies that controlling shareholders' use of funds through share pledging for personal consumption, investment in other businesses and investment in financial products is prohibited; in other words, the obtained funds should be invested in the operation of firms and serve the real economy, thus increasing corporate performance as well as firm value. This provision ensures that controlling shareholders may not be able to use pledged funds to purchase listed firm stakes, such as Yao of Baoneng attempting to acquire Vanke.

Another provision states that 'small-value share pledging is banned, and that the transaction value had to be larger than 5 million RMB'; in other words, regulators reinforce the limitation on share pledging for personal consumption and purchase of other firms' stocks by shareholders. This provision also implies that the Shanghai Stock Exchange, Shenzhen Stock Exchange, and CSDC will reinforce the supervision of the disclosure of share pledge information to ensure that pledged funds meet the requirements. Pan and Qian (2019) reported a positive shareholder wealth effect of insiders pledging firm stocks as collateral for personal loans through intercorporate borrowing and explained that the funds that insiders receive flow into firms to relax the firms' financial constraints and that the increases in outside shareholder wealth are larger for financially constrained firms. Based on data on India, Singh (2018) found that share pledges for personal loans reduce the effective ownership of controlling shareholders and destroy firm value, whereas share pledges for firm loans can mitigate problems associated with the limited pledgeability of cash flows and further increase firm value. Therefore, we expect that the two provisions about the restriction on the usage of pledged funds and banning small-value share pledging for shareholders can effectively reduce the financial constraints of listed firms, reinforce the supervision over the disclosure of share pledge

information, mitigate the agency conflicts between controlling and minority shareholders, and reduce their motivation to expropriate minority shareholders via tunnelling.

The last important provision of the new regulation is that ‘pledged shares involved in performance commitments to share compensation are prohibited from financing through share pledging.’ This provision means that firms with performance commitments will be excluded from allowing share pledge financing, and the firms that are allowed to implement share pledges for financing would be free from pressure brought by performance commitments. Meeting performance commitment targets is the main motivation for controlling shareholders to engage in earnings manipulation (DeLong *et al.*, 2019), which increases firms’ business risk, and causes firms to face greater bankruptcy risk (Singh, 2018), thereby reducing firm value. The implementation of this provision will effectively address the aforementioned issues. Therefore, we propose that prohibiting pledged shares involved in performance commitments effectively reduces controlling shareholders’ motivation to make firm performance ‘look good’ and decrease firms’ business risk, thereby reducing bankruptcy risk and the negative effect on firm value.

Based on the above discussion, we propose the following main hypothesis:

H1: New tighter regulatory requirements of share pledging significantly alleviate the negative effect of controlling shareholders’ activities on firm value, thus improving firm value.

In gaining further insight into the underlying channels, we propose the following hypotheses:

H2a: Imposing a ceiling on the ratio of shares pledged effectively reduces firm crash risk.

H2b: Setting restrictions on the usage of pledged funds and banning small-value share pledging effectively reduces the financial constraints of listed firms and mitigates

the controlling shareholder expropriation of minority shareholders' wealth via tunnelling.

H2c: Prohibiting share pledging involved in performance commitments effectively reduces firms' bankruptcy risk.

3.3 Sample Selection and Data Discussion

3.3.1 Sample Selection

Our initial sample included all Chinese listed firms (A-shares) from 2015 to 2020. We selected 2015 as the baseline year because we needed observations from three years before the policy reform, which was implemented in 2018. The firms' financial data are collected from the China Stock Market and Accounting Research (CSMAR) database²⁸. Consistent with previous studies, we exclude observations in financial industries owing to their atypical characteristics in terms of operation, and reported and deleted the observations with missing data to calculate variables. The final sample comprises 18,261 firm-year observations. To reduce the influence of outliers, we winsorize all the continuous variables at the 1st and 99th percentiles. We use robust standard errors clustered at the firm level in each regression to mitigate concerns regarding heteroscedasticity and serial correlation in the error term (Petersen, 2009).

3.3.2 Descriptive Statistics

Table 2 presents the descriptive statistics for our main variables. Panel A presents the full sample, the average 47.4% of firms have pledged shares, and the mean (median) values of *ROA* and *TOBINQ* are 3.2% (3.6%) and 2.245 (1.659), respectively. Regarding the firm characteristic variables, the average firm size (*SIZE*) is 22.257 in the natural logarithm of the total assets. The leverage ratio (*LEV*) has a mean value of 42.70%. Panel

²⁸ The CSMAR database is an economic and financial database developed by the Shenzhen Sysma Data Technology Co., Ltd. for academic research.

B presents the values for our main variables for pledged firms. The mean values of *ROA* and *TOBINQ* are 3.3% and 2.364, respectively. Panel C presents the values for the variables for non-pledged firms. The mean values of *ROA* and *TOBINQ* are 3.1% and 2.137, respectively. By comparing the two subsamples we find that corporate performance and firm value are higher in pledged firms than in non-pledged firms.

INSERT TABLE 2 HERE

Table 3 presents the differences-in-differences analyses of *ROA* and *TOBINQ* for the two subsamples. Panel A reports the *ROA* results. The difference-in-differences test shows that the difference in the change in the mean *ROA* between pledged and non-pledged firms is 2.4% and is significant at the 1% level. This result indicates that compared with non-pledged firms, pledged firms experienced a more significant increase in *ROA* following the regulatory reforms. Panel A of Figure 2 shows the trend change of *ROA* between pledged and non-pledged firms from 2015 to 2020. Before 2018, the *ROA* of pledged firms was lower than that of non-pledged firms; however, after 2018, the *ROA* of pledged firms exceeded that of non-pledged firms.

Panel B shows the results of *TOBINQ*. The DID test shows that the difference in the change in the mean *TOBINQ* between pledged firms and non-pledged firms is 0.404 and is significant at the 5% level. This result indicates that compared with non-pledged firms, pledged firms experienced a significant increase in *TOBINQ* following the regulatory reforms. Panel B of Figure 2 shows the trend changes of *TOBINQ* between pledged and non-pledged firms from 2015 to 2020. Before 2018, the *TOBINQ* of pledged firms was lower than that of non-pledged firms; however, after 2018, the *TOBINQ* of pledged firms exceeded that of non-pledged firms. Overall, the above estimates with DID analysis meet our expectations.

INSERT TABLE 3 HERE

INSERT FIGURE 2 Panel A and Panel B HERE

3.4 Empirical Analysis

3.4.1 Model Specification

3.4.1.1 Firm performance/value

Drawing on research on share pledging (Wang and Chou, 2018), we estimated the following DID approach to examine (1) the general relationship between corporate performance (*ROA*), regulatory reforms (*POST*), and the interaction effects between share pledging and regulatory reforms (*PLEDGE*POST*); and (2) the relationship between firm value (*TOBINQ*), regulatory reforms (*POST*), and the interaction effects between share pledging and regulatory reforms (*PLEDGE*POST*).

It should be stressed that we adopt several strategies to address endogeneity concerns. In particular, we control for firm fixed effects throughout our regression analysis to mitigate the concern about the unobserved time-invariant firm characteristics that may affect both regulatory reforms and firm value. Additionally, we perform propensity score matching to mitigate the concern about the functional form misspecification problem. We further conduct regression tests with share pledging ratio, dynamic analysis, and the placebo test, and adopt alternative variables probing to mitigate the concerns about reverse causality and other potential omitted variables.

$$ROA_{i,t} = \beta_0 + \beta_1 PLEDGE_{i,t} * POST_{i,t} + \beta_2 POST_{i,t} + \gamma CONTROLS_{i,t} + \sum YEAR + \sum FIRM + \varepsilon_{i,t} \quad (1)$$

$$TOBINQ_{i,t} = \beta_0 + \beta_1 PLEDGE_{i,t} * POST_{i,t} + \beta_2 POST_{i,t} + \gamma CONTROLS_{i,t} + \sum YEAR + \sum FIRM + \varepsilon_{i,t} \quad (2)$$

where i denotes the firm, t denotes the year, *YEAR* is the year fixed effects, *FIRM* is the firm fixed effects, and ε is the error term. In models 1 and 2, the dependent variables

are *ROA* and *TOBINQ*, respectively; a dummy variable for controlling shareholder share pledging, *PLEDGE*, is set to 1 for the treatment group and 0 for the control group; we set *POST* as an indicator variable is equal to 1 for the year>2018 and 0 otherwise. We performed a regression analysis using ordinary least squares (OLS) with *t*-statistics robust to heteroscedasticity and clustering at the firm level. The other variables are defined in Appendix A.

Following extant studies, we controlled the relevant factors in models 1 and 2 as follows. We included the percentage holding of the largest shareholder (*FIRST*) to control for the institutional shareholders' monitoring effects (Gotti *et al.*, 2012; Mitra *et al.*, 2007). The divergence between cash flow rights and control rights (*SEP*) owing to their significant effects on agency problems were controlled (Claessens *et al.*, 2002)²⁹, thus influencing firm performance and value. Following Anderson and Puleo (2020) and Singh (2018), we controlled for the following: the proportion of independent directors on the board to reflect governance effects (*INDEP*), size effects (*SIZE*) given that large companies are generally more stable, the ratio of total liabilities to total assets (*LEV*), and cash holding (*CASH*) given that the companies that lost money in the previous year are more likely to report unstable accrued profits. *BIG 4* and the audit opinion (*OPINION*) were controlled for an auditor-specific effect (Zhang *et al.*, 2007). We controlled the corporate ownership structure (*SOE*) because the non-SOE controlling shareholders face more serious financing constraints (Faccio, 2006). We also controlled R&D intensity for innovation (*R&D*) because it captures the effects of agency problems related to contracting imperfections typically associated with greater innovation (Anderson and Puleo, 2020).

²⁹ The definition of the cash flows and control rights of the ultimate owners is the same as in Claessens *et al.* (2002), where cash flow rights are measured by the sum of the products of the proportion of ownership along the control chains, and the control rights are measured by the minimum proportion of ownership along the control chains.

3.4.1.2 Channel Analysis

Following previous literature (e.g. Chen *et al.*, 2001; Kim *et al.*, 2011), we use the negative conditional return skewness (*NCSKEW*) as our primary measure of stock price crash risk. We calculate *NCSKEW* by taking the negative of the third moment of firm-specific weekly returns scaled by the standard deviation of firm-specific weekly returns raised to the third power. The alternative measure of stock price crash risk is ‘down-to-up volatility’ (*DUVOL*), which is calculated as the log of the ratio of the standard deviation on negative firm-specific return periods to the positive periods. Therefore, *DUVOL* captures asymmetric volatilities between down periods and up periods.

Following Almeida *et al.* (2004) and Pan and Qian, (2019), we use the SA index (*SA*, based on Hadlock and Pierce, 2010) as a measure of firm financial constraints. Firms with a higher *SA* score are more likely to experience difficulties when financial conditions worsen because they may have difficulty financing their ongoing operations.

To shed light on the controlling shareholder expropriation of wealth via the tunnelling channel, following Jiang *et al.*, 2015; Liu and Tian (2021), we use controlling shareholders’ tunnelling activities to evaluate the agency conflict between controlling and minority shareholders. We evaluate the controlling shareholder’s tunnelling based on inter-corporate loans (also called funds occupation) developed by Jiang *et al.* (2010). We also use other receivables to total assets (*OTHER*) to evaluate inter-corporate loans to controlling shareholders.

Following previous literature (e.g. Charitou *et al.*, 2011; Franzen *et al.*, 2007; Singh, 2018), we used Altman’s Z-score (*ZSCORE*) to proxy for firm bankruptcy risk; a higher *ZSCORE* indicates a low risk of bankruptcy.

To test the channel analysis, we then construct the following DID model:

$$CHANNEL_{i,t} = \beta_0 + \beta_1 PLEDGE_i * POST_{i,t} + \beta_2 POST_{i,t} + \gamma CONTROLS_{i,t} + \sum YEAR + \sum FIRM + \varepsilon_{i,t} \quad (3)$$

CHANNEL is an umbrella term that captures the following five dependent variables, *NCSKEW*, *DUVOL*, *SA*, *OTHER*, and *ZSCORE* where i denotes the firm, t denotes the year, *YEAR* is the year fixed effects, *FIRM* is the firm fixed effects, and ε is the error term. *PLEDGE* as a dummy variable, is set to 1 for the treatment group and 0 for the control group; we set *POST* as an indicator variable equal to 1 for the post-regulatory reform period and equal to 0 for the pre-regulatory reform period. We perform a regression analysis using OLS with t-statistics robust to heteroscedasticity and clustering at the firm level. The independent variables and other variables are defined in Appendix A.

3.4.2 Empirical Results

3.4.2.1 Main Results

Table 4 presents the results of the baseline regression. Column 1 shows that *POST* is positively related to *ROA* and significant at the 1% level. Column 2 shows the results after the addition of the control variables, *POST* is significantly positively related to *ROA*, and the interaction between *POST* and *PLEDGE* is positively related to *ROA* and is significant at the 1% level. This indicates that after the regulatory reforms, controlling shareholders, as firm decision makers, changed their motivation and behaviours, thereby transforming the negative effect of the share pledging business into a positive one and helping firms improve the ability to obtain profits and increase short-term performance. Column 3 shows similar results to *TOBINQ*, the impact of *POST* becomes positive to *TOBINQ*, significantly at the 1% level. Column 4 shows the results after the addition of the control variables. The interaction between *POST* and *PLEDGE* is positively related to *TOBINQ* and significant at the 5% level. This result suggests that tighter requirements for share pledging also change controlling shareholders' motivation, driving them to focus more on long-term firm performance. This changes the effect of share pledging on

firm value from negative to positive. In sum, these findings suggest that new regulatory reforms for share pledging may significantly alleviate the destructive effect of controlling shareholders' activities on firm value and improve overall firm performance and value. Therefore, hypothesis 1 is supported.

INSERT TABLE 4 HERE

Regarding the control variables, Columns 2 and 4 of Table 4 show that *SEP* is insignificantly negatively related to *ROA* but insignificantly positively related to *TOBINQ*, this result seems to contradict our proposition and the classical literature (e.g. Claessens *et al.*, 2002). The possible reason is the influence of our sample interval. After the regulatory reforms in 2018, the separation of control rights and cash flow rights weakened the effect on firm performance. The results of *FIRST*, *INDEP*, *SIZE*, *LEV*, *CASH*, *BIG4*, *OPINION*, *SOE*, and *R&D* are all consistent with those in the existing literature.

3.4.2.2 Channel Analysis Results

Table 5 shows the results of the channels analyses. In Column 1, the coefficient of *PLEDGE*POST* is negatively related to *NCSKEW* and significant at the 1% level. This result indicates that the interaction effect between share pledging and regulatory reforms results in a lower *NCSKEW*. In Column 2, the coefficient of *PLEDGE*POST* is negatively related to *DUVOL* and significant at the 1% level. A lower *DUVOL* means that the risk of a stock price crash is lower. This result suggests that tighter regulatory requirements motivate controlling shareholders to take caution to avoid firm crash risk compared with before the reforms. The result is consistent with hypothesis 2a.

In Column 3, the coefficient of *PLEDGE*POST* is negatively related to *SA* and significant at the 1% level. This indicates that the interaction effect between share

pledging and regulatory reforms results in a lower *SA*. This result suggests that tighter regulatory requirements drive the flow of controlling shareholders' pledged funds back to listed firms to support firm operation and reduce firms' financial constraints³⁰. In Column 4, the coefficient of *PLEDGE*POST* is negatively related to *OTHER* and significant at the 10% level. This result suggests that regulatory reforms also limit controlling shareholders' motivation to exploit shareholders' wealth through tunnelling behaviours. Collectively, the results support hypothesis 2b.

In Column 5, the coefficient of *PLEDGE*POST* is positively related to *ZSCORE* and significant at the 5% level. This indicates that the interaction effect between share pledging and regulatory reforms results in a higher *ZSCORE*. Higher *ZSCORE* means a low risk of bankruptcy, suggesting that new regulatory reforms motivate controlling shareholders to reduce business risk and avoid share pledging default.³¹ Therefore, hypothesis 2c is supported.

INSERT TABLE 5 HERE

3.5 Robustness Tests

3.5.1 Propensity Score Matching Approach

We perform PSM analysis to control for observed differences between pledged firms and non-pledged firms. Specifically, to obtain propensity scores, we run a logit regression to calculate the likelihood of a firm with shareholder pledging (*PLEDGE*=1), which provides estimates given the function on firm-level financial characteristics. The variables used in the PSM approach include *FIRST*, *SEP*, *INDEP*, *SOE*, *OPINION*, *BIG4*,

³⁰ We also construct a KZ index following Kaplan and Zingales (1997) as an alternative measure of financial constraints and find that the results are similar.

³¹ Following Singh, (2018), we use Ohlson's O-score (*OSCORE*) as an alternative proxy for firm bankruptcy risk, and find that the results are similar.

SIZE, *LEV*, *CASH*, and *R&D*. We further construct a one-to-one match using a calliper distance of 0.03 from those firms without share pledging (*PLEDGE*=0) to form a control group. Table 6 presents the regression results by using the matched samples. These results are consistent with the previous findings.

INSERT TABLE 6 HERE

3.5.2 Regression Test with Share Pledging Ratio

Following He et al., (2022), we use share pledging ratio (*PLEDGE_R*) as an alternative proxy for the pledges dummy variable, which is a continuous variable defined as the percentage of shares pledged by the controlling shareholders in the year end out of the total firm shares. Using continuous variables can eliminate the effects of changes in transaction quantities since share pledging declines dramatically after regulatory reforms. Table 7 reports the estimation results, In Columns 1 and 2, the coefficient of *PLEDGE_R*POST* is positively related to *ROA* and *TOBINQ*, significant at the 1% and 5% levels, respectively. The main findings stay qualitatively unchanged with this alternative proxy.

INSERT TABLE 7 HERE

3.5.3 Dynamic Approach Test

To corroborate our results, we further perform a dynamic analysis. We set five indicator variables: *Y2016*, *Y2017*, *Y2018*, *Y2019*, and *Y2020*. Specifically, *Y2016* is equal to 1 for year 2016 and 0 otherwise, *Y2017* is equal to 1 for year 2017 and 0 otherwise, *Y2018* is equal to 1 for year 2018 and 0 otherwise, *Y2019* is equal to 1 for year 2019 and 0 otherwise, and *Y2020* is equal to 1 for year 2020 and 0 otherwise. Table 8 reports the regression results using the dynamic approach. The coefficients on *PLEDGE*Y2016* and *PLEDGE*Y2017* are insignificant. Meanwhile, the coefficients on *PLEDGE*Y2018*,

*PLEDGE*Y2019*, and *PLEDGE*Y2020* are positively significant, suggesting that these results are consistent with our expectation; after regulatory reforms, firm value increases.

INSERT TABLE 8 HERE

3.5.4 Placebo Test

Following previous studies, we employ a non-parametric permutation test to make a statistical inference by comparing the actual estimated coefficients with the distribution of placebo coefficients estimated when pledged firms' identity is randomly assigned to observations. To conduct the test, we randomly assign pledged and non-pledged to observations without replacement 500 times. We then estimate the regression of our main models using each of the 500 randomly drawn placebo assignments. In Figure 3, we plot the distribution of the estimated coefficients on *PLEDGE*POST* when the dependent variables are *ROA* and *TOBINQ* from the 500 sets of regressions and determine the location of the coefficient from the actual dataset. As expected, the distribution of placebo coefficients is centred around 0, and none of the estimates is more positive than our true estimates. The results indicate that the actual estimated regulatory effect is unlikely to be owing to accidental factors.

INSERT FIGURE 3 Panel A and Panel B HERE

3.5.5 Further Alternative Probing

As China's real estate industry shows the characteristics of virtualisation similar to the financial industry, we further exclude real estate firms from the sample using the same basis as that used for excluding financial firms. We replace *ROA* with net profit divided by total equity (*ROE*) and with EBIT divided by total assets (*ROI*). Table 9 presents the regression results by using these alternative variables. The coefficients on

*PLEDGE*POST* are both significantly positive, which is consistent with the previous findings.

INSERT TABLE 9 HERE

3.6 Further Analysis

We conduct further analysis to examine the effects of relaxed financial constraints. Although we find that tighter requirements relax a firm's financial constraints and positively affect firm value, the underlying mechanism is still ambiguous. Conventional wisdom suggests that loans obtained by controlling shareholders may flow back to the listed firms via borrowings, equity investments, or other related-party transactions (e.g. Meng et al., 2019; Pang and Wang, 2020)³². However, some researchers argue that a large fraction of share pledging used by controlling shareholders may support their entrepreneurial activities or invest in listed firms (Guo *et al.*, 2020; He et al., 2022). If the funds obtained through share pledging are not invested in the firm, the firm's financial constraints will not be relieved (Singh, 2018). To identify how pledged funds influence the relaxation of a firm's financial constraints, we conduct this underlying mechanism analysis in two steps. First, we collect the disclosure information of the share pledge in CSMAR and divide it into three categories according to the pledged funds usage, personal loans, firm loans, and financing third parties. Following Pan and Qian (2019), we expect that firm loans and financing third parties within the scope can relax the firm's financial constraints directly.

Second, because listed firms are not required to disclose the purpose of share pledges by shareholders, we are unable to directly investigate information regarding

³² Meng et al. (2019) suggested that share pledging is a financing channel for firms heavily dependent on external financing. Pang and Wang (2020) argued that compared with traditional external financing, share pledging is an easier, faster, and less costly financing channel for listed firms.

personal loans. We, therefore, adopt indirect measures to replace it. We select capital investment projects and R&D expenditure as our measures of controlling shareholders' investment by their personal loans, as they can significantly affect firm value and competitiveness, especially from long-term growth (Pang and Wang, 2020; Wang, et al., 2020), which is also impeded by the firm's financial constraints (Brown et al., 2009; Hsu et al., 2014). We presume that controlling shareholders are the ultimate decision-makers of the firm and, under the new restriction of the usage of pledged funds, if the firm's financial constraint is relaxed, their best option is to invest personal loans into projects that generate profits for the firm. If this financial constraint relaxation hypothesis is correct, we should be able to observe a positive relationship between relaxed financial constraints and firm capital investment, as well as R&D expenditure.

To test these predictions, we employ a regression model of the following specification:

$$INVEST_{i,t} = \beta_0 + \beta_1 POST_{i,t} + \gamma CONTROLS_{i,t} + \sum YEAR + \sum INDUSTRY + \sum FIRM + \varepsilon_{i,t} \quad (4)$$

INVEST is an umbrella term that captures the following three dependent variables, *PROJECT*, *CAPX* and *R&D*. *PROJECT* is a dummy variable that equals 1 if pledged funds invest to firm, 0 otherwise; *CAPX* and *R&D* are dependent variables, respectively. *i* denotes the firm, *t* denotes the year, *YEAR* is the year fixed effects, *INDUSTRY* is the industry fixed effects, *FIRM* is the firm fixed effects, and ε is the error term. We set *POST* as an indicator variable equal to 1 for the post-regulatory reform period and equal to 0 for the pre-regulatory reform period. We perform a regression analysis using OLS with t-statistics robust to heteroscedasticity and clustering at the firm level. The independent variable and other variables are defined in Appendix A.

Panel A of Table 10 shows funds invested into firm (*PROJECT*). The mean value

of *PROJECT* for pledged firms in the post-regulatory reforms period (after 2018) is 14.6%, 3.2% higher than that in the pre-regulatory reforms period (before 2018), and the differences in mean are statistically significant at the 1% level. These results indicate that the average percentage of share pledged funds invest to listed firms increases 3.2% more after regulatory reforms than before it.

INSERT TABLE 10 HERE

Panel B of Table 10 shows the results of the effects of relaxed firm's financial constraints. In Column 1, with *PROJECT* as the dependent variable, coefficient *POST* is positively related to *PROJECT* and significant at the 1% level, indicating that regulatory reforms positively affect share pledges funds flow back to the listed firm. In Columns 2 and 3, with *CAPX* and *R&D* as the dependent variable respectively, the coefficients of *POST* are positively related to *CAPX* and *R&D*, both significant at the 1% level, suggesting that regulatory reforms relax firm's financial constraints, and the relaxation of financial constraints positively affect firm capital investment and R&D expenditure. More investment in capital investment projects and R&D expenditure will benefit firm growth and competitiveness, hence, increasing firm long-term value.

3.7 Conclusion

Extant literature on share pledging in China mostly focused on the regulatory shock that took place in May 2013 and found that share pledging had likely had a negative effect on firm value. This study utilises the 2018 regulatory framework reforms as a quasi-natural experiment and investigates the effect of tighter regulations on firm value as well as explores the mechanism through which adjusting pledging regulations affects value. Our findings show that tighter regulatory requirements, such as the cap in share pledge

ratio, restricting the usage of pledged funds, banning small-value pledges, and prohibiting share pledges involved in performance commitments, can effectively reduce firms' crash risk, relax financial constraints, reduce bankruptcy risk, and mitigate controlling shareholder expropriation of minority shareholders wealth via tunnelling. These effects significantly alleviate the destructive effect of controlling shareholders' activities on firm and increase firm value.

We also demonstrate that regulatory reforms relax firm's financial constraints, as well as drive controlling shareholders to plough more pledged funds back to listed firms, which in turn, fosters firm capital investment and R&D expenditure, benefits firm growth and competitiveness and ultimately increases firm long-term value.

Our findings not only have significant implications for policymakers and investors facing share pledge reforms in China but also for regulators in other economies with similar concentrated ownership structure, specifically, restricting the usage of pledged funds and prohibiting share pledges involved in performance commitments.

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3.8 Appendix C

Appendix (A): Definitions of Variables

Dependent variables	Definition
<i>ROA</i>	Return on assets, the ratio of net profit to total assets (source: CSMAR)
<i>TOBINQ</i>	Sum of the market value of equity and the book value of debt scaled by total assets (source: CSMAR)
<i>NCSKEW</i>	The negative of the third moment of firm-specific weekly returns scaled by the standard deviation of firm-specific weekly returns raised to the third power (source: CSMAR)
<i>DUVOL</i>	The down-to-up volatility that is calculated as the log of the ratio of the standard deviation on negative firm-specific return weeks to positive weeks (source: CSMAR)
<i>SA</i>	A measurement for firms' financial constraints calculated based on Hadlock and Pierce (2010) (source: CSMAR)
<i>ZSCORE</i>	Altman Z-score (Altman, 1968), which is a formula for determining whether a company is headed for bankruptcy (source: CSMAR)
<i>OTHER</i>	Other receivables scaled by total assets (source: CSMAR)
<i>CAPX</i>	Cash paid for the construction of fixed assets, intangible assets and other long-term assets scaled by total assets (source: CSMAR)
<i>R&D</i>	R&D expenditure scaled by total operating income (source: CSMAR)
<i>PROJECT</i>	Dummy variable, equal to 1 for share pledged funds flow to firms and 0 otherwise (source: CSMAR)
Independent variables	Definition
<i>PLEDGE</i>	Dummy variable, equal to 1 for firms with share pledges during the period from 2015 through 2020 and 0 otherwise (source: CSMAR)
<i>PLEDGE_R</i>	The percentage of shares pledged by the controlling shareholders scaled by the total shares of the listed firm (source: CSMAR).
<i>POST</i>	Indicator variable is equal to 1 for the year > 2018 and 0 otherwise
<i>ROE</i>	The ratio of net profit to total equity (source: CSMAR)
<i>ROI</i>	The ratio of EBIT to total assets (source: CSMAR)
Control variables	Definition
<i>FIRST</i>	Proportion of shareholding by the largest shareholder (source: CSMAR)
<i>SEP</i>	The difference between the largest shareholder's control rights and cash flow rights (Claessens <i>et al.</i> , 2002) (source: CSMAR).
<i>INDEP</i>	Proportion of independent directors in the board (source: CSMAR)
<i>SOE</i>	Dummy variable, equal to 1 if the firm is owned by state and 0 otherwise (source: CSMAR)
<i>OPINION</i>	Dummy variable, equal to 1 if the firm audit opinion is issued with qualified and 0 otherwise (source: CSMAR)
<i>BIG4</i>	Dummy variable, equal to 1 if the firm is audited by one of the Big 4 auditors and 0 otherwise (source: CSMAR)

<i>SIZE</i>	Natural logarithm of total assets (source: CSMAR)
<i>LEV</i>	Ratio of total liabilities to total assets (source: CSMAR)
<i>CASH</i>	Monetary capital scaled by total assets (source: CSMAR)
<i>YEAR</i>	Year fixed effect
<i>FIRM</i>	Firm fixed effect
<i>INDUSTRY</i>	Industry fixed effect

Appendix (B)

The Chinese A-share index declined from a peak of 5,178 points in 2015 to 3,295 points at the end of 2017. Since February 2018, the index has been recording a rapid decline; it fell below 3,000 and 2,500 points in June and October 2018, respectively. Despite this plunge in the stock index, there has been a surge in the share pledging business. According to the WIND statistics, in 2015, 2016, and 2017, controlling shareholders pledged 1,376, 1,622, and 1,987 companies, respectively. We note an average increase of 20%. By the end of 2017, 97.9% of A-share companies had implemented share pledges. In February 2018, approximately 117 companies (mainly private companies) had already triggered the margin call, possibly having to liquidate their shares. The forced liquidation and auction of the shares of controlling shareholders can result in the translocation of the actual controllers of private enterprises, affect company operations, and drag down other enterprises upstream and downstream of the industrial chain, thereby causing a decline in the economic growth rate. If the share price falls and shares are liquidated, then a large number of banks, securities firms, and trusts would suffer huge losses and even systemic risks. Aware of the huge systemic risks caused by share pledges, the China Securities Regulatory Commission (CSRC) introduced policies to alleviate the problem of share pledging (source: WIND, 2021; Oriental Fortune Network).

Appendix (C)

Yao Zhenhua, the controller of Baoneng, which is a local real estate firm in

Shenzhen. In July 2015, Yao used Baoneng and other companies he controlled to raise money, through share pledging and insurance funding, and acquired a 15% stake of Vanke, a famous Fortune 500 company. He further used the 15% of the stake of Vanke to take six rounds of recycling pledges and purchased another 10.4% stake of Vanke. By the end of 2016, he held 25.4% stake of Vanke and became the largest shareholder. This "snake swallowing elephant" hostile merger caused a strong counterattack from Vanke's management, to fight for the controlling rights of the company, which also alerted the CSRC and the China Insurance Regulatory Commission (CIRC). On 24 February 2017, CIRC punished Baoneng for the illegal use of funds and awarded Yao a 10-year penalty ban in the insurance industry.

Appendix (D)

In March 2018, the CSRC began reinforcing the regulations on share pledging, resulting in the following mandates: i) for a listed firm, the total number of shares pledged could not exceed 50% of its total shares; for a single pledgor, the overall shares pledged could not exceed 60% of this pledgor's total holdings; ii) share pledging funds should only be used in the real economy, and investments in obsolete industries and the stock market are prohibited; iii) small-value share pledging was banned, and the transaction value should be greater than 5 million RMB; iv) pledged shares involved in performance commitments to share compensation are prohibited from financing through share pledging.

3.9 Figures and Tables

Table 1: Annual distribution of controlling shareholders' share pledging during the period 2007–2020

Year	Obs	Number of Pledged Firms	Percent (%)
2007	1,270	400	31.50
2008	1,377	452	32.82
2009	1,486	526	35.40
2010	1,807	739	40.90
2011	2,092	924	44.17
2012	2,252	1,022	45.38
2013	2,222	996	44.82
2014	2,255	1,043	46.25
2015	2,443	1,164	47.65
2016	2,701	1,301	48.17
2017	3,140	1,506	47.96
2018	3,335	1,572	47.14
2019	3,333	1,567	47.01
2020	3,309	1,554	46.96

Table 2: Descriptive statistics

Panel A: Full Sample								
Variable	Obs	Mean	SD	Min	Q1	Median	Q3	Max
<i>ROA</i>	18261	0.032	0.083	-0.447	0.013	0.036	0.066	0.203
<i>TOBINQ</i>	18261	2.245	1.542	0.844	1.247	1.659	2.421	10.167
<i>PLEDGE</i>	18261	0.474	0.499	0.000	0.000	0.000	1.000	1.000
<i>PLEDGE_R</i>	7657	0.035	0.049	0.000	0.005	0.016	0.050	0.256
<i>POST</i>	18261	0.546	0.498	0.000	0.000	1.000	1.000	1.000
<i>NCSKEW</i>	17243	-0.293	0.795	-2.457	-0.713	-0.271	0.139	1.930
<i>DUVOL</i>	17243	-0.194	0.516	-1.387	-0.531	-0.204	0.124	1.163
<i>SA</i>	18261	-3.837	.256	-5.600	-3.998	-3.837	-3.677	-2.112
<i>ZSCORE</i>	18261	5.034	6.177	-1.080	1.787	3.112	5.743	30.392
<i>OTHER</i>	18246	0.052	0.127	0.000	0.005	0.015	0.038	0.919
<i>CAPX</i>	7657	0.047	0.044	0.001	0.015	0.034	0.066	0.223
<i>PROJECT</i>	7657	0.131	0.338	0	0	0	0	1
<i>FIRST</i>	18261	0.338	0.144	0.084	0.226	0.316	0.432	0.737
<i>SEP</i>	18261	0.050	0.075	0.000	0.000	0.000	0.086	0.286
<i>INDEP</i>	18261	0.378	0.054	0.333	0.333	0.364	0.429	0.571
<i>SOE</i>	18261	0.329	0.470	0.000	0.000	0.000	1.000	1.000
<i>OPINION</i>	18261	0.049	0.215	0.000	0.000	0.000	0.000	1.000
<i>BIG4</i>	18261	0.056	0.229	0.000	0.000	0.000	0.000	1.000
<i>SIZE</i>	18261	22.257	1.328	19.654	21.318	22.096	22.996	27.162
<i>LEV</i>	18261	0.427	0.207	0.060	0.263	0.414	0.574	0.966
<i>CASH</i>	18261	0.171	0.118	0.011	0.088	0.141	0.222	0.613
<i>R&D</i>	18261	0.040	0.045	0.000	0.005	0.032	0.051	0.255
Panel B: Pledged Firms								
Variable	Obs	Mean	SD	Min	Q1	Median	Q3	Max
<i>ROA</i>	8664	0.033	0.089	-0.447	0.012	0.035	0.065	0.203
<i>TOBINQ</i>	8664	2.364	1.491	0.844	1.316	1.747	2.520	10.167
Panel C: Non-Pledged Firms								
Variable	Obs	Mean	SD	Min	Q1	Median	Q3	Max
<i>ROA</i>	9597	0.031	0.077	-0.447	0.013	0.036	0.067	0.203
<i>TOBINQ</i>	9597	2.137	1.586	0.844	1.191	1.581	2.331	10.167

Note. This table presents the descriptive statistics for the firms in our sample for the period from 2015 through 2020. Panel A shows the full sample, which includes 18,261 firm–year observations whilst Panels B and C show the descriptive statistics of pledged/non-pledged firms for the two variables, *ROA* and *TOBINQ*; the observations for these variables are 8,664 and 9,597, respectively. All the variables are defined in Appendix C.

Table 3: Differences between pledged and non-pledged firms affected by tighter regulatory reforms for share pledging: *ROA* and *TOBINQ*

Panel A: <i>ROA</i>					
Variable	Year < 2018		Year ≥ 2018		Diff
	N	Mean	N	Mean	
PLEDGE	4313	0.017	4693	0.047	0.030***
NON- PLEDGE	3971	0.028	4693	0.034	0.006***
Diff-in-Diff (PLEDGE-NON-PLEDGE)					0.024***

Panel B: <i>TOBINQ</i>					
Variable	Year < 2018		Year ≥ 2018		Diff
	N	Mean	N	Mean	
PLEDGE	4313	1.597	5284	2.573	0.976***
NON- PLEDGE	3791	1.823	5284	2.395	0.572***
Diff-in-Diff (PLEDGE-NON-PLEDGE)					0.404**

Note. This table presents the difference-in-differences results between pledged and non-pledged firms affected by the tighter regulatory reforms for share pledging in 2018. Panel A shows the results of *ROA*, Panel B shows the results of *TOBINQ*. All the variables are defined in Appendix C. *t* (*z*)-statistics appear in parentheses and are based on standard errors clustered by firm and year. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively.

Table 4: Share pledging – *ROA* and *TOBINQ*

	(1)	(2)	(3)	(4)
	<i>ROA</i>	<i>ROA</i>	<i>TOBINQ</i>	<i>TOBINQ</i>
<i>POST</i>	0.0187*** (7.847)	0.0142*** (5.939)	0.6152*** (14.285)	0.5837*** (12.659)
<i>PLEDGE*POST</i>		0.0090*** (4.631)		0.0814** (2.066)
<i>FIRST</i>	0.0911*** (5.700)	0.0828*** (5.212)	-0.4924 (-1.627)	-0.5659* (-1.860)
<i>SEP</i>	-0.0108 (-0.729)	-0.0108 (-0.733)	0.3684 (1.401)	0.3638 (1.385)
<i>INDEP</i>	-0.0111 (-0.536)	-0.0113 (-0.550)	0.2964 (0.951)	0.2992 (0.960)
<i>SOE</i>	-0.0113* (-1.771)	-0.0095 (-1.468)	-0.2208*** (-3.020)	-0.2090*** (-2.853)
<i>OPINION</i>	-0.0853*** (-15.365)	-0.0831*** (-15.005)	-0.0266 (-0.441)	-0.0176 (-0.291)
<i>BIG4</i>	0.0056 (1.106)	0.0053 (1.034)	0.0990 (0.716)	0.0990 (0.719)
<i>SIZE</i>	0.0429*** (15.396)	0.0436*** (15.411)	-0.6503*** (-11.212)	-0.6455*** (-11.113)
<i>LEV</i>	-0.2586*** (-25.779)	-0.2551*** (-25.556)	0.0036 (0.020)	0.0185 (0.103)
<i>CASH</i>	0.0348*** (3.977)	0.0346*** (3.908)	0.0383 (0.216)	0.0248 (0.140)
<i>R&D</i>	-0.5786*** (-10.481)	-0.5753*** (-10.507)	-1.0805* (-1.750)	-1.0463* (-1.695)
<i>CONS</i>	-0.8232*** (-13.119)	-0.7550*** (-9.692)	16.1432*** (11.550)	16.0338*** (11.435)
<i>YEAR</i>	YES	YES	YES	YES
<i>FIRM</i>	YES	YES	YES	YES
<i>N</i>	18261	18261	18261	18261
<i>R</i> ²	0.280	0.286	0.270	0.271

Note. This table presents the results from the OLS regression test. Columns 1 and 2 use *ROA* as the dependent variable and examine its relationship with *POST*, as well as the interaction effect between *PLEDGE* and *POST*. Columns 3 and 4 use *TOBINQ* as the dependent variable and examine its relationship with *POST*, as well as the interaction effect between *PLEDGE* and *POST*. All the variables are defined in Appendix C. *t*-statistics appear in parentheses and are based on standard errors clustered by firm and year. ***, **, and * indicate significance levels at 1%, 5%, and 10%, respectively.

Table 5: Share pledging and channel analysis

	(1)	(2)	(3)	(4)	(5)
	<i>NCSKEW</i>	<i>DUVOL</i>	<i>SA</i>	<i>OTHER</i>	<i>ZSCORE</i>
<i>POST</i>	0.2797*** (10.290)	0.2511*** (9.227)	-0.1771*** (-30.050)	-0.0028 (-0.921)	1.5037*** (9.202)
<i>PLEDGE*POST</i>	-0.0919*** (-3.439)	-0.0785*** (-2.941)	-0.0113*** (-5.408)	-0.0276* (-1.931)	0.3343** (2.212)
<i>FIRST</i>	-0.2352 (-1.394)	-0.2255 (-1.328)	0.0629*** (2.657)	-0.0534*** (-5.446)	-0.5337 (-0.440)
<i>SEP</i>	-0.2471 (-1.251)	-0.2486 (-1.253)	0.0020 (0.134)	0.0386* (1.912)	0.8270 (0.860)
<i>INDEP</i>	0.1461 (0.666)	0.1746 (0.794)	-0.0052 (-0.342)	0.0460* (1.915)	1.1791 (1.033)
<i>SOE</i>	-0.0660 (-1.174)	-0.0710 (-1.254)	-0.0021 (-0.485)	-0.0085** (-2.396)	-0.0340 (-0.121)
<i>OPINION</i>	0.1178*** (2.792)	0.1198*** (2.836)	0.0112*** (3.326)	0.1517*** (11.401)	0.5052** (2.197)
<i>BIG4</i>	-0.0240 (-0.322)	-0.0282 (-0.380)	0.0216** (2.569)	0.0055 (0.666)	-0.7562 (-1.363)
<i>SIZE</i>	0.0551** (2.374)	0.0574** (2.473)	-0.0202*** (-3.443)	-0.0014 (-0.860)	-0.8449*** (-4.425)
<i>LEV</i>	0.0849 (1.006)	0.0828 (0.980)	-0.0078 (-0.578)	0.0350*** (3.417)	-16.1074*** (-25.402)
<i>CASH</i>	0.0662 (0.681)	0.0729 (0.746)	0.0460*** (4.080)	-0.0654*** (-5.640)	2.1365*** (2.934)
<i>R&D</i>	0.0669 (0.162)	0.0721 (0.173)	-0.0459 (-1.535)	0.1424*** (3.151)	-2.8951 (-0.981)
<i>CONS</i>	-1.6520*** (-3.113)	-1.7171*** (-3.235)	-3.3149*** (-25.872)	0.0970** (2.332)	30.4309*** (6.980)
<i>YEAR</i>	YES	YES	YES	YES	YES
<i>FIRM</i>	YES	YES	YES	YES	YES
<i>N</i>	17243	17243	18261	18246	18261
<i>R²</i>	0.038	0.044	0.161	0.207	0.411

Note. This table presents the results of *NCSKEW*, *DUVOL*, *SA*, *OTHER*, and *ZSCORE* in relation to *POST* and *PLEDGE*POST* and to the control variables. In Column 1, we use *NCSKEW* as the dependent variable; in Columns 2, 3, 4, and 5 we use *DUVOL*, *SA*, *OTHER*, and *ZSCORE* as the dependent variable, respectively. All the variables are defined in Appendix C. *t*-statistics appear in parentheses and are based on standard errors clustered by firm and year. ***, **, and * indicate 1%, 5%, and 10% significance levels, respectively.

Table 6: Robustness test with regressions using PSM

	(1)	(2)
	<i>ROA</i>	<i>TOBINQ</i>
<i>POST</i>	0.0015 (0.541)	1.0125*** (16.020)
<i>PLEDGE*POST</i>	0.0057** (2.091)	0.0722** (2.237)
<i>FIRST</i>	0.0647*** (9.383)	-0.5721*** (-3.777)
<i>SEP</i>	-0.0282** (-2.486)	1.1476*** (4.117)
<i>INDEP</i>	-0.0250 (-1.372)	1.3651*** (3.273)
<i>SOE</i>	-0.0177*** (-6.917)	0.1325** (2.101)
<i>OPINION</i>	-0.1107*** (-15.537)	0.6498*** (5.090)
<i>BIG4</i>	0.0062 (1.528)	0.6877*** (5.704)
<i>SIZE</i>	0.0137*** (12.176)	-0.5656*** (-14.925)
<i>LEV</i>	-0.1413*** (-19.868)	0.1569 (0.916)
<i>CASH</i>	0.0813*** (9.068)	0.8434*** (4.043)
<i>R&D</i>	-0.1421*** (-3.713)	3.7775*** (3.985)
<i>CONS</i>	-0.2203*** (-8.629)	14.0993*** (17.621)
<i>YEAR</i>	YES	YES
<i>FIRM</i>	YES	YES
<i>N</i>	10472	10472
<i>R</i> ²	0.321	0.312

Note. This table presents the results of the robustness test with regressions using the PSM method. For the PSM method, matching with non-pledged firms was based on firm *FIRST*, *SEP*, *INDEP*, *SOE*, *OPINION*, *BIG4*, *SIZE*, *LEV*, *CASH*, and *R&D* and then, construct a one-to-one match to form a control group. All variables are defined in Appendix C. *t*-statistics appear in parentheses and are based on standard errors clustered by firm and year. ***, **, and * indicate 1%, 5%, and 10% significance levels, respectively.

Table 7: Robustness test with regressions using *PLEDGE_R*

	(1)	(2)
	<i>ROA</i>	<i>TOBINQ</i>
<i>PLEDGE_R</i>	-0.0432*	-0.6978
	(-1.689)	(-1.616)
<i>POST</i>	0.0371***	0.8005***
	(8.348)	(9.704)
<i>PLEDGE_R *POST</i>	0.1238***	0.4335**
	(3.404)	(2.285)
<i>FIRST</i>	0.1326***	-0.3948
	(4.594)	(-0.772)
<i>SEP</i>	-0.0208	0.4499
	(-0.788)	(1.095)
<i>INDEP</i>	-0.0309	0.0259
	(-0.843)	(0.052)
<i>SOE</i>	-0.0163	-0.3025***
	(-1.594)	(-3.376)
<i>OPINION</i>	-0.0785***	-0.0704
	(-9.683)	(-1.030)
<i>BIG4</i>	0.0014	0.2093
	(0.133)	(0.577)
<i>SIZE</i>	0.0549***	-0.6304***
	(12.043)	(-7.126)
<i>LEV</i>	-0.2584***	-0.1113
	(-16.502)	(-0.446)
<i>CASH</i>	-0.0112	-0.0262
	(-0.767)	(-0.097)
<i>R&D</i>	-0.7346***	-2.8308***
	(-9.219)	(-3.352)
<i>CONS</i>	-1.0417***	17.3707***
	(-10.258)	(8.860)
<i>YEAR</i>	YES	YES
<i>FIRM</i>	YES	YES
<i>N</i>	7657	7657
<i>R²</i>	0.300	0.341

Note. This table presents the results of the robustness test with regressions using the share pledging ratio (*PLEDGE_R*). Column 1 uses *ROA* as the dependent variable and examines its relationship with *PLEDGE_R* and *POST*, as well as the interaction effect between *PLEDGE_R* and *POST*. Column 2 uses *TOBINQ* as the dependent variable and examines its relationship with *PLEDGE_R* and *POST*, as well as the interaction effect between *PLEDGE_R* and *POST*. All the variables are defined in Appendix C. *t*-statistics appear in parentheses and are based on standard errors clustered by firm and year. ***, **, and * indicate 1%, 5%, and 10% significance levels, respectively.

Table 8: Robustness test with dynamic approach

	(1) <i>ROA</i>	(2) <i>TOBINQ</i>
<i>PLEDGE*Y2016</i>	0.0064 (0.595)	0.2076 (0.880)
<i>PLEDGE*Y2017</i>	-0.0031 (-1.238)	0.2520 (0.951)
<i>PLEDGE*Y2018</i>	0.0074** (2.270)	0.2686*** (3.976)
<i>PLEDGE*Y2019</i>	0.0186*** (5.436)	0.2492*** (3.589)
<i>PLEDGE*Y2020</i>	0.0108*** (3.188)	0.2689*** (3.456)
<i>FIRST</i>	0.0563*** (11.162)	-0.2969** (-2.559)
<i>SEP</i>	-0.0137 (-1.615)	0.6130*** (2.935)
<i>INDEP</i>	-0.0305** (-2.353)	1.0965*** (3.668)
<i>SOE</i>	-0.0162*** (-8.751)	0.0728 (1.478)
<i>OPINION</i>	-0.1139*** (-20.007)	0.6524*** (5.973)
<i>BIG4</i>	0.0001 (0.020)	0.4389*** (5.499)
<i>SIZE</i>	0.0124*** (16.204)	-0.4725*** (-16.929)
<i>LEV</i>	-0.1396*** (-26.320)	0.0099 (0.072)
<i>CASH</i>	0.0867*** (12.374)	1.1531*** (6.015)
<i>R&D</i>	-0.1872*** (-6.716)	3.6221*** (5.825)
<i>CONS</i>	-0.1951*** (-11.307)	12.0722*** (20.115)
<i>YEAR</i>	YES	YES
<i>FIRM</i>	YES	YES
<i>N</i>	18261	18261
<i>R²</i>	0.321	0.314

Note. This table presents the results of the robustness test with the dynamic approach. We set five indicator variables – *Y2016*, *Y2017*, *Y2018*, *Y2019*, and *Y2020* – and replace the *POST* indicator in the models with these five indicators. Columns 1 and 2 show the regression results. All the variables are defined in Appendix C. *t*-statistics appear in parentheses and are based on standard errors clustered by firm and year. ***, **, and * indicate 1%, 5%, and 10% significance levels, respectively.

Table 9: Robustness test with alternative variables

	(1)	(2)	(3)	(4)
	Delete Real Estate Firms		Replace ROA	
	<i>ROA</i>	<i>TOBINQ</i>	<i>ROE</i>	<i>ROI</i>
<i>POST</i>	0.0147*** (5.923)	0.5998*** (12.649)	0.0284*** (5.246)	0.0136*** (5.616)
<i>PLEDGE*POST</i>	0.0099*** (4.915)	0.1056*** (2.611)	0.0206*** (4.978)	0.0086*** (4.307)
<i>FIRST</i>	0.0827*** (4.966)	-0.6886** (-2.141)	0.1451*** (4.361)	0.0841*** (5.213)
<i>SEP</i>	-0.0132 (-0.878)	0.3663 (1.325)	-0.0268 (-0.793)	-0.0122 (-0.816)
<i>INDEP</i>	-0.0097 (-0.455)	0.2790 (0.851)	-0.0563 (-1.236)	-0.0112 (-0.541)
<i>SOE</i>	-0.0093 (-1.431)	-0.2061*** (-2.844)	-0.0331** (-2.254)	-0.0108 (-1.640)
<i>OPINION</i>	-0.0846*** (-14.708)	-0.0553 (-0.862)	-0.2000*** (-15.526)	-0.0780*** (-14.464)
<i>BIG4</i>	0.0070 (1.264)	0.0537 (0.335)	0.0240* (1.867)	0.0057 (1.053)
<i>SIZE</i>	0.0442*** (15.167)	-0.6479*** (-10.580)	0.0949*** (15.438)	0.0402*** (14.623)
<i>LEV</i>	-0.2603*** (-25.611)	0.0835 (0.436)	-0.5469*** (-23.072)	-0.2294*** (-23.346)
<i>CASH</i>	0.0321*** (3.646)	0.0479 (0.261)	0.0838*** (4.890)	0.0341*** (3.832)
<i>R&D</i>	-0.5997*** (-10.802)	-0.9800 (-1.561)	-1.0904*** (-11.672)	-0.6088*** (-11.300)
<i>CONS</i>	-0.8477*** (-12.865)	16.8305*** (12.269)	-1.8230*** (-13.291)	-0.7567*** (-12.191)
<i>YEAR</i>	YES	YES	YES	YES
<i>FIRM</i>	YES	YES	YES	YES
<i>N</i>	17581	17581	18261	18261
<i>R²</i>	0.284	0.263	0.275	0.252

Note. This table presents the results of the robustness test with alternative variables. In Columns 1 and 2, we omit real estate firms. In Columns 3 and 4, we replace *ROA* with *ROE* and *ROI*. All the variables are defined in Appendix C. *t*-statistics appear in parentheses and are based on standard errors clustered by firm and year. ***, **, and * indicate 1%, 5%, and 10% significance levels, respectively.

Table 10: Further analysis: effects of relaxed financial constraints

Panel A:

	POST=0		POST=1		
	N	mean	N	mean	diff
PROJECT	3377	0.114	4280	0.146	0.032***

Panel B:

	(1)	(2)	(3)
	<i>PROJECT</i>	<i>CAPX</i>	<i>R&D</i>
<i>POST</i>	0.5420***	0.0615***	0.0079***
	(4.170)	(17.691)	(9.249)
<i>FIRST</i>	0.2667	-0.0203	0.0002
	(0.568)	(-1.110)	(0.037)
<i>SEP</i>	-1.4697**	-0.0205	0.0083
	(-2.225)	(-0.887)	(1.465)
<i>INDEP</i>	1.2144	0.0371	-0.0027
	(1.275)	(1.359)	(-0.388)
<i>SOE</i>	0.4164**	0.0152***	0.0018
	(1.995)	(2.788)	(0.811)
<i>OPINION</i>	0.0290	0.0139**	0.0057***
	(0.145)	(2.331)	(3.596)
<i>BIG4</i>	-0.3078	-0.0088	0.0029
	(-1.198)	(-0.590)	(1.323)
<i>SIZE</i>	-0.1338**	-0.0366***	-0.0008
	(-2.351)	(-10.264)	(-0.774)
<i>LEV</i>	-0.7935**	0.0699***	-0.0064**
	(-2.374)	(5.942)	(-1.970)
<i>CASH</i>	0.9365*	0.2988***	-0.0074**
	(1.813)	(18.635)	(-2.200)
<i>R&D</i>	0.0170	0.0500	-
	(0.013)	(0.891)	-
<i>CONS</i>	4.4251***	0.6287***	0.0583**
	(3.261)	(7.891)	(2.445)
<i>YEAR</i>	YES	YES	YES
<i>INDUSTRY</i>	YES	NO	NO
<i>FIRM</i>	NO	YES	YES
<i>N</i>	7657	7657	7657
<i>R²</i>	0.129	0.115	0.345

Note. This table presents the results of the further analysis of the effects of relaxed financial constraints. Panel A presents the difference-in-differences results between personal loans and firm loans impacted by the tighter regulatory reforms for share pledging in 2018. Panel B presents the results of the effects of relaxed financial constraints. In Column 1, we use *PROJECT* as the dependent variable and show the results for *POST*. In Columns 2 and 3, we use *CAPX* and *R&D* as the dependent variable, respectively, and show the results for *POST*. All the variables are defined in Appendix C. *t* (*z*)-statistics appear in parentheses and are based on standard errors clustered by firm and year. ***, **, and * indicate 1%, 5%, and 10% significance levels, respectively.

Figure Legends

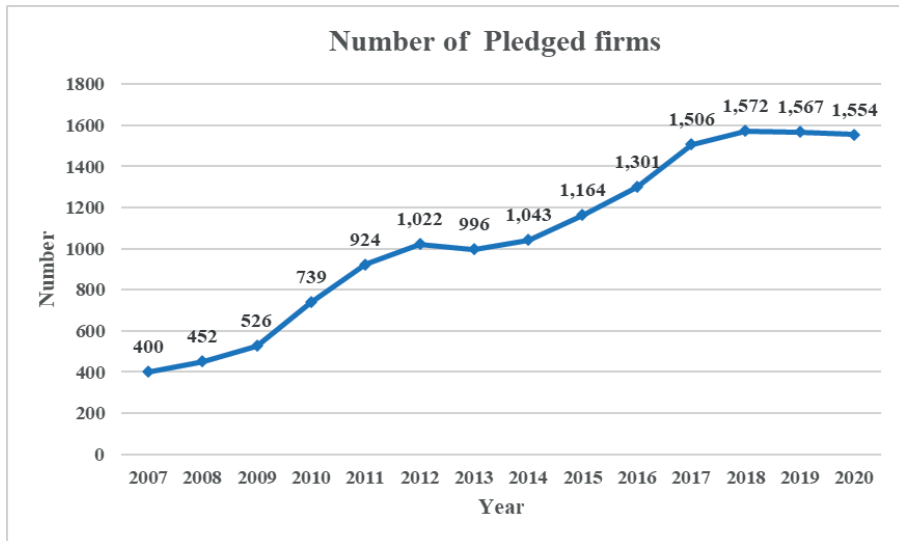


Figure 1 Panel A: Trend of the number of controlling shareholders' share pledging transactions from 2007 to 2020

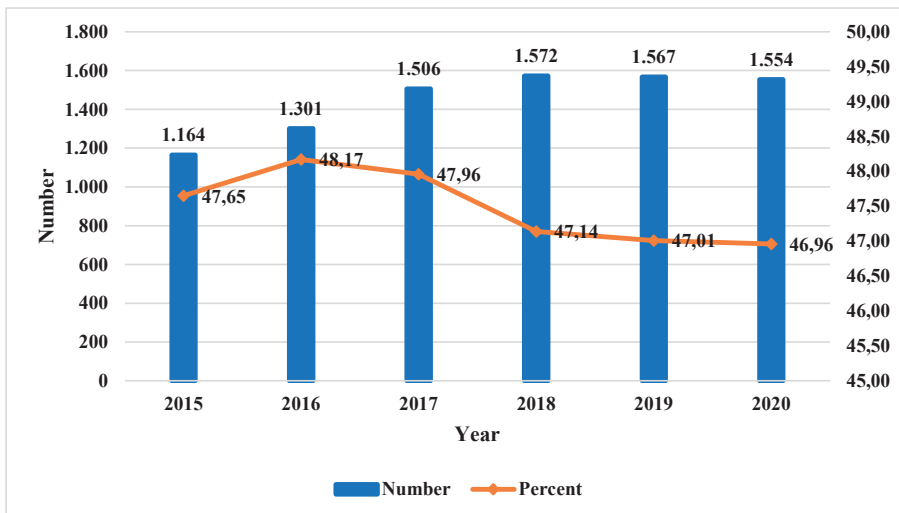


Figure 1 Panel B: Trend of the number and percentage of controlling shareholders' share pledging activities from 2015 to 2020

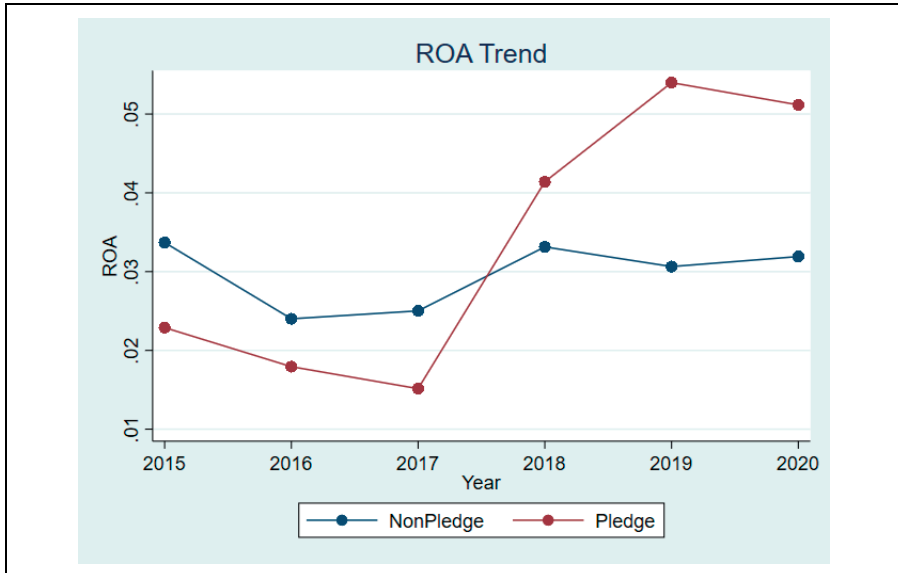


Figure 2 Panel A: Trend change of *ROA*

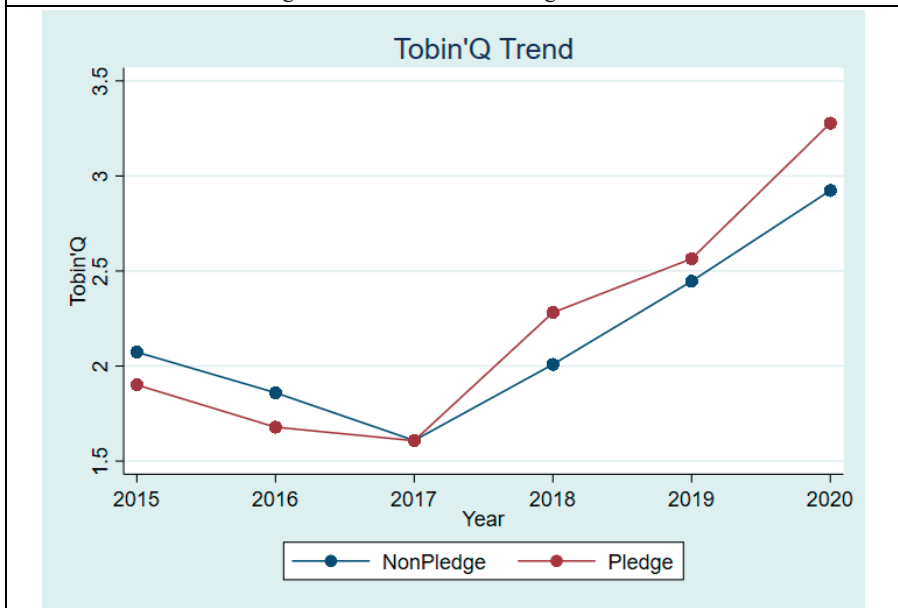


Figure 2 Panel B: Trend change of *TOBINQ*

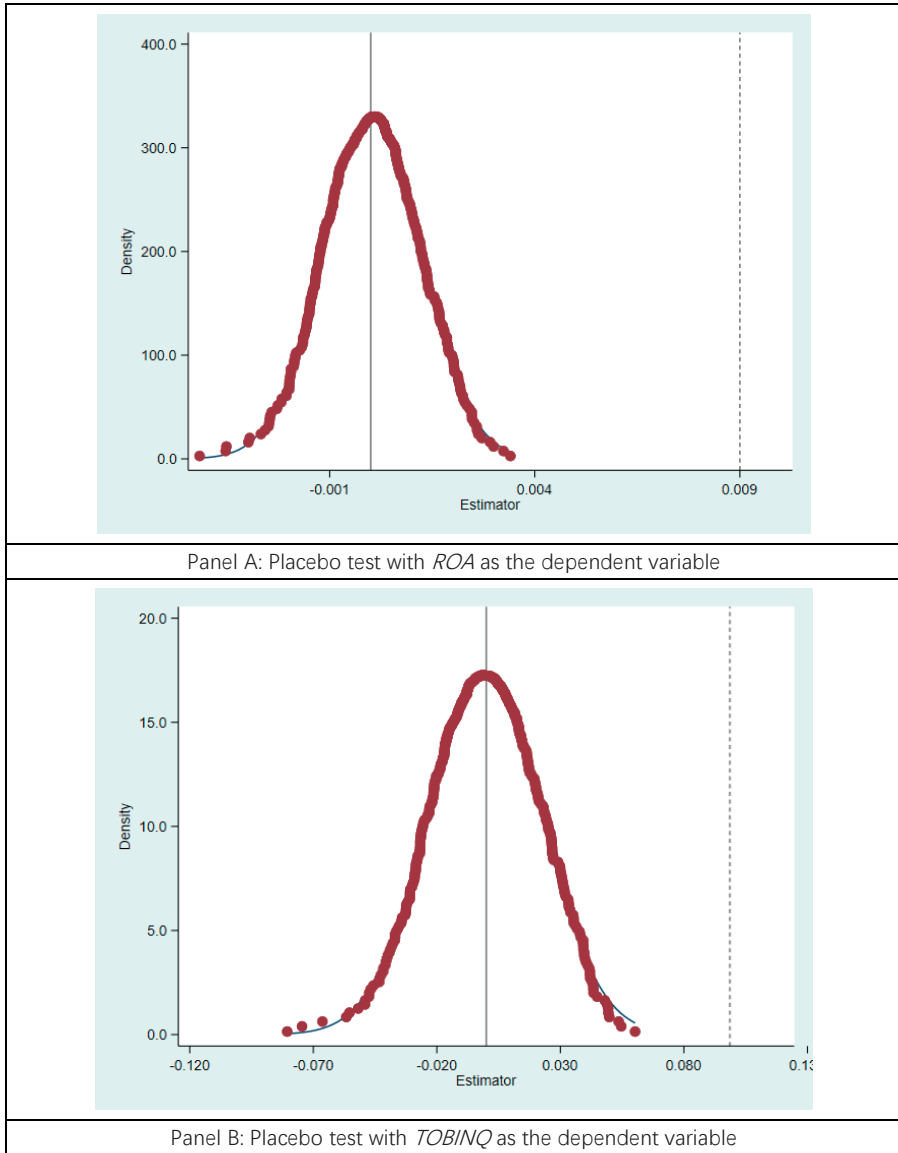


Figure 3: Robustness test with placebo tests: *ROA* and *TOBINQ*

Conclusion and Implications

This PhD thesis consists of three essays: the first two on equity incentives and the third one on share pledging in China. In the first chapter, I show regional investor protection has a significant restraining effect on managers self-interested behavior, and this restraining effect can have a positive effect on corporate growth and performance. These results have important policy implications that is in countries where investor protection is weak overall, like, Vietnam, Philippines and Brazil, policies designed to improve regional investor protection, via improvements in regional legal environments, could be adopted.

In the second chapter, I find the anti-corruption campaign in China has increased managers' risk-aversion, and the risk aversion-related mechanisms to mitigate managers' motivation to manipulate firms' performance in SOEs, less competitive industries and high institutional ownership firms. Some policy implications 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.

In chapter three, my findings show that tighter regulatory requirements can effectively reduce firms' crash risk, relax financial constraints, reduce bankruptcy risk, and mitigate controlling shareholder expropriation of minority shareholders wealth via tunnelling. These effects significantly alleviate the destructive effect of controlling

shareholders' activities on firm and increase firm value. These findings not only have significant implications for policymakers and investors facing share pledge reforms in China but also for regulators in other economies with similar concentrated ownership structure, specifically, restricting the usage of pledged funds and prohibiting share pledges involved in performance commitments.

Academic Summary

This PhD thesis consists of three independent chapters that aim to improve our understanding of equity incentives and share pledging in China. China is one of the largest emerging economies in the world, the success of its economy acts as a magnet for international inflows of capital, thus raising expectations for future returns. However, despite the booming of the real economy in the past decades, the performance of the Chinese stock market has been poor. The law enforcement which protects investors' interests has been relatively weak which ultimately resulted in lower payout (Li et al. 2014; Lv et al. 2012; Chen and Guo 2017), while the number of financial misreporting cases from listed firms has also increased (Hass et al. 2016; Zhang et al. 2018).

Equity incentives can alleviate agency problems, but also provide managers with a channel to promote their own self-interest by increasing payouts. In China, although all provinces are formally required to implement nationally promulgated laws and regulations, in practice the enforcement and effect of these legal provisions differs from region to region, depending on regional legal environments. Thus, regional levels of investor protection also differ. However, the interactive effects between equity incentives and regional investor protection on firm payouts and performance is missing in the existing literature.

Equity incentives facing risk-averse executives comprise two countervailing effects, a positive "reward effect" and a negative "risk effect" (Armstrong et al. 2013). The anti-corruption campaign since 2012 in China, may have made executives more

risk-averse, this may especially be true for state-owned enterprises (SOEs) management (Wang and Kong, 2016; Zhong et al. 2016). However, very few studies have explored the risk effect in the context of the relationship between equity incentives and financial misreporting.

Share pledging is a significant supporting practice for China's economic growth, especially from the private sector (Brandt and Li, 2003; Song et al. 2011). Most previous studies used the 2013 loose regulatory change as a quasi-natural experiment and documented that share pledging impairs firm value (Li et al. 2020; Meng et al. 2019). In 2018, the China Securities Regulatory Commission (CSRC) began reinforcing the regulations on share pledging, which is aimed at preventing systemic risks to the Chinese capital market from share pledging. However, the impact of the tightened regulatory reform on firm value are unclear.

In chapter 1, I examine the impact of equity incentives and regional investor protection on corporate payout policies and corporate performance. I utilize one component from China Marketization Index – legal intermediaries and law enforcement environment – as an index of regional investor protection. By analyzing the interaction between equity incentives and regional investor protection, I find that the managers of firms adopting equity incentives tend to act in their own interests, increasing their cash receipts by increasing dividend distributions, as measured by cash dividend payout ratios, and regional investor protection has a significant restraining effect on this self-interested behavior. The stronger the degree of regional investor protection, the greater of this effect. I also incorporate factors reflecting growth in the model equations, the

result suggests that this restraining effect depends crucially on firms' growth opportunities. That is, the effect on cash (stock) dividends is weaker (stronger) in high-growth firms – whose ability to pay cash dividends is limited by their appetite for cash for expansion – and stronger (weaker) in low-growth firms with lower cash appetites. Finally, I further analyze the restraining effect on corporate performance, the results suggest that this restraining effect can have a positive effect on corporate growth and performance.

In chapter 2, I investigate the impact of anti-corruption and risk effects on equity incentive and financial misreporting in the context of China's unique corporate ownership structure and governance regime. I 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; also use both restatements and earnings management as proxies for financial misreporting. I find that managers' shareholdings are significantly and positively correlated with financial misreporting, suggesting that equity incentives strongly motivate managers to manipulate firms' performance. In a further analysis, I find that the levels of industry competition and institutional ownership exert a strong positive (resp. negative) influence on managers' motivation to manage earnings.

In chapter 3, I utilize the 2018 regulatory reforms as a quasi-natural experiment and investigate the effect of tightened regulations on firm value as well as the mechanism through which the new pledging regulation affects value. My findings show that tighter regulatory requirements, such as the cap in share pledge ratio, restricting

the usage of pledged funds, banning small-value pledges, and prohibiting share pledges involved in performance commitments, can effectively reduce firms' crash risk, relax financial constraints, reduce bankruptcy risk, and mitigate controlling shareholder expropriation of minority shareholders wealth via tunnelling. These effects significantly alleviate the destructive effect of controlling shareholders' activities on firm and increase firm value. I also demonstrate that these regulatory reforms relax firm's financial constraints, as well as drive controlling shareholders flow to more pledged funds back to listed firms, which in turn, foster firm capital investment and R&D expenditure, benefit firm growth and competitiveness and ultimately increase firm long-term value.

Academische Samenvatting

Dit proefschrift bestaat uit drie onafhankelijke hoofdstukken die tot doel hebben ons begrip van aandelenprijken en verpanden van aandelen (share pledging) in China te verbeteren. China is een van de grootste opkomende economieën ter wereld. Het succes van de Chinese economie werkt als een magneet op internationale kapitaalinstroom, waardoor de verwachtingen voor toekomstige rendementen stijgen. Maar ondanks de bloei van de reële economie in de afgelopen decennia is de prestatie van de Chinese aandelenmarkt onvoldoende geweest. De wetshandhaving ter bescherming van de belangen van beleggers is relatief zwak, wat uiteindelijk heeft geleid tot lagere uitbetalingen (Li et al. 2014; Lv et al. 2012; Chen en Guo 2017), terwijl ook het aantal gevallen van onjuiste financiële rapportage door beursgenoteerde bedrijven is toegenomen (Hass et al. 2016; Zhang et al. 2018).

Aandelenprikkels kunnen agency problemen verlichten, maar bieden managers ook een kanaal om hun eigenbelang te bevorderen door de dividenduitkeringen te verhogen. Hoewel in China alle provincies formeel verplicht zijn om nationaal uitgevaardigde wetten en regels toe te passen, verschilt de handhaving en het effect van deze wettelijke bepalingen in de praktijk van regio tot regio, afhankelijk van de regionale juridische omgeving. De regionale niveaus van beleggersbescherming verschillen dus ook. In de bestaande literatuur ontbreekt echter het interactieve effect tussen aandelenprikkels en regionale beleggersbescherming op dividenduitkeringen door bedrijven en prestaties.

Aandelenprikkels voor risicomijdende managers bestaan uit twee compenserende effecten, een positief "beloningseffect" en een negatief "risico-effect" (Armstrong et al. 2013). De anticorruptie campagne sinds 2012 in China kan managers meer risicomijdend hebben gemaakt, dit kan vooral gelden voor het management van staatsbedrijven (Wang en Kong, 2016; Zhong et al. 2016). Er zijn echter maar weinig studies die het risico-effect hebben onderzocht in de context van de relatie tussen aandelenprikkels en onjuiste financiële verslaggeving.

Het verpanden van aandelen is een belangrijke ondersteunende praktijk voor de economische groei van China, vooral vanuit de private sector (Brandt en Li, 2003; Song et al. 2011). De meeste eerdere studies gebruikten de wijziging van de regelgeving in 2013 als een quasi-natuurlijk experiment en documenteerden dat het toezeggen van aandelen de waarde van bedrijven schaadt (Li et al. 2020; Meng et al. 2019). In 2018 begon de China Securities Regulatory Commission (CSRC) de regelgeving voor het

verpanden van aandelen aan te scherpen, wat bedoeld is om systeemrisico's voor de Chinese kapitaalmarkt als gevolg van het verpanden van aandelen te voorkomen. De impact van de aangescherpte regelgeving op de waarde van bedrijven is echter onduidelijk.

In hoofdstuk 1 onderzoek ik de invloed van aandelenprikkels en regionale beleggersbescherming op het dividend uitkeringsbeleid en de prestaties van bedrijven. Ik gebruik één component van de China Marketization Index - wettelijke tussenpersonen en rechtshandavingsomgeving - als index voor regionale beleggersbescherming. Door de interactie tussen aandelenprikkels en regionale beleggersbescherming te analyseren, vind ik dat de managers van bedrijven die aandelenprikkels aannemen geneigd zijn in hun eigen belang te handelen en hun kasinkomsten te verhogen door de dividenduitkeringen te verhogen, zoals gemeten aan de hand van de dividenduitkeringsratio's. De regionale beleggersbescherming heeft een significant remmend effect op dit eigenbelanggedrag. Hoe sterker de mate van regionale beleggersbescherming, hoe groter dit effect. Als ik ook factoren die groei weerspiegelen opneem in de statistische modellen, suggereert het resultaat dat dit remmende effect in belangrijke mate afhangt van de groei mogelijkheden van bedrijven. Dat wil zeggen dat het effect op dividenden in contanten (in aandelen) zwakker (sterker) is bij snelgroeiende bedrijven - waarvan het vermogen om contant dividend te betalen wordt beperkt door hun voorkeur in contanten voor expansie - en sterker (zwakker) bij bedrijven met een lage groei en een lagere voorkeur in contanten. Tot slot analyseer ik verder het remmende effect op de prestaties van bedrijven. De resultaten suggereren dat

dit remmende effect een positief effect kan hebben op de groei en prestaties van bedrijven.

In hoofdstuk 2 onderzoek ik de invloed van anticorruptie- en risico-effecten op aandelenprikkels en onjuiste financiële verslaggeving in de context van China's unieke eigendomsstructuur en bestuursstelsel. Ik gebruik de volatiliteit van de bedrijfswinsten als maatstaf voor de effecten van bedrijfsrisico's (Risk) en verwacht dat bedrijfsrisico's een mediërende factor zullen zijn voor de motivatie van managers om onjuist te rapporteren. Ik vind dat het aandelenbezit van managers significant en positief gecorreleerd is met onjuiste financiële rapportage, wat suggereert dat aandelenprikkels managers sterk motiveren om de prestaties van bedrijven te manipuleren. In een verdere analyse ontdek ik dat de mate van concurrentie in de sector en institutionele eigendom een sterke positieve (resp. negatieve) invloed hebben op de motivatie van managers om de winst te manipuleren.

In hoofdstuk 3 gebruik ik de hervormingen van de regelgeving in 2018 als een quasi-natuurlijk experiment en onderzoek ik het effect van strengere regelgeving op de waarde van bedrijven, evenals het mechanisme waardoor de nieuwe regelgeving voor verpanding de waarde beïnvloedt. Mijn bevindingen tonen aan dat strengere regelgeving, zoals de limiet voor de inpandgevingsratio van aandelen, het beperken van het gebruik van in pand gegeven fondsen, het verbieden van inpandgeving van kleine bedragen en het verbieden van inpandgeving van aandelen in het kader van prestatieverbintenissen, het crashrisico van bedrijven effectief kan verminderen, de financiële beperkingen kan versoepelen, het faillissementsrisico kan verkleinen en de

beknotting van de minderheidsaandeelhouders door de meerderheidsaandeelhouder via tunneling kan beperken. Deze effecten verlichten het destructieve effect van de activiteiten van aandeelhouders met zeggenschap op de onderneming aanzienlijk en verhogen de waarde van de onderneming. Ik toon ook aan dat deze hervormingen in de regelgeving de financiële beperkingen van ondernemingen versoepelen en ervoor zorgen dat aandeelhouders met zeggenschap meer geld terugstorten naar beursgenoteerde ondernemingen, wat op zijn beurt de kapitaalinvesteringen en onderzoek- en ontwikkelingsuitgaven van ondernemingen bevordert, de groei en het concurrentievermogen van ondernemingen ten goede komt en uiteindelijk de lange termijn waarde van ondernemingen verhoogt.

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The three essays collected in this PhD thesis: the first two on equity incentives and the third one on share pledging in China. The first essay shows regional investor protection has a significant restraining effect on managers self-interested behavior, and this restraining effect can have a positive effect on corporate growth and performance. The second essay finds that the anti-corruption campaign in China has increased managers' risk-aversion, and the risk aversion-related mechanisms to mitigate managers' motivation to manipulate firms' performance in SOEs, less competitive industries and high institutional ownership firms. The third essay demonstrates tighter regulatory requirements can effectively reduce firms' crash risk, relax financial constraints, reduce bankruptcy risk, and mitigate controlling shareholder expropriation of minority shareholders wealth via tunnelling. These effects significantly alleviate the destructive effect of controlling shareholders' activities on firm and increase firm value.

ZILI SU (1970) is a member of China Top Talent CFO, received his PhD degree in finance from Tilburg University. He has worked in several large state-owned enterprises such as PETROCHINA, SINOPEC and GENERTEC, positioned as CFO of CAERI (SH, 601965) from 2012 to 2019 and CEO of CNIC from 2021 till now. Abundant experience was gained during his career in respect of corporate governance, risk management, strategic performance management and international cooperation in the hi-tech and energy industry. Meanwhile, he published 3 monographs and more than 40 papers on international economic core journals. He was also once highly recognized as the financial controller trainer for both Shanghai and Shenzhen Stock Exchange, and provided management consulting services to a number of listed firms.

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