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The Extreme Outcomes of Corporate Tax Management: Evidence from Chinese Listed Enterprises

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Abstract: This study presents an empirical analysis of how corporate tax management and government ownership influence a firm's stock price crash risk. The study investigates firm-specific stock price crash to corporate tax management based on a sample of Chinese listed enterprises during 2008 to 2013 period and finds that tax management activities can lead to a significant decline in short-term crash risk. However, the results show that tax management would lead to the high probability of future crash risk, which is consistent with agency conflict between management and shareholders. Because of the opacity and complexity of tax management, there exists opportunities for short-term rent-seeking which can lead to future crashes. In addition, the study finds that the positive relationship between tax management and future crash risk is more pronounced in enterprises controlled by the municipal government.

Keywords: Corporate tax management, Stock price crash risk, conflict of interest, state-controlled enterprises (SOEs)

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1. Introduction

Taxation as a significant cost affecting firms' decision-making behaviour regarding the available choices in the magnitude and structure of output, disposal of net profit, the direction of capital investment, among many other things. Reducing corporate tax burden has become a powerful motivational force in corporate life. Therefore, corporate tax management has emerged as an important financial strategy desired by shareholders to improve firm

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value. But a series of recent high-profile corporate accounting scandals, such as Enron, Amazon, and Apple, showed managers using complex tax management as a mask to seek personal interest, which injures the interests of shareholders and loss in government tax revenues. Hence, the extreme consequence of aggressive tax management has aroused much attention from investors, government, and researchers.

In a traditional theory framework, the main purpose of a business is to the maximization of shareholders' interests over the long term. Managers, who are employed to act on behalf of shareholders are required to have long-term focus and planning. However, in practice, because of the separation between management and ownership, managers and shareholders, the former always have better information than shareholders. Further, managers face many short-term powerful incentives such as employment contract and remuneration, which motivate them to be more concerned with short-term profitability and stock price. Thus, instead of achieving long-term returns, short-term goals have become the focus of attention of managers. Second, recent research reveals that because of incomplete information and fierce competition, shareholders in modern public listed enterprises are more likely to focus on a short time horizon. Hence, managerial myopia is becoming a pervasive phenomenon of modern corporations. Tax saving fits this short-term focus. Unlike reducing operating costs, tax saving does not cause direct adverse consequences for a firm's daily operation. More importantly, the complex and opaque nature of tax management also offers opportunities to managers and short-sighted investors for earnings manipulation to cover up corporate real operating performance, boost the short-term stock price, and cause corporate shares to be mispriced. Once the true situation becomes exposed future firm-specific stock price can crash.

In contrast to developed countries with robust tax systems, in China the tax system is still in a state of transition. In the Forbes Tax Misery Index[1], China has consistently ranked among the harshest taxes countries in the world since 2002. The coverage of the present system is still not comprehensive and has many loopholes offering opportunities which corporations may exploit. In addition, China's opaque stock market (Svensson, 2005) further provides space for managers to utilize tax management as a medium for earnings manipulation and resource diversion. In recent years, many aggressive tax management activities in China, e.g. of Gujing Distillery Company (*gujing gongjiu*), have aroused scrutiny at home and abroad.

Moreover, China because its development model of state-led growth has contributed to economic success and therefore a good case study. With their connection with government, executives in State controlled enterprises (SOE) are more motivated to take advantage of the preferential treatment

from the government to avoid taxes and pursue self-interests, such as political career advancement and cash compensations.

Government ownership/control of SOEs is categorized in terms of central, provincial, and municipal (includes prefectural city- and county-level) SOEs. Central government controlled SOEs (*yangqi*) are the giant, opaque and complex organizations in pillar industries that are supported by the central administration and strictly audited. Their top executives normally have higher administrative rank motivating the executives to conceal adverse outcomes in order to protect their political careers. Provincial SOEs are second tier SOEs controlled by provincial governments, where both the SOEs' executives and government officials have strong political incentives because of the higher opportunities to move up political ranks from local to central. In contrast, municipal SOEs are mostly far from central government control, and the executives generally have lower or even no political rank. They receive lower salaries thus giving these executives temptation to use their political connection and/or collude with local government officials to maximize their self-profit through tax management activities. From 2012 onwards dozens of high-profile cases of SOEs managers' illicit appropriation of state assets have been exposed.

Against this background, this study attempts to answer the following questions. First, what impact does corporate tax management have on crash risk in the current year and in the future? Second, do the different types of state ownership moderate the above relationship? And, by extension, can investing in state-controlled enterprises be considered for investors who are risk averse?

This study contributes to existing knowledge in several ways. First, the results provide support for the bad news hoarding theory developed by Jin and Myers (2006), and Bleck and Liu (2007). Second, the study produces empirical evidence that links current to future outcomes (Kim, Li & Zhang, 2011; Li, Luo, Wang & Foo, 2016; Xu, Jiang, Chan & Yi, 2013). Third, contrary to conventional wisdom suggesting SOEs are a stabilizing factor, the study finds a higher likelihood of future stock price crashes for municipal listed SOEs. The study reveals a more complicated and deeper problem between current local governments and listed SOEs' managers, extending the agency theory by considering modern listed SOEs as a feature specific to China.

2. The China Context

2.1 Economic reforms in China and State-controlled Enterprises

In the traditional context, SOEs in China were initially ideological organizations established as work units (*gongzuo danwei*) to support social and political rather than economic objectives (Leung & Cheng, 2013). In this form, managers appointed by the government and the SOEs' staff were seen as owning an 'iron rice bowl' (*tiefanwan*) with cradle-to-grave benefits (Hua, Miesing & Li, 2006). Hence, SOEs were viewed as highly inefficient.

Enterprise reform in China took place step by step since 1978, involving a process of corporatization and privatization to raise funds for expansion and increase revenue. During the first two stages, new non-state firms were allowed into the market, and their dynamic growth increased market competitive pressure on SOEs and government bureaucrats responsible for them. Subsequently managers of SOEs were granted more autonomy and compensation incentives to motivate them to improve their performance (Kang & Kim, 2012). Meanwhile, the government replaced the old command structure of government revenue with a market-oriented system of taxation. At present, China adopts a dual system of tax collection and administration, and the revenue from corporate taxation is shared by central and local governments, with the central government's share being 60%.[2]

A Company Law was promulgated in December 1993 providing a legal framework for transforming and corporatizing traditional SOEs into modern corporations, which have clarified property rights (Kang & Kim, 2012; Schipani & Liu, 2002; Yang, 2007). To focus on strategic enterprises, the SOE reform strategy turned to "grasping the large, letting go the small" (*zhuada fangxiao*). Under this policy, only key large state enterprises were selected to maintain the controlling rights and shape the core of China's modern enterprise system (L. Wu, Wang, Luo & Gillis, 2012). At the same time, these enterprises started to introduce a modern corporate structure and adopt professional management practices while thousands of unprofitable small- and medium-SOEs were privatized through leases, mergers, sales or liquidated (Zhang, 2004). The State-owned Assets Supervision and Administration Commission of the State Council (SASAC) was established in June 2003 to oversee all SOEs. Corresponding changes in employee management policies have taken place. A labour contract system[3] was introduced to SOEs, and managers' wages and salaries in SOEs were tied to their profitability, depending on the extent to which the SOEs achieve their profit targets.

Hence, from the perspective of the modern Chinese SOEs, reform has allowed them to retain a large part of firm profits together with greater autonomy. SOEs are expected to be more profitable and efficient, thus

increasing the potential of a conflict of interest among top executives and shareholders. The autonomy of SOEs executives motivates them to maximize their personal interest as well.

2.2 Aggressive Tax management in SOEs

Enterprise autonomy has allowed SOE managers to undertake aggressive tax management. The Accounting Information Quality Inspection Announcement (No. 21) of China's Ministry of Finance (2009) reveals that some SOEs have different problems paying taxes for performance evaluation standards, access to bank loans and other purposes. The report alleged that the Changling branch of Sinopec's asset management firm in Jilin Province offered its employees a total of 50.08 million yuan as bonus without approval; in addition, Sinopec has also falsely stated 52.06-million-yuan as income recorded in its books and 4.12-million-yuan owner's equity, accounting irregularities which resulted in failure to pay 11.82 million yuan in taxes in 2009. In 2011, the National Audit Office published the audit report of 15 central-SOEs and stated that they falsified income and profit to the tune of 3.825 billion and 5.908 billion yuan, respectively, and seven of them failed to pay 471 million yuan in taxes. Based on the actual situation of China, managers of SOEs have the motivation to do aggressive tax management in order to show good performance, either for promotion purposes or to be rewarded with monetary incentives.

3. Literature Review and Hypotheses Development

To date, concern about has contributed to greater research on corporate tax management (Hanlon & Heitzman, 2010). In a traditional concept, by being corporate tax efficient, tax management is seen as a firm value-maximizing activity, transferring the benefits from government to enterprises (Hanlon & Heitzman, 2010). But from the perspective of modern corporations, corporate tax management has received two opposing views. On the one hand, tax management would incorporate more dimensions of the agency conflict between owners and managers. Managers can disguise complex tax avoiding transactions under the ostensible objective of alleviating firms' tax burden to conduct managerial opportunism and resource diversion (Desai & Dharmapala, 2006, 2009a). For example, Badertscher, Katz & Rego, (2013) find that managers can use tax management to engage in shirking and rent-extraction activities. On the other side, especially in modern listed enterprises, there is a clear gap between theory and practice. In theory, shareholders as the owners of enterprises should be concerned with enterprises' long-term interests and development. But, due to information

asymmetry, shareholders cannot effectively predict long-term cash flows. This preference for what can be obtained with greater certainty – the 'bird-in-hand being better than two-in-the-bush' mentality may induce shareholders to engage in short-term behaviour, like short-term profit maximization and higher share price.[4] Therefore, managers may get higher pressure from shareholders to improve short-term performance. Thus, managers have been motivated by various incentives for short-term performance using tax management as a tool. Based on the above views, tax management activities may yield different economic outcomes, thus attracting considerable interest in the literature.

Exploring the extreme market return of stock price crash has become a hot topic. Jin and Myers (2006) ′bad news hoarding theory' empirically show that enterprises in an information opaque market are more likely to have a high risk of stock price crash. More specifically, lack of information transparency motivates managers to strategically hide and accumulate firms' bad news for their personal interests, such as compensation purpose and career development. When these incentives disappear or the accumulated negative information reaches a certain threshold, the undisclosed bad news will suddenly be released to the stock market that would lead to the stock price crash (Jin & Myers, 2006). The results of Hutton, Marcus and Tehranian (2009) and Kim, Li, H. and Li, S. (2014) show the positive relationship between opaqueness of financial reports and future crash risk.

The complex and opaque characteristics of tax management can offer tools and opportunities for managers to hide firms' negative information for a certain period, which leads to a high probability of future stock price crash. Kim et al. (2011), using U.S. firm-level data, examine the effect of corporate tax avoidance on future crash risk, and the results show that tax avoidance is positively correlated with the future crash risk, but this relationship can be alleviated for firms with a strong external monitoring mechanism.

In comparison with research in developed countries (Abdul Wahab & Holland, 2012; Badertscher et al., 2013; Desai & Dharmapala, 2009a; 2009b), Claessens and Fan (2002) document corporate governance conditions in Asian countries, where agency problems are worsened by low corporate transparency accompanied with many rent-seeking and relation-based transactions, extensive group structures, and risky financial structures. Svensson (2005) show that in addition to having concentrated ownership structures, weak legal protection, highly politicized institutional arrangements, rent-seeking behaviour, and corruption, China suffers from opaque information environments and weak corporate transparency. Following Jin and Myers (2006), Piotrosk, Wong and Zhang, (2015) using Chinese data find that China stock market has a significant higher negative skewness in daily excess returns than the global average. Hence, since the low information transparency in China bad news suppression will cause a

greater frequency of stock return crashes in the future. The following are Hypothesis 1 and 2 of the study.

H1. Corporate tax management is negatively associated with contemporaneous stock price crash risk.

H2. Corporate tax management is positively associated with future stock price crash risk.

Most previous studies claim that governments, as the controller of the SOEs, appoint bureaucrats to serve social and political interests, such as employment and social security (Jensen & Meckling, 1976; Ross, 1973; Xu, Zhu & Lin, 2005). However, this view overlooks the complex incentives individual bureaucrats and SOEs' managers have in modern Chinese SOEs. There are two strands of literature related to state-controlled enterprises that are relevant for this study. The first strand shows that managers of listed SOEs mostly are bureaucrats appointed by the government to represent the government (ultimate controlling shareholders) in decision-making. Compared with managers in private enterprises, managers in SOEs have more incentive to seek future political advancement which will garner more privileges even after they leave their positions (Tu, Lin & Liu, 2013); hence it is natural that managers in SOEs try to demonstrate outstanding firm performance to the government and thus conceal adverse operating outcomes. The second strand shows that the reform of SOEs have gradually improved the efficiency of the managerial labour market for SOEs (Lu & Zhao, 2008; Wan, Zhu & Chen, 2015), thus the performance-based bonus policy gives SOEs managers incentives to withhold negative information and show outstanding performance. Under the modern Chinese SOEs, political concerns and compensation contracts facilitate SOEs' managers to conceal adverse firm performance.

China's economic reform has moved the country from central government fiscal control through fiscal decentralization. The fiscal system is decentralized into different levels of governments, which are national, provincial, and municipal (including cities, prefectures, counties, and townships). Hence, government ownership is also divided into several administrative levels of government control. The term "municipal SOEs" in this study refers to the administrative level that stands below the provincial level while remaining higher than those at the township, including prefectural- and county-level SOEs. Since central SOEs play a strategically important role in the national economy, their top executives have a higher administrative rank at the vice-ministerial level (*fubuji*) or department-level (*zhengtingji*), and comes with important political privileges (Liao, Liu & Wang, 2014). Therefore, political benefits are the main incentives of executives in central SOEs to hide their firms' bad news. On the other hand,

because of the important role of central SOEs in China's economy, when these SOEs encounter financial problems, the Chinese government sees the need to provide a bailout to contain social unrest (Wang, Wong & Xia, 2008). In this situation, central SOEs are offered a large security margin to stave off bankruptcy.

Local SOEs generally lack strict and independent accounting auditing and property evaluation institutions, thus encouraging agents to take advantage of information asymmetry to pursue self-interests (Svensson, 2005; Yang, 2016). Yang (2016) and Chen, Lee and Li (2008) find that there is a higher collusion between Chinese local government and SOEs managers, which leads to abnormally high agency costs and SOEs' inefficiency. More specifically, as an agent of the controlling shareholder local government, officials can directly interfere in the running of their controlling SOEs (Fan, Wong & Zhang, 2007), such as hiring acquiescent auditors to seek private gains (Eisenhardt, 1989). Wang et al. (2008) found Chinese local SOEs tend to hire small local auditors within the same region that is conducive to hide bad accounting information. Moreover, local governments are also deemed as privatization-friendly leaders, keen to privatize their SOEs to increase local fiscal revenue and more importantly to advance their personal benefits from the privatized firms (Liu, 2014). In addition, existing research also finds local governments are the big players behind a series of privatization, especially at the municipal and county levels (Garnaut, Song, Tenev & Yao, 2005; Tenev, Zhang & Brefort, 2002).

Under the modern system governing Chinese SOEs, executives are motivated to pursue a self-serving agenda (for political career advancement and higher compensation) by using tax management to hide bad news and dress up their performance. Compared with other enterprises, municipal SOEs may face a comparatively high risk of closure when they meet downturns and financial scandals. Because of weaker protection from governments, the underperforming municipal SOEs are easily abandoned or privatized by municipal governments. Therefore, when the accumulated negative information is released to the stock market, municipal SOEs are exposed to the risk of a crash. The following is the third hypotheses of the study.

H3a. Firms controlled by central or provincial government have a weaker correlation between tax management and future risk of stock price crashing.

H3b. Firms controlled by municipal government have a stronger correlation between tax management and future risk of stock price crashing.

4. Data and Research Design

4.1 Sample

This study uses data for all Chinese A-share (main market) listed enterprises in Shanghai and Shenzhen stock exchanges, excluding financial industry firms which according to the China Securities Regulatory Commission Industry Classifications (CSRCIC), are heavily regulated and their tax incentives differ from firms in other industries, the study excluded enterprises in the financial industry. The period covered is from 2008[5] to 2013. All data was obtained from the China Stock Market and Accounting Research (CSMAR) database. To get a complete and accurate ownership data, part of the state ownership data was hand-collected from corporate annual reports.

In line with Wang et al. (2008), L. Wu et al. (2012), and Bradshaw, Liao and Ma (2012), the study identified firms as SOEs if their ultimate controller is the central, provincial or municipal government. If there were two or more types of owners controlling a listed firm, the study classified the firm's ownership type based on who was the ultimate largest shareholder.

In addition, this study also excluded data of firms for which firm-year observations are fewer than 26 weeks of stock return and have non-positive book values and total assets. With these exclusions, the sample of panel data consisted of 6706 firm-year observations. To eliminate the effect of outliers, the study winsorises variables at the top and bottom 1%.

4.2 Variables used

Four measures of corporate tax avoidance were used to capture different aspects of corporate tax management activities. Corporate effective tax rate can reflect all tax management transactions, even aggressive tax avoidance through permanent book-tax differences (Chen, S., Chen, X., Cheng & Shevlin, 2010). The first measure is the effective income tax rate (ETR). It is defined as tax expenses minus deferred tax expenses over pre-tax income. In addition, we also look at a long-run ETR (LETR) over a three-year period, which is intended to achieve better matching between taxes paid and the income related to these taxes (Dyreng, Hanlon & Maydew, 2008). The study also employs two additional book-tax difference measures, i.e. book-tax difference (BTD) and residual book-tax difference measure (DTAX). The residual book-tax difference captures more risky tax avoidance associated

with tax shelter transactions (Hanlon and Heitzman, 2010). Appendix A provides the definitions of these four variables.

Following Xu, Li, Yuan and Chan (2014), Kim et al. (2014), and Xu et al. (2013), we construct two measures of stock price crash risk. Both measures were constructed on firm-specific weekly returns. Thus, the study firstly estimated firm-specific weekly returns, symbolised by $W_{i,t}$.

$$R_{i,t} = \alpha_i + \beta_1 R_{m,t-2} + \beta_2 R_{m,t-1} + \beta_3 R_{m,t} + \beta_4 R_{m,t+1} + \beta_5 R_{m,t+2} + \varepsilon_{i,t} \quad (1)$$

Where $R_{i,t}$ is the return on stock *i* in week *t* and $R_{m,t}$ is the value-weighed A-share market return in week *t*. The firm-specific weekly return for firm *i* in week *t* is measured by the natural logarithm of one plus the residual return in Eq. (1), that is, $W_{i,t} = \text{Ln}\,(1+\varepsilon_{i,t})$.

Following Kim et al. (2011) and Xu et al. (2013), the first measure of crash risk is the negative conditional return skewness, denoted by NCSKEW. Eq. (2) shows the NCSKEW for each firm *i* in year *t*.

$$NCSKEW_{i,t} = -[n(n-1)^{3/2} \sum W_{i,t}^3]/[(n-1)(n-2)(\sum W_{i,t}^2)^{3/2}] \quad (2)$$

For a second measure of crash risk, this study uses down-to-up volatility (DUVOL) which captures asymmetric volatilities between negative and positive firm-specific weekly returns (Kim et al., 2011). Specifically, the study firstly separates all the weeks with firm-specific weekly returns into down weeks and up weeks. The down weeks means the firm-specific weekly returns lower than the annual mean, and the up weeks are the firm-specific weekly returns higher than the annual mean. The standard deviations for the two subsamples are computed separately, and then calculate the DUVOL followed by Eq. (3) for firm *i* in year *t*.

$$\text{DUVOL}_{i,t} = \ln\{[(n_u - 1)\sum_{down} W_{i,t}^2]/[(n_d - 1)\sum_{up} W_{i,t}^2]\} \quad (3)$$

A higher value of NCSKEW and DUVOL is consistent with a greater likelihood of the stock price crash risk.

4.3 Model Specification

According to the prior study of Kim et al. (2011), this study estimates the following regression model, Eq. (4) to test H1. In the model, there are two alternative dependent variables of Crash Risk, NCSKEW and DUVOL. Four

measures of Tax Management are employed: ETR, LETR, DTAX, and BTD, and standard errors are two-way clustered by year and firm.

$$Crash\ Risk_{i,t} = \alpha_0 + \beta_1 Tax\ Management_{i,t} + \beta_2 Tax\ Management_{i,t-1} + \beta_3 NCSKEW_{i,t-1} + \beta_4 DTURN_{i,t-1} + \beta_5 RET_{i,t-1} + \beta_6 SIGMA_{i,t-1} + \beta_7 ROA_{i,t-1} + \beta_8 MB_{i,t-1} + \beta_9 SIZE_{i,t-1} + \beta_{10} LEV_{i,t-1} + \beta_{11} Disacc_{i,t-1} + Industry\ Dummies + Year\ Dummies + \varepsilon_{i,t} \quad (4)$$

Eq. (5) estimates the moderating role of government ownership on the relationship between tax management and stock price crash risk. A dummy variable OWNER and interaction variable OWNER*TAX are set up. Where, OWNER represents the enterprises' ultimate controller, which is controlled by central, provincial and municipal governments: Central, Provincial, and Muni.

$$Crash\ Risk_{i,t} = \alpha_0 + \beta_1 Tax\ Management_{i,t} + \beta_2 Tax\ Management_{i,t-1} + \beta_3 OWNER * TAX_{i,t-1} + \beta_4 OWNER_{i,t-1} + \beta_5 NCSKEW_{i,t-1} + \beta_6 DTURN_{i,t-1} + \beta_7 RET_{i,t-1} + \beta_8 SIGMA_{i,t-1} + \beta_9 ROA_{i,t-1} + \beta_{10} MB_{i,t-1} + \beta_{11} SIZE_{i,t-1} + \beta_{12} LEV_{i,t-1} + \beta_{13} Disacc_{i,t-1} + Industry\ Dummies + Year\ Dummies + \varepsilon_{i,t} \quad (5)$$

Several control variables as potential predictors of crash risk were included. $DTURN_{i,t-1}$ is the detrended average monthly stock turnover, which is a proxy for investor heterogeneity or for differences of opinion among investors. $NCSKEW_{i,t-1}$ is the lagged negative skewness of firm-specific stock returns. Kim et al. (2011) show that the last year return skewness is likely to influence the return skewness in the current year. The variable $SIGMA_{i,t-1}$ is the standard deviation of last year firm-specific stock returns, and $RET_{i,t-1}$ is the mean of firm-specific weekly return in year *t-1*. In addition, several standard corporate control variables are included, which are $SIZE_{i,t-1}$ (the firm's natural logarithm of total assets), $MB_{i,t-1}$ (the ratio of the market value of equity to the book value of equity), $LEV_{i,t-1}$ (the ratio of book value of total debts scaled by total assets), and $ROA_{i,t-1}$ (net income over total assets). The variable $Discacc_{i,t-1}$ is absolute discretionary accruals, which measures accrual manipulation and is estimated from the modified Jones model (Dechow et al., 1995). Moreover, this study also includes industry and year dummies to control the effects of industry and time, respectively. The definitions of variables can be found in Appendix A.

5. Empirical Results

5.1 Descriptive statistics

Table 1 presents the summary descriptive statistics. In terms of the two effective tax rates (ETR and LETR), two indications of the size of corporate tax management, the average and median are about 21% and 19%, respectively, below the statutory rate of 25%, which suggest that more than half of the firm-year observations have a lower corporate effective tax rate. Hence, corporate tax management is a significant strategy of corporate management in Chinese listed enterprises.

Table 1: Descriptive Statistics of Main Variables

Variables	N	Mean	Std. Dev.	Min	p25	Median	p75	Max
Crash risk measures								
$NCSKEW_t$	6706	-0.558	0.880	-3.062	-1.104	-0.570	0.024	1.601
$DUVOL_t$	6706	-0.100	0.347	-0.909	-0.343	-0.106	0.147	0.697
Tax management measures								
ETR_t	6706	0.220	0.140	0.000	0.141	0.197	0.274	
$LETR_t$	6706	0.212	0.123	0.000	0.144	0.194	0.266	0.991
TS_t	6706	-0.010	0.197	-0.864	-0.076	-0.004	0.060	0.829
BTD_t	6706	0.091	0.099	-0.058	0.031	0.063	0.115	0.609
ETR_{t-1}	4464	0.215	0.129	0.000	0.141	0.196	0.272	0.985
$LETR_{t-1}$	4464	0.210	0.118	0.000	0.142	0.194	0.265	0.985
TS_{t-1}	4464	0.000	0.195	-0.864	-0.066	0.002	0.066	0.829
BTD_{t-1}	4464	0.099	0.103	-0.058	0.036	0.070	0.126	0.609
Control variables								
$NCSKEW_{t-1}$	4464	-0.505	0.885	-3.062	-1.079	-0.522	0.108	1.601
$DTURN_{t-1}$	4464	0.309	0.209	0.034	0.151	0.253	0.416	0.988
LEV_{t-1}	4464	0.493	0.194	0.063	0.353	0.499	0.640	0.940
MB_{t-1}	4464	0.206	0.237	0.001	0.003	0.093	0.393	0.800
ROA_{t-1}	4464	0.054	0.045	-0.058	0.023	0.042	0.073	0.223
$SIZE_{t-1}$	4464	9.568	0.536	8.287	9.200	9.502	9.887	11.191
$SIGMA_{t-1}$	4464	0.064	0.021	0.028	0.049	0.061	0.076	0.124
RET_{t-1}	4464	0.002	0.012	-0.023	-0.007	0.000	0.008	0.031
$Discacc_{t-1}$	4464	0.151	0.140	0.002	0.055	0.117	0.210	0.853

Notes: The sample contains from 2008 to 2013 with non-missing values. P25 refers to percentile 25, and P75 refers to percentile 75. The variables are as defined in the Appendix A.

Table 2 reports the correlation coefficients of all variables. The coefficients between independent variables are mostly less than 0.8. Then, the study tests the variance inflation factor (VIF) statistics, and the value of VIF is less than 5. Therefore, the multicollinearity is not a factor in the regression analysis.

Table 2: Correlation

Panel A: Correlation Between Dependent Variables and Independent Variables

	$ETR_{i,t}$	$ETR_{i,t-1}$	$LETR_{i,t}$	$LETR_{i,t-1}$	$DTAX_{i,t}$	$DTAX_{i,t-1}$	$BTD_{i,t}$	$BTD_{i,t-1}$	$NCSKEW_{i,t-1}$
$NCSKEW_{i,t}$	0.010	-0.057***	-0.024*	-0.040***	0.037***	0.057***	0.035***	0.131***	-0.083***
$DUVOL_{i,t}$	0.046***	-0.043***	0.009	-0.030**	0.044***	0.063***	-0.030**	0.101***	-0.104***
	$DTURN_{i,t-1}$	$LEV_{i,t-1}$	$MB_{i,t-1}$	$ROA_{i,t-1}$	$SIZE_{i,t-1}$	$SIGMA_{i,t-1}$	$RET_{i,t-1}$	$Discacc_{i,t-1}$	
$NCSKEW_{i,t}$	0.102***	-0.015	0.008	0.131***	0.044***	0.013	0.241***	0.021	
$DUVOL_{i,t}$	0.104***	0.000	-0.088***	0.101***	0.092***	-0.182***	0.307***	-0.009	

Panel B: Correlation Between Independent Variables

	$ETR_{i,t}$	$ETR_{i,t-1}$	$LETR_{i,t}$	$LETR_{i,t-1}$	$DTAX_{i,t}$	$DTAX_{i,t-1}$	$BTD_{i,t}$	$BTD_{i,t-1}$	$NCSKEW_{i,t-1}$	$DTURN_{i,t-1}$	$LEV_{i,t-1}$	$MB_{i,t-1}$
$ETR_{i,t-1}$	0.500***											
$LETR_{t}$	0.748***	0.778***										
$LETR_{i,t-1}$	0.441***	0.770***	0.812***									
$DTAX_{t}$	-0.046***	-0.050***	-0.001	0.000								
$DTAX_{i,t-1}$	0.015	-0.039***	-0.003	0.007	0.095***							
BTD_{t}	-0.147***	-0.121***	-0.110***	-0.103***	0.351***	-0.013						
$BTD_{i,t-1}$	-0.092***	-0.126***	-0.097***	-0.096***	-0.001	0.385***	0.560***					
$NCSKEW_{i,t-1}$	-0.022	-0.008	-0.038**	-0.038**	-0.089***	0.062***	-0.028*	0.039***				
$DTURN_{i,t-1}$	0.005	-0.018	-0.008	0.008	0.122***	-0.001	-0.092***	-0.164***	-0.226***			
$LEV_{i,t-1}$	0.204***	0.210***	0.259***	0.229***	-0.02	-0.037**	-0.230***	-0.222***	-0.059***	0.019		
$MB_{i,t-1}$	-0.037**	-0.012	-0.011	-0.001	-0.122***	-0.001	0.071***	0.188***	0.074***	-0.156***	-0.011	
$ROA_{i,t-1}$	-0.173***	-0.227***	-0.206***	-0.190***	0.020	0.233***	0.593***	0.792***	0.048***	-0.137***	-0.415***	0.055***
$SIZE_{i,t-1}$	0.154***	0.142***	0.193***	0.157***	-0.033**	0.071***	-0.067***	0.081***	-0.025*	-0.340***	0.386***	-0.006
$SIGMA_{i,t-1}$	-0.036**	-0.006	-0.004	0.030**	0.009	-0.003	0.031**	0.007	-0.081***	0.371***	0.065***	0.280***
$RET_{i,t-1}$	-0.024	-0.064***	-0.026*	-0.023	0.164***	-0.061***	0.164***	0.076***	-0.537***	0.436***	0.024	-0.069***
$Discacc_{i,t-1}$	0.027*	0.027*	0.043***	0.041***	-0.023	0.140***	0.026*	0.245***	0.005	-0.031**	0.194***	0.175***
	$ROA_{i,t-1}$	$SIZE_{i,t-1}$	$SIGMA_{i,t-1}$	$RET_{i,t-1}$								
$SIZE_{i,t-1}$	-0.027*											
$SIGMA_{i,t-1}$	-0.044***	-0.221***										
$RET_{i,t-1}$	0.075***	-0.034**	0.000									
$Discacc_{i,t-1}$	-0.051***	0.135***	0.074***	0.008								

Note: *, **, *** indicates significance at 10%, 5% and 1% respectively.

5.2 Regression results

Panel A of Table 3 lists the results of the pool OLS regressions with NCSKEW as the proxy for crash risk and four proxies of ETR, LETR, DTAX, and BTD for corporate tax management described above. In column (1) of Panel A of Table 3, the coefficient of $ETR_{i,t-1}$ is highly significant at the 1% level with negative sign (-0.330 with t=-3.495), while the coefficient of $ETR_{i,t}$ is significant with positive sign (0.325 with t=3.300). Because a lower ETR represents a higher level of tax management, the results indicate that tax management in year *t* is negatively correlated with crash risk in year *t*, but tax management in year *t-1* is positively correlated with crash risk in year *t*. The coefficients associated with DTAX and BTD in year *t* under both models (columns (3) and (4) in Panel A of Table 3) are negative and highly significant at 1% level (-0.190 with t=-13.424, and -0.976 with t=-5.533, respectively), while the coefficients of the two proxies in year *t-1* are positive and highly significant (0.113 with t=2.139, and 0.592 with t=7.232, respectively). Since the higher BTD and DTAX represent a higher-level of tax management, the results in columns (3) and (4) of Panel A of Table 3 are consistent with the results of ETR, where corporate tax management is negatively associated with contemporaneous stock price crash risk, but positively associated with future stock price crashes. Thus, the results in Panel A of Table 3 support Hypothesis 1 and Hypothesis 2.

DUVOL as an alternative measure is used to test the robustness of our results, where Panel B of Table 3 reports the results. $DUVOL_{i,t}$ is positively related to $ETR_{i,t}$ and $LETR_{i,t}$, and negatively related to $ETR_{i,t-1}$ and $LETR_{i,t-1}$. Moreover, DUVOL in year *t* also shows a negative relationship with DTAX and BTD in year *t* and a positive relationship in year *t-1*. Hence, the results of DUVOL as the dependent variable are in line with the results displayed in Panel A of Table 3. These findings support Hypothesis 1 and Hypothesis 2, indicating that firms with higher tax management activities are less prone to crash in the current year but more crash prone in the future.

The results support the bad news hoarding theory and agency theory. Corporate tax management activities can be used undesirably as a tool to conceal negative firms' news, such as adverse operating outcomes, manipulate management performance thereby producing reduced immediate crash risk. When these opportunistic short-term behaviour is eventually uncovered, the result is future enterprise crash risk. Bad news can only be postponed, not eliminated.

Table 3: Corporate tax management and stock price crash risk (H1 and H2)

	(1) ETR	**(2) LETR**	**(3) DTAX**	**(4) BTD**
Panel A: Dependent variable: NCSKEW				
$ETR_{i,t}$	0.325***			
	(3.300)			
$ETR_{i,t-1}$	-0.330***			
	(-3.495)			
$LETR_{i,t}$		0.076		
		(0.676)		
$LETR_{i,t-1}$		-0.241**		
		(-2.454)		
$DTAX_{i,t}$			-0.190***	
			(-13.424)	
$DTAX_{i,t-1}$			0.113**	
			(2.139)	
$BTD_{i,t}$				-0.976***
				(-5.533)
$BTD_{i,t-1}$				0.592***
				(7.232)
$NCSKEW_{i,t-1}$	0.056*	0.055*	0.0551*	0.056*
	(1.836)	(1.805)	(1.880)	(1.778)
$DTURN_{i,t-1}$	-0.170	-0.160	-0.177	-0.223*
	(-1.391)	(-1.333)	(-1.393)	(-1.840)
$RET_{i,t-1}$	16.827***	16.711***	17.507***	18.605***
	(2.833)	(2.783)	(2.962)	(3.150)
$SIGMA_{i,t-1}$	1.381	1.422	1.401	1.373
	(0.794)	(0.826)	(0.829)	(0.767)
$SIZE_{i,t-1}$	0.105*	0.109**	0.102*	0.082
	(1.941)	(2.058)	(1.795)	(1.527)
$MB_{i,t-1}$	-0.019	-0.020	-0.037	-0.050
	(-0.414)	(-0.457)	(-0.855)	(-1.016)
$LEV_{i,t-1}$	-0.039	-0.028	-0.036	-0.030
	(-0.487)	(-0.369)	(-0.412)	(-0.313)
$ROA_{i,t-1}$	1.634***	1.638***	1.555***	1.727***
	(5.083)	(5.067)	(4.923)	(3.698)
$Discacc_{i,t-1}$	0.062	0.063	0.038	-0.020
	(0.821)	(0.826)	(0.498)	(-0.309)

Table 3: (Continued)

Industry effect	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes
Constant	-2.005***	-2.058***	-1.970***	-1.713**
	(-2.785)	(-2.877)	(-2.617)	(-2.365)
N	4464	4464	4464	4464
Adjusted R^2	0.223	0.221	0.222	0.227
Panel B: Dependent variable: DUVOL				
$ETR_{i,t}$	0.169***			
	(4.633)			
$ETR_{i,t-1}$	-0.139***			
	(-3.880)			
$LETR_{i,t}$		0.101**		
		(2.034)		
$LETR_{i,t-1}$		-0.115**		
		(-2.511)		
$DTAX_{i,t}$			-0.067***	
			(-3.454)	
$DTAX_{i,t-1}$			0.051*	
			(1.924)	
$BTD_{i,t}$				-0.534***
				(-8.323)
$BTD_{i,t-1}$				0.234***
				(4.918)
$NCSKEW_{i,t-1}$	0.015	0.014	0.015	0.015
	(1.419)	(1.412)	(1.491)	(1.397)
$DTURN_{i,t-1}$	-0.062	-0.058	-0.063	-0.092
	(-1.010)	(-0.953)	(-0.999)	(-1.472)
$RET_{i,t-1}$	5.720***	5.656**	5.941***	6.783***
	(2.633)	(2.574)	(2.710)	(3.100)
$SIGMA_{i,t-1}$	0.737	0.763	0.753	0.750
	(1.504)	(1.561)	(1.574)	(1.444)
$SIZE_{i,t-1}$	0.053**	0.054**	0.052*	0.042
	(2.026)	(2.100)	(1.899)	(1.601)
$MB_{i,t-1}$	-0.017	-0.018	-0.024	-0.030*
	(-1.132)	(-1.201)	(-1.499)	(-1.762)

Table 3: (Continued)

$LEV_{i,t-1}$	-0.042	-0.038	-0.039	-0.035
	(-1.523)	(-1.488)	(-1.349)	(-1.068)
$ROA_{i,t-1}$	0.335***	0.341***	0.289**	0.533**
	(2.890)	(3.110)	(2.374)	(2.445)
$Discacc_{i,t-1}$	-0.032	-0.031	-0.043	-0.059**
	(-1.170)	(-1.145)	(-1.416)	(-2.058)
Industry effect	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes
Constant	-0.993***	-1.013***	-0.984***	-0.849***
	(-3.134)	(-3.206)	(-2.953)	(-2.597)
N	4464	4464	4464	4464
Adjusted R^2	0.341	0.338	0.339	0.351

Notes: The dependent variable is measured by NCSKEW and DUVOL. The independent variable of tax management is proxied by ETR, LETR, DTAX, and BTD, respectively. Regressions include the following control variables: $NCSKEW_{i,t-1}$, $DTURN_{i,t-1}$, $RET_{i,t-1}$, $SIGMA_{i,t-1}$, $SIZE_{i,t-1}$, $MB_{i,t-1}$, $LEV_{i,t-1}$, $ROA_{i,t-1}$, $Discacc_{i,t-1}$, Industry and Year variables, which are not been tabulated. The pool OLS model is estimated with clustering error by both firm and time, where *t*-values are in parentheses. All variables are defined in Appendix A. Here *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

5.3 The Effect of State Ownership/Control

To assess the impact of state ownership/control on Chinese listed enterprises, Eq. (5) including the dummy variables of state ownership (OWNER) based on the corporate ultimate controller and the interaction term of OWNER*TAX was estimated. To increase the power of the test, this study uses three dummy variables (central, province, and muni) for each level state ownership variable. Table 4 reports the results when central state control interacts with four tax management measures. As shown in Panel A of Table 4, with NCSKEW as the dependent variable, after interactions are included, the tax management proxies in year *t* are still negatively associated with firm crash risk; specifically, $ETR_{i,t}$ has a significantly positive coefficient, and $DTAX_{i,t}$ and $BTD_{i,t}$ have significantly negative coefficients. The results are consistent with H1. In addition, there is also a significantly positive relationship between tax management and future crash risk consistent with H2. While, the coefficients of four interaction terms, that is, Central*TAX (Central*ETR, Central*LERT, Central*DTAX, Central*BTD), are not statistically significant, which means that central government ownership

would not statistically impact the relationship between tax management and future stock price crash risk.

Panel B of Table 4 displays the regression results of DUVOL as a proxy of crash risk, all the coefficients of two main effect terms (Tax Management$_{i,t}$ and Tax Management$_{i,t-1}$) are highly significant with expecting signs, except that only DTAX$_{i,t-1}$ is the coefficient insignificant. In addition, the coefficients of four interaction terms in Panel B of Table 4, Central*ETR$_{i,t-1}$, Central*LERT$_{i,t-1}$, Central*DTAX$_{i,t-1}$, Central*BTD$_{i,t-1}$ are also not shown statistically significant. Hence, the results reported in Panel A and Panel B of Table 4 suggest that the central government control would not influence the impact of tax management on future stock price crash.

Table 4: Impact of central government ownership on the relationship between tax management and crash risk. (H3a)

	(1) ETR	**(2) LETR**	**(3) DTAX**	**(4) BTD**
Panel A: Dependent variable: NCSKEW				
ETR$_{i,t}$	0.325***			
	(3.292)			
ETR$_{i,t-1}$	-0.3094***			
	(-3.033)			
Central*ETR$_{i,t-1}$	-0.096			
	(-0.635)			
LETR$_{i,t}$		0.076		
		(0.647)		
LETR$_{i,t-1}$		-0.284**		
		(-2.560)		
Central*LETR$_{i,t-1}$		0.269		
		(1.150)		
DTAX$_{i,t}$			-0.190***	
			(-15.210)	
DTAX$_{i,t-1}$			0.075	
			(1.035)	
Central*DTAX$_{i,t-1}$			0.269	
			(1.269)	
BTD$_{i,t}$				-0.966***
				(-5.383)
BTD$_{i,t-1}$				0.585***
				(6.283)
Central*BTD$_{i,t-1}$				0.131
				(0.261)
Central$_{i,t-1}$	0.059	-0.016	0.039	0.024
	(0.965)	(-0.215)	(1.163)	(0.353)

Table 4: (Continued)

$NCSKEW_{i,t-1}$	0.056*	0.055*	0.055*	0.056*
	(1.816)	(1.790)	(1.873)	(1.781)
$DTURN_{i,t-1}$	-0.166	-0.162	-0.175	-0.221*
	(-1.377)	(-1.396)	(-1.402)	(-1.842)
$RET_{i,t-1}$	16.837***	16.826***	17.509***	18.588***
	(2.838)	(2.802)	(2.969)	(3.169)
$SIGMA_{i,t-1}$	1.300	1.356	1.331	1.307
	(0.727)	(0.761)	(0.781)	(0.709)
$SIZE_{i,t-1}$	0.100*	0.103*	0.097	0.078
	(1.779)	(1.866)	(1.636)	(1.363)
$MB_{i,t-1}$	-0.016	-0.020	-0.036	-0.048
	(-0.345)	(-0.436)	(-0.845)	(-0.980)
$LEV_{i,t-1}$	-0.037	-0.021	-0.037	-0.027
	(-0.462)	(-0.272)	(-0.422)	(-0.288)
$ROA_{i,t-1}$	1.668***	1.6680***	1.592***	1.728***
	(5.062)	(5.024)	(4.893)	(3.648)
$Discacc_{i,t-1}$	0.066	0.066	0.050	-0.018
	(0.871)	(0.868)	(0.623)	(-0.284)
Industry effect	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes
Constant	-1.966***	-1.996***	-1.926**	-1.675**
	(-2.665)	(-2.745)	(-2.496)	(-2.236)
N	4464	4464	4464	4464
Adjusted R^2	0.223	0.221	0.223	0.227
Panel B. Dependent variable: DUVOL				
$ETR_{i,t}$	0.169***			
	(4.628)			
$ETR_{i,t-1}$	-0.133***			
	(-3.513)			
Central*$ETR_{i,t-1}$	-0.030			
	(-0.799)			
$LETR_{i,t}$		0.101**		
		(1.998)		
$LETR_{i,t-1}$		-0.129**		
		(-2.268)		
Central*$LETR_{i,t-1}$		0.084		
		(1.424)		
$DTAX_{i,t}$			-0.067***	
			(-3.438)	
$DTAX_{i,t-1}$			0.040	
			(1.123)	

Table 4: (Continued)

Central*$DTAX_{i,t-1}$			0.070	
			(0.829)	
$BTD_{i,t}$				-0.531***

				(-8.254)
$BTD_{i,t-1}$				0.230***
				(4.135)
$Central*BTD_{i,t-1}$				0.053
				(0.380)
$Central_{i,t-1}$	0.021	-0.003	0.015*	0.007
	(1.446)	(-0.125)	(1.755)	(0.415)
$NCSKEW_{i,t-1}$	0.015	0.014	0.014	0.015
	(1.408)	(1.413)	(1.488)	(1.397)
$DTURN_{i,t-1}$	-0.060	-0.058	-0.062	-0.091
	(-0.995)	(-0.973)	(-0.997)	(-1.476)
$RET_{i,t-1}$	5.725***	5.694***	5.945***	6.777***
	(2.638)	(2.599)	(2.722)	(3.110)
$SIGMA_{i,t-1}$	0.707	0.737	0.726	0.728
	(1.434)	(1.484)	(1.533)	(1.385)
$SIZE_{i,t-1}$	0.051*	0.052**	0.050*	0.040
	(1.933)	(1.985)	(1.809)	(1.507)
$MB_{i,t-1}$	-0.016	-0.018	-0.023	-0.029*
	(-1.076)	(-1.167)	(-1.473)	(-1.762)
$LEV_{i,t-1}$	-0.041	-0.035	-0.039	-0.034
	(-1.481)	(-1.400)	(-1.298)	(-1.046)
$ROA_{i,t-1}$	0.347***	0.353***	0.302**	0.533**
	(3.077)	(3.260)	(2.546)	(2.471)
$Discacc_{i,t-1}$	-0.031	-0.030	-0.039	-0.059**
	(-1.136)	(-1.107)	(-1.223)	(-2.018)
Industry effect	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes
Constant	-0.978***	-0.991***	-0.967***	-0.836**
	(-3.056)	(-3.110)	(-2.876)	(-2.515)
N	4464	4464	4464	4464
Adjusted R^2	0.341	0.338	0.339	0.351

Notes: The dependent variable is measured by NCSKEW and DUVOL. The independent variable of tax management is proxied by ETR, LETR, DTAX, and BTD, respectively. Regressions include the following control variables: $NCSKEW_{i,t-1}$, $DTURN_{i,t-1}$, $RET_{i,t-1}$, $SIGMA_{i,t-1}$, $SIZE_{i,t-1}$, $MB_{i,t-1}$, $LEV_{i,t-1}$, $ROA_{i,t-1}$, $Discacc_{i,t-1}$, Industry and Year variables, which are not been tabulated. The OLS model is estimated with clustering error by both firm and time, where *t*-values are in parentheses. All variables are defined in Appendix A. Here *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

Table 5 shows the moderating effect of provincial government control, which includes the interaction terms (Provincial*$ETR_{i,t-1}$, Provincial*$LETR_{i,t-1}$, Provincial*$DTAX_{i,t-1}$, and Provincial*$BTD_{i,t-1}$). Panel A and B display the results with NCSKEW and DUVOL as the dependent variables, respectively. The results show that corporate tax management has a significantly negative relationship with contemporaneous crash risk, and

positive relationship with future crash risk, which support H1 and H2 again. In addition, the coefficients of the four interaction terms (Provincial*$ETR_{i,t-1}$, Provincial*$LETR_{i,t-1}$, Provincial*$DTAX_{i,t-1}$, and Provincial*$BTD_{i,t-1}$) in Panel A and B of Table 5 are not statistically significant, except that only Province*$LETR_{i,t-1}$ is slightly positive significant in Panel B of Table 5. Therefore, the results suggest that the provincial government control would not statistically influence the relationship between tax management and future stock price crash risk.

The results of Table 4 and Table 5 reject Hypothesis 3a. Therefore, the firms controlled by central and provincial government would not impact the positive correlation between tax management and future risk of stock price crashing. For non-financial SOEs, government control is exercised mostly through ensuring compliance with government policies and strategies. Control is not extended to day-to-day management (Ran and Cheok, 2016). Hence, tax management is generally left in the hands of SOE management.

Table 5: Impact of provincial government ownership on the relationship between tax management and crash risk. (H3a)

	(1) ETR	(2) LETR	(3) DTAX	(4) BTD
Panel A: Dependent variable: NCSKEW				
$ETR_{i,t}$	0.318***			
	(3.289)			
$ETR_{i,t-1}$	-0.376***			
	(-4.022)			
Provincial*$ETR_{i,t-1}$	0.221			
	(1.643)			
$LETR_{i,t}$		0.062		
		(0.572)		
$LETR_{i,t-1}$		-0.290**		
		(-2.470)		
Provincial*$LETR_{i,t-1}$		0.269		
		(1.476)		
$DTAX_{i,t}$			-0.186***	
			(-18.585)	
$DTAX_{i,t-1}$			0.107*	
			(1.869)	
Provincial*$DTAX_{i,t-1}$			0.037	
			(0.232)	

Table 5: (Continued)

$BTD_{i,t}$				-0.974***
				(-5.567)
$BTD_{i,t-1}$				0.623***
				(7.487)
Provincial*$BTD_{i,t-1}$				-0.087
				(-0.248)

Provincial$_{i,t-1}$	-0.098**	-0.109**	-0.048*	-0.042
	(-2.143)	(-2.308)	(-1.684)	(-1.458)
NCSKEW$_{i,t-1}$	0.054*	0.053*	0.054*	0.055*
	(1.825)	(1.785)	(1.875)	(1.763)
DTURN$_{i,t-1}$	-0.169	-0.157	-0.179	-0.226*
	(-1.374)	(-1.323)	(-1.399)	(-1.859)
RET$_{i,t-1}$	16.597***	16.488***	17.356***	18.417***
	(2.811)	(2.757)	(2.968)	(3.139)
SIGMA$_{i,t-1}$	1.383	1.402	1.427	1.414
	(0.803)	(0.829)	(0.835)	(0.787)
SIZE$_{i,t-1}$	0.113**	0.118**	0.109**	0.089*
	(2.148)	(2.265)	(1.982)	(1.749)
MB$_{i,t-1}$	-0.018	-0.019	-0.036	-0.049
	(-0.392)	(-0.442)	(-0.869)	(-1.006)
LEV$_{i,t-1}$	-0.048	-0.038	-0.042	-0.036
	(-0.596)	(-0.499)	(-0.473)	(-0.382)
ROA$_{i,t-1}$	1.606***	1.612***	1.538***	1.686***
	(5.229)	(5.180)	(5.037)	(4.055)
Discacc$_{i,t-1}$	0.066	0.069	0.040	-0.020
	(0.869)	(0.890)	(0.516)	(-0.299)
Industry effect	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes
Constant	-2.059***	-2.109***	-2.022***	-1.774***
	(-3.2759)	(-3.3683)	(-3.0742)	(-2.7549)
N	4464	4464	4464	4464
Adjusted R^2	0.223	0.221	0.222	0.227

Panel B. Dependent variable: DUVOL

ETR$_{i,t}$	0.167***			
	(4.591)			
ETR$_{i,t-1}$	-0.151***			
	(-4.309)			
Provincial*ETR$_{i,t-1}$	0.057			
	(1.135)			
LETR$_{i,t}$		0.095*		
		(1.895)		
LETR$_{i,t-1}$		-0.139***		
		(-3.284)		
Provincial*LETR$_{i,t-1}$		0.128*		
		(1.879)		
DTAX$_{i,t}$			-0.066***	
			(-3.447)	

Table 5: (Continued)

DTAX$_{i,t-1}$			0.046**	
			(2.041)	
Provincial*DTAX$_{i,t-1}$			0.025	
			(0.436)	
BTD$_{i,t}$				-0.533***
				(-8.294)

$BTD_{i,t-1}$				0.250***
				(4.537)
Provincial*$BTD_{i,t-1}$				-0.049
				(-0.465)
$Provincial_{i,t-1}$	-0.029**	-0.046**	-0.017**	-0.013**
	(-2.054)	(-2.434)	(-2.333)	(-2.106)
$NCSKEW_{i,t-1}$	0.014	0.014	0.014	0.015
	(1.384)	(1.340)	(1.478)	(1.377)
$DTURN_{i,t-1}$	-0.062	-0.056	-0.064	-0.092
	(-1.006)	(-0.937)	(-1.005)	(-1.489)
$RET_{i,t-1}$	5.647***	5.570**	5.892***	6.714***
	(2.602)	(2.528)	(2.722)	(3.086)
$SIGMA_{i,t-1}$	0.741	0.749	0.760	0.766
	(1.504)	(1.546)	(1.537)	(1.449)
$SIZE_{i,t-1}$	0.056**	0.058**	0.055**	0.044*
	(2.124)	(2.229)	(1.990)	(1.717)
$MB_{i,t-1}$	-0.017	-0.018	-0.024	-0.030*
	(-1.116)	(-1.202)	(-1.556)	(-1.758)
$LEV_{i,t-1}$	-0.044	-0.042	-0.041	-0.037
	(-1.567)	(-1.540)	(-1.393)	(-1.119)
$ROA_{i,t-1}$	0.326***	0.331***	0.283**	0.515**
	(2.817)	(2.994)	(2.344)	(2.470)
$Discacc_{i,t-1}$	-0.031	-0.029	-0.042	-0.060**
	(-1.113)	(-1.029)	(-1.396)	(-2.064)
Industry effect	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes
Constant	-1.011***	-1.0314***	-1.002***	-0.8719***
	(-3.595)	(-3.655)	(-3.380)	(-2.885)
N	4464	4464	4464	4464
Adjusted R^2	0.341	0.338	0.339	0.351

Notes: The dependent variable is measured by NCSKEW and DUVOL. The independent variable of tax management is proxied by ETR, LETR, DTAX, and BTD, respectively. Regressions include the following control variables: $NCSKEW_{i,t-1}$, $DTURN_{i,t-1}$, $RET_{i,t-1}$, $SIGMA_{i,t-1}$, $SIZE_{i,t-1}$, $MB_{i,t-1}$, $LEV_{i,t-1}$, $ROA_{i,t-1}$, $Discacc_{i,t-1}$, Industry and Year variables, which are not been tabulated. The OLS model is estimated with clustering error by both firm and time, where *t*-values are in parentheses. All variables are defined in Appendix A. Here *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

In Panel A of Table 6, the results of NCSKEW as the dependent variable, where corporate tax management activities have a negative relationship with contemporaneous crash risk, but a positive relationship with future crash risk, which again support H1 and H2. The coefficients of the interaction terms Muni*$ETR_{i,t-1}$, Muni*$LETR_{i,t-1}$, Muni*$BTD_{i,t-1}$, and Muni*$DTAX_{i,t-1}$ are statistically significant with expected signs in all cases, except interaction terms (Muni*$LETR_{i,t-1}$) insignificant. Panel B of Table 6 reports the

regression results when the dependent variable is DUVOL, in which all the coefficients of interactions are statistically significant with same signs in Panel A, except that only Muni*ETR$_{i,t-1}$ is the coefficient that is insignificant. Hence, the results presented in Table 6 lend support to H3b, which postulates that the enterprises controlled by municipal governments have a higher probability of future crash risk because of corporate tax management.

Table 6: The impact of municipal government ownership on the relationship between tax management and crash risk. (H3b)

	(1) ETR	**(2) LETR**	**(3) DTAX**	**(4) BTD**
Panel A: Dependent variable: NCSKEW				
ETR$_{i,t}$	0.328***			
	(3.293)			
ETR$_{i,t-1}$	-0.279**			
	(-2.329)			
Muni*ETR$_{i,t-1}$	-0.229*			
	(-1.771)			
LETR$_{i,t}$		0.077		
		(0.661)		
LETR$_{i,t-1}$		-0.196*		
		(-1.746)		
Muni*LETR$_{i,t-1}$		-0.179		
		(-0.919)		
DTAX$_{i,t}$			-0.193***	
			(-19.713)	
DTAX$_{i,t-1}$			0.069	
			(1.266)	
Muni*DTAX$_{i,t-1}$			0.297*	
			(1.849)	
BTD$_{i,t}$				-0.995***
				(-5.836)
BTD$_{i,t-1}$				0.480***
				(3.813)
Muni*BTD$_{i,t-1}$				0.772**
				(2.087)
Muni$_{i,t-1}$	0.030	0.021	-0.021	-0.090*
	(0.870)	(0.740)	(-1.064)	(-1.799)
NCSKEW$_{i,t-1}$	0.056*	0.055*	0.056*	0.057*
	(1.832)	(1.807)	(1.915)	(1.775)
Table 6: (Continued)				
DTURN$_{i,t-1}$	-0.169	-0.158	-0.175	-0.221*
	(-1.379)	(-1.308)	(-1.403)	(-1.835)
RET$_{i,t-1}$	16.896***	16.779***	17.564***	18.759***
	(2.832)	(2.776)	(2.957)	(3.097)
SIGMA$_{i,t-1}$	1.306	1.347	1.363	1.382
	(0.769)	(0.808)	(0.832)	(0.799)
SIZE$_{i,t-1}$	0.103*	0.108**	0.101*	0.079

	(1.926)	(2.075)	(1.807)	(1.507)
$MB_{i,t-1}$	-0.022	-0.023	-0.042	-0.053
	(-0.495)	(-0.522)	(-1.001)	(-1.070)
$LEV_{i,t-1}$	-0.034	-0.024	-0.033	-0.026
	(-0.410)	(-0.303)	(-0.363)	(-0.272)
$ROA_{i,t-1}$	1.642***	1.645***	1.555***	1.691***
	(5.021)	(4.994)	(4.855)	(3.546)
$Discacc_{i,t-1}$	0.064	0.064	0.044	-0.014
	(0.843)	(0.844)	(0.606)	(-0.217)
Industry effect	0.293	0.328	0.314	0.332
Year effect	-0.049	-0.041	-0.051	-0.078
Constant	-1.990***	-2.041***	-1.961***	-1.667**
	(-2.777)	(-2.886)	(-2.631)	(-2.356)
N	4464	4464	4464	4464
Adjusted R^2	0.223	0.221	0.223	0.228
Panel B. Dependent variable: DUVOL				
$ETR_{i,t}$	0.170***			
	(4.622)			
$ETR_{i,t-1}$	-0.136***			
	(-3.175)			
$Muni*ETR_{i,t-1}$	-0.017			
	(-0.526)			
$LETR_{i,t}$		0.101**		
		(2.034)		
$LETR_{i,t-1}$		-0.107**		
		(-2.484)		
$Muni*LETR_{i,t-1}$		-0.034*		
		(-1.688)		
$DTAX_{i,t}$			-0.068***	
			(-3.615)	
$DTAX_{i,t-1}$			0.034	
			(1.398)	
$Muni*DTAX_{i,t-1}$			0.111*	
			(1.819)	
$BTD_{i,t}$				-0.541***
				(-8.786)
$BTD_{i,t-1}$				0.191***
				(3.465)

Table 6: (Continued)

$Muni*BTD_{i,t-1}$				0.296**
				(2.097)
$Muni_{i,t-1}$	-0.002	0.003	-0.005	-0.031**
	(-0.110)	(0.455)	(-0.471)	(-2.020)
$NCSKEW_{i,t-1}$	0.015	0.014	0.015	0.016
	(1.416)	(1.412)	(1.527)	(1.407)
$DTURN_{i,t-1}$	-0.061	-0.057	-0.063	-0.091
	(-1.016)	(-0.955)	(-1.023)	(-1.494)

$RET_{i,t-1}$	5.734***	5.671**	5.954***	6.834***
	(2.628)	(2.569)	(2.712)	(3.046)
$SIGMA_{i,t-1}$	0.721	0.747	0.748	0.763
	(1.486)	(1.553)	(1.610)	(1.484)
$SIZE_{i,t-1}$	0.052**	0.054**	0.052*	0.041
	(2.009)	(2.078)	(1.892)	(1.577)
$MB_{i,t-1}$	-0.018	-0.019	-0.025	-0.031*
	(-1.141)	(-1.186)	(-1.583)	(-1.721)
$LEV_{i,t-1}$	-0.041	-0.037	-0.038	-0.034
	(-1.466)	(-1.437)	(-1.307)	(-1.049)
$ROA_{i,t-1}$	0.335***	0.342***	0.289**	0.519**
	(2.870)	(3.099)	(2.386)	(2.387)
$Discacc_{i,t-1}$	-0.032	-0.031	-0.040	-0.057*
	(-1.164)	(-1.134)	(-1.392)	(-1.898)
Industry effect	Yes	Yes	Yes	Yes
Year effect	Yes	Yes	Yes	Yes
Constant	-0.989***	-1.010***	-0.982***	-0.834**
	(-3.104)	(-3.174)	(-2.939)	(-2.567)
N	4464	4464	4464	4464
Adjusted R^2	0.341	0.338	0.339	0.352

Notes: The dependent variable is measured by NCSKEW and DUVOL. The independent variable of tax management is proxied by ETR, LETR, DTAX, and BTD, respectively. Regressions include the following control variables: $NCSKEW_{i,t-1}$, $DTURN_{i,t-1}$, $RET_{i,t-1}$, $SIGMA_{i,t-1}$, $SIZE_{i,t-1}$, $MB_{i,t-1}$, $LEV_{i,t-1}$, $ROA_{i,t-1}$, $Discacc_{i,t-1}$, Industry and Year variables, which are not tabulated. The OLS model is estimated with clustering error by both firm and time, where *t*-values are in parentheses. All variables are defined in Appendix A. Here *, **, and *** indicate statistical significance at the 10%, 5%, and 1% level, respectively.

6. Robustness Checks

6.1 Endogeneity issue

Although this study controls for firm characteristics and accounting properties variables in the regressions, the results may still be biased if the explanatory variables are not strictly exogenous and the panel's time dimension is small (Wintoki et al., 2012). Hence, the endogeneity issue would lead to the regression results having a spurious correlation between tax management and crash risk. To obtain reliable and unbiased results, we further implement a dynamic system Generalized Method of Moments (system GMM) estimator for Eq. (4).

Table 7 reports the results of the specification tests of the system-GMM, second-order serial correlation tests AR (2) and Hansen J test of over-identifying restrictions. The results of AR tests suggest that the underlying conditional errors are not autocorrelated, where the AR (1) test are shown

significant, and the AR (2) test are shown non-significant and *p*-value between 0.131 and 0.275. Moreover, the results of Hansen J test of over-identifying restrictions are non-significant (the *p*-values of Hansen test between 0.19 and 0.226), which cannot reject the null hypothesis that these instruments are exogenous. Thus, endogeneity is not an important concern in our approach.

The results of system GMM (shown in Table 7) is in line with the results of Table 3, where the relationship between tax management and crash risk is highly significant with an expected negative sign in year *t* and positive sign in year *t-1*.

Table 7: The Impact of Tax Management on Stock Price Crash Risk

	(1) ETR	**(2) LETR**	**(3) TS**	**(4) BTD**
$ETR_{i,t}$	0.244**			
	(2.106)			
$ETR_{i,t-1}$	-0.404***			
	(-3.207)			
$LETR_{i,t}$		-0.050		
		(-0.217)		
$LETR_{i,t-1}$		-0.316*		
		(-1.657)		
$DTAX_{i,t}$			-0.205***	
			(-2.701)	
$DTAX_{i,t-1}$			0.264***	
			(2.823)	
$BTD_{i,t}$				-0.498**
				(-2.274)
$BTD_{i,t-1}$				2.252***
				(4.204)
$NCSKEW_{i,t-1}$	0.118***	0.120***	0.121***	0.107***
	(3.986)	(4.020)	(4.082)	(3.630)
$DTURN_{i,t-1}$	-0.227**	-0.209*	-0.263**	-0.232**
	(-1.999)	(-1.847)	(-2.281)	(-2.065)
$RET_{i,t-1}$	29.211***	29.269***	30.400***	27.943***
	(9.172)	(9.182)	(9.387)	(8.731)
$SIGMA_{i,t-1}$	6.705***	6.644***	6.843***	6.462***
	(4.465)	(4.422)	(4.557)	(4.235)
$SIZE_{i,t-1}$	0.219***	0.225***	0.207***	0.170***
	(6.811)	(7.076)	(6.440)	(5.443)

Table 7: (Continued)

$MB_{i,t-1}$	-0.183	-0.175	-0.189	-0.271*
	(-1.295)	(-1.251)	(-1.356)	(-1.820)
$LEV_{i,t-1}$	-0.390***	-0.364***	-0.411***	-0.382***
	(-3.402)	(-3.216)	(-3.525)	(-3.465)
$ROA_{i,t-1}$	-1.537*	-1.401*	-1.956**	-4.590***
	(-1.833)	(-1.723)	(-2.222)	(-3.012)
$Discacc_{i,t-1}$	-0.039	-0.039	-0.123	-0.515***
	(-0.307)	(-0.307)	(-0.914)	(-3.291)
Industry effect	Yes	Yes	Yes	Yes

Year effect	Yes	Yes	Yes	Yes
Constant	-2.985***	-3.316***	-3.095***	-2.648***
	(-9.316)	(-9.838)	(-8.973)	(-7.444)
N	4464	4464	4464	4464
AR (1) test	0.000	0.000	0.000	0.000
AR (2) test	0.165	0.142	0.131	0.275
Sargan test	0.173	0.158	0.148	0.128
Hansen test	0.226	0.222	0.225	0.190
Difference in Hansen	0.197	0.172	0.162	0.179

Notes: The dependent variable is measured by NCSKEW. The independent variable of tax management is proxied by ETR, LETR, DTAX, and BTD, respectively. All variables are defined in Appendix A. The system GMM model is estimated with Windmeijer (2005) corrected robust standard errors shown in parentheses. The study also reports the *p*-values for four additional tests. AR (1) and AR (2) are tests for first order and second order serial correlation in the first-differenced residuals, under the null of no serial correlation. The Sargan and Hansen test of over-identification has a null hypothesis of the instruments as a group is exogenous. The difference in Hansen test of exogeneity has a null hypothesis that the levels of instruments in the GMM and the IV are exogenous. *t*-values are in parentheses* 10% level of statistical significance. ** 5% level of statistical significance. *** 1% level of statistical significance.

7. Conclusion

Based on the data on China A-share listed companies from 2008 to 2013, this study examined the economic consequences of corporate tax management through investors' current perceptions of corporate tax management and future extreme returns of tax management. Given the Chinese characteristics of state-owned/controlled shareholding, this study explored the role of government control on tax management and stock price crash risk.

The study found a negative association between tax management and stock price crash risk, supporting the contention that corporate tax management can be employed to conceal adverse operating outcomes and manipulate management performance and reduce immediate crash risk. However, these opportunistic short-term behaviours would ultimately increase future enterprise risk. This result is in line with the results of Kim et al. (2011), who showed that the accumulation of bad news hidden from view through tax management would increase the likelihood of crash risk. It was also found that central and provincial government control cannot statistically mitigate the positive relationship between tax management and future crash risk, while municipal SOEs have a higher probability of future stock price crash.

Two caveats need to be noted in this conclusion. First, our sample consists primarily of A-share listed SOEs, of which government is the ultimate controller. Accordingly, our results may not be generalized to include wholly state-owned enterprises. Second, even if SOEs are found to have a stock price crash risk, the reality is that the government, with its substantial financial resources, is unlikely to let its enterprises fail. But keeping them afloat implies the wasteful use of public resources.

Thus, the results of this study lead to the need for action at two levels. At the level of the firm, firms should strengthen their internal monitoring on and management ability for optimal decision-making in tax planning activities. Having said this, it must be stated that tax management is not synonymous with concealment. There are legitimate reasons for tax management. To the extent that it affords opportunities for managers' short-term bias, it is important for firms to be careful with the potential risk that managers will behave in a way that might harm the future interests of enterprises. And at the level of government, the current tax system in China is complicated and opaque; this provides opportunities to undertake aggressive tax management and harms government tax revenues and raises the cost of ensuring compliance. The State Administration of Taxation Department should strengthen its external supervision and inspection ability to reduce the possibility of illegal tax activities to protect the national interest. In addition, policymakers should enact effective tax laws to promote fair competition.

Notes

1. The Forbes Tax Misery Index published by Forbes magazine is a proxy for evaluating a country whether their tax policy attracts or repels capital and talent. Source from: https://www.forbes.com /global/2009/0413/034-tax-misery-reform-index.html
2. The State Administration of Taxation (SAT) is responsible for the collection of corporate tax of central-SOEs. Local governments are responsible for collecting the corporate tax from local SOEs and all other non-SOEs, and then transfer the 60% revenue collected to the central government (Liu, 2014).
3. In 2003, "Interim Regulations on Supervision and Management of State-owned Assets of Enterprises" are promulgated by the China State Council Article and states that "the state-owned assets supervision and administration authority shall establish a system for evaluating the performance of the responsible persons of enterprises, sign performance contracts with the responsible persons

of enterprises appointed by it, and conduct annual and office-term evaluation of the responsible persons according to the performance contract". More information from http://en.sasac.gov.cn /n1408035/c1477199/content.html. And in 2009, the government issued the regulations on top managers' pay of SOEs. The cash compensation of a top manager in an SOE includes three parts: a bases salary, a performance-based bonus, and an incentive income, while the performance-based bonus is flexible and varying based on the firm performance (Xu et al., 2014).

4. Based on the report from ACCA "Myopic management". http://www.accaglobal.com/za/en/student/exam-support-resources/fundamentals-exams-study-resources/f9/technical-articles/myopic-management--causes-and-remedies.html
5. During the fifth Session of the tenth National People's Congress (NPC) on March 16, 2007, the new Corporate Income Tax Law was approved and became effective on January 1, 2008. The new tax law set a unified tax rate of 25% for both domestic companies and foreign invested companies, and changed the current tax holiday, preferential tax treatments and transitional provisions. (See more detail from: http://www.npc.gov.cn/englishnpc/Law/2009-02/20/content_1471133.htm) Under the previous tax law, domestic companies had been assessed at a 33% statutory income tax rate; while certain foreign companies enjoyed preferential tax rates of 24% or 15%. To obtain the effect of new Corporate Income Tax Law, the sampling in this study began in 2008.

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