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Tournaments and managerial incentives in China's listed firms: New evidence

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ABSTRACT

The promotion tournament as a potentially important incentive mechanism for top management in transition economies has not been examined by the literature on managerial incentives. This paper attempts to fill this important gap in the literature. The paper begins with modifying the empirical predictions previously-derived from the tournament theory to the context of transition economies in which state ownership still plays a significant role in publicly-traded firms. Specifically, we test the following two hypotheses. First, the winner's prize will need to increase in order to prevent each contestant from lowering his/her effort level in the face of a larger contestant pool. Such an optimal response of the winner's prize to the size of the contestant pool is more evident for China's listed firms that are less controlled by the state. Second, the winner's prize will also need to rise in order to prevent each contestant from reducing his/her effort level in the face of greater market volatility (or more noise in the performance measure used to determine the tournament winner). Using comprehensive financial and accounting data on China's listed firms from 1998 to 2002, augmented by unique data on executive compensation and ownership structure, we find evidence in support of both hypotheses. Finally, we also find evidence suggesting that an increase in the winner's prize will result in improved firm performance due to enhanced managerial effort, and that the performance effect of the winner's prize is greater for China's listed firms that are less controlled by the state. As such this paper provides yet another piece of evidence that ownership restructuring may be needed for China to successfully transform its SOEs to efficient modernized corporations and reform its overall economy.

1. Introduction

Theorists have identified several matters concerning the managerial labor market that potentially have a vital bearing on the success of overall reform during transition (e.g. Aghion, Blanchard & Burgess, 1994). Key issues include the formation of markets for managers and the specific design of management contracts in order to contribute to improved incentive packages for managers and ultimately to result in improved enterprise productivity.

To address such key issues facing transition economies, prior studies focus on two main incentive mechanisms for top management: (i) pay-performance sensitivities (linking executive pay to firm performance); and (ii) turnover-performance sensitivities (making the probability of top management dismissal more sensitive to firm performance). Jones and Kato (1996)

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draw on panel survey data for a large sample of Bulgarian firms to report some of the first econometric evidence on the determinants of executive compensation for an economy during fading communism and early transition. Using standard specifications, the level of CEO pay was found to be positively related to size but not to profitability. In specifications adapted to transitional economies, the level of CEO compensation was found to be positively related to size and to productivity and to be more strongly tied to productivity when the firm was either corporatized or privatized. More recent studies examine such pay-performance link for top management in other transitional economies, including Jones and Mygind (2004) for Estonia; Eriksson (2005) for Czech and Slovak Republics; and Kato and Long (2006b) and Firth, Fung and Rui (2006) for China. In addition, several attempts have been made recently to estimate the sensitivities of CEO turnover to firm performance in transition economies (Muravyev, 2003 for Russia; Eriksson, 2005 for Czech and Slovak Republics; Kato & Long, 2006a,c; Liao et al., 2009 for China).

The literature on top management incentives in developed countries, however, points out that there is another potentially powerful incentive mechanism for top managers, i.e., promotion tournament. Nonetheless, the promotion tournament as a potentially important incentive mechanism for top management in transition economies has not been examined by the emerging literature on managerial incentives in transition economies. This paper is the first attempt to fill this important gap in the literature. Specifically, we use financial, personnel, and ownership information at firm level and test in the context of Chinese listed firms the empirical validity of the tournament theory developed originally by Lazear and Rosen (1981). Following the relatively small empirical literature on tournaments, all of which use data from firms in developed countries (see, for instance, O'Reilly et al., 1988; Ehrenberg & Bognanno, 1990; Main et al., 1993; Lambert et al., 1993; Baker et al., 1994; Knoeber & Thurman, 1994; Drago & Garvey, 1998; Eriksson, 1999; Bognanno, 2001; Agrawal et al., 2006; Audas et al., 2004), we begin with two previously-tested empirical predictions from the tournament model: (i) the prize of the tournament (the salary gap between the top executive and the other contestants) rises with the number of contestants in the tournament pool; and (ii) the prize of the tournament is greater in firms facing more volatile market conditions (and hence managers having less control over their performance).[1]

We then examine the effect of ownership structure on the sensitivities of the tournament prize to the size of the contestant pool and market volatility. Our OLS estimates show that the sensitivities of the tournament prize to the size of the contestant pool and market volatility are significantly greater for firms that are less state-owned, pointing to the limited relevance of the tournament model to China's listed firms with greater ownership of the state. It follows that state ownership may hinder the use of tournament as an incentive mechanism for top management in China's listed firms. Recent studies on the sensitivities of top management pay and turnover to firm performance in China's listed firms also point to the absence or weak presence of the more standard incentive mechanisms for top management (linking pay and turnover to firm performance) in listed firms that are still state-controlled (Kato & Long, 2006a,b,c).[2] As such, our new finding on the relevance of the tournament model to China's listed firms with varying degrees of state ownership and control provides yet another piece of evidence for the importance of ownership restructuring in China's current effort to create modern and efficient corporations with high quality corporate governance and adequate incentives for top management.[3]

Finally, to see if a higher prize actually results in enhanced managerial effort and hence improved firm performance, we estimate the effect on firm performance of the winner's prize for firms with differing levels of state ownership and control. To be consistent with our results on the sensitivities of the winner's prize to the size of the contestant pool and market volatility, we find that the performance effect of the winner's prize is greater for listed firms that are less controlled by the state.

The structure of the remaining part of the paper is as follows. In Section 2, we present background information on the current Chinese corporate governance system. The empirical strategy and results are discussed in Section 3, followed by the concluding section.

2. State ownership and managerial incentives

Perhaps the most distinguishing feature of firms listed on China's stock exchanges is the predominance of state ownership and control. From their beginning in the early 1990s, the stock markets in Shanghai and Shenzhen were designed mainly to help state-owned enterprises (SOEs) raise capital and reduce their debt burden rather than to promote efficient resource allocation. To this end, quotas on public listings were imposed until 2000 and public listings were reserved almost exclusively for SOEs. The policy of "grasping the big and letting go of the small," adopted at the Chinese Communist Party's 15th Party Congress in 1997, vowed support for privatization of small SOEs and opened the door for ownership restructuring for large SOEs. However, ownership restructuring of Chinese listed firms has been sluggish.[4] In 2003, the government remained the largest shareholder in over 80% of

[1] There is an important and growing experimental literature on tournaments (Bull, Schotter & Weigelt, 1987 for the first experimental test of the tournament theory; Harbring & Irlenbusch, 2005, 2008, on the size of the tournament pool; Eriksson, Teyssier & Villeval, 2009, on the variance of effort in tournament; Vandegrift & Brown, 2003 on risk-taking). Since we use non-experimental data, we draw mostly on the empirical literature on tournaments.

[2] A most recent working paper by Conyon and He (2008) provides new evidence that less state-controlled firms tend to provide their CEOs with greater equity incentives than more state-controlled firms. CEO incentives are found stronger in China's listed firms with less state control not only in cash compensation but also in equity ownership. Chi and Zhang (2010) report fresh evidence pointing to the beneficial effect on executive pay-performance sensitivities of cross-listing in Hong Kong.

[3] Zhou (2004) provides an intriguing theoretical case for the employee stakeholder model of corporate governance as applied to China's SOEs. Specifically, in the absence of privatization and the market for managers, employees under long-term employment contracts with low wage and high benefits that are tied to firm performance may play an important role of monitor of management.

[4] Naughton (1995) and Yang (1997) provide a detailed discussion on China's earlier enterprise reform from a historic perspective, while Xiao (1991), Cauley and Sandler (1992), and Choe and Yin (2000) explore economic explanations of why China's earlier enterprise reform did not often produce its intended outcome. Huang (2003) identifies the detrimental effects of China's delay in privatizing its SOEs. Megginson and Netter (2001) contain a general discussion on enterprise reform in transition economies.

all listed firms. The state maintained control either by direct share ownership or by indirect ownership through legal-person shares; together these holdings constitute about two thirds of the company stock of all listed firms.[5]

The preponderance of the state in China's listed firms implies the absence of adequate incentive mechanisms for managers to pursue economic efficiency.[6] First, publicly-traded firms with strong state presence suffer from the separation between ownership by the general public and control by the bureaucrats in charge of the daily operations of the firm, who may have very different goals from the general public, as Shleifer and Vishny (1997) discuss. Second, even if the state is somewhat capable of holding the bureaucrats accountable for the state's goals, the multiple and oftentimes conflicting social objectives pursued by the state suggest that the firm's economic efficiency is often sacrificed to achieve higher social goals, e.g., full employment. Third, state and legal-person shares of Chinese listed firms held directly or indirectly by the government are non-tradable and any transfer of these stocks must be approved by numerous government agencies, including both the CSRC and the Ministry of Finance. Hence, the disciplinary function of the market for corporate control is particularly weak for listed firms with the eminence of state control. Taken together, these characteristics weaken incentives for state-owned firms to pursue economic efficiency.[7]

To reflect such absence of adequate managerial incentive to pursue economic efficiency, most listed firms controlled by the state tend to follow the same procedures as SOEs concerning top personnel decisions. Depending on the level of authority over the firm, the government of the corresponding level appoints top management. For SOEs at the central government level, the central government's CCP (Communist Party of China) Department of Organization has the final say in the selection of the CEO or General Manager. For SOEs at the provincial government level, the Department of Organization at the provincial government makes these decisions.[8] For listed firms that have the government or SOEs as their largest shareholders, the same procedures are apt to apply. According to China's Corporate Law, personnel decisions are supposed to be made by the board of directors. In reality, however, the candidates for the Chairman of the board of directors and the General Manager are almost always nominated by the largest government shareholder and rubber-stamped by the board. Thus, the multiplicity of the goals of the government points to the economic efficiency of the firm being often a secondary consideration to political pressures and social connections in personnel decisions.

The relatively weak role of economic efficiency in personnel decisions in state-controlled listed firms is demonstrated most vividly in the determination of executive compensation.[9] Before economic reform started in the late 1970s, executive compensation, as part of the rigid pre-reform compensation system, was mostly determined by the region, industry, level of management (by central or local government) and size of the enterprise, and job title, occupation, and seniority of the individual. Performance (either at the firm level or at the individual level), is typically not reflected in executive compensation.

In 1992 the CCP (Chinese Communist Party) accepted "a market economy with Chinese characteristics" as the goal of China's economic reform in general and a modern corporation system resembling Western corporations as the goal of SOE reform in particular. China's public policy makers appear to have recognized the importance of executive compensation as a key incentive device for top management and have considered it a crucial component of enterprise reform. Nevertheless, the effective implementation of such reform in China's listed firms appears to have been hampered by state ownership. First, new forms of executive compensation that are more reflective of firm performance and economic efficiency saw much faster adoption among privatized firms than among SOEs after it proved to be an effective incentive mechanism. According to a national survey conducted in 2002, the percentages of enterprises that had adopted such progressive compensation systems ranged from 15.2% for SOEs, to 20.2% for collective firms and 41.4% for privatized firms.[10] Although a systematic study of managerial contracts is beyond the scope of this paper, both our interviews with firm executives and a review of several compensation plans used in these firms highlight the differences between how SOEs and wholly privatized firms in China implement such compensation reform.[11]

Most studies on Chinese listed firms provide evidence in support of the above notion that China's listed firms still controlled by the state tend to lack quality corporate governance. For instance, Lin (2001) argues that many listed firms are merely reincarnations of SOEs, which inherited both the inferior corporate governance and the poor firm performance.[12] More recently, Kato and Long (2006a,b,c) provide evidence linking poor corporate governance of China's listed firms more directly to state ownership and control by showing that the sensitivities of top executive compensation and turnover to firm performance are weaker in listed firms with greater proportion of stock owned by the state. In short, state-controlled listed firms tend to lack two important incentive mechanisms for top management which are most often discussed in the managerial incentive literature, pay-performance sensitivities and turnover-performance sensitivities. There is, however, one more potentially important incentive device for top management, promotion tournament. This paper will examine whether there is any evidence for the presence of

[5] Unless noted otherwise, numbers cited are computed by the authors using the GTA and Sinofin data bases. Qiang (2003) provides similar estimates for different types of share percentages.

[6] Zhu (1998) shows theoretically in the context of TVEs that the government bureaucrat may deliberately choose to offer his/her manager an inefficient incentive contract so as to maximize his/her own rent contractual and ownership arrangements, which results in inefficient.

[7] Bonin (1976), Weitzman (1976), Kornai (1992), Ickes and Samuelson (1987), Litwack (1991), and Dewatripont and Roland (1997) discuss the negative impact on managerial incentives of these arrangements.

[8] Our discussion of the personnel appointment process is based on surveys and interviews conducted in Beijing, Shanghai, and Chengdu, Sichuan in the summer of 2004.

[9] See Kato and Long (2006b) for detailed history of executive compensation reform.

[10] See "Report on Chinese Entrepreneurs: Emergence and Development"(*Zhongguo qiyejia chengzhang yu fazhan baogao*), p27, issued by the Survey System for Chinese Entrepreneurs 2004.

[11] Dong and Putterman (2003) provide empirical support for a similar argument explaining why state ownership slows down the interest alignment process between top managers and shareholders, namely that state-owned enterprises and thus their top executives in transition economies are often required to pursue non-financial objectives such as employment provision. For a more formal theoretical argument, see Schmidt and Schnitzer (1993).

[12] For a similar view, see Schipani and Liu (2001).

well-functioning promotion tournament in China's listed firms and explore whether such promotion tournament is more or less likely to be present in listed firms with greater share of stock by the state.

3. Empirical strategy and results

Accounting and financial data as well as executive compensation data are obtained from the China Stock Market and Accounting Research Database (CSMAR) developed by Shenzhen GTA Information Technology Company, while ownership structure data are assembled from the database developed by SinoFin Information Services. The CSMAR data set has been used in previous studies,[13] yet on our reading of the literature, we are one of the first to use the Sinofin dataset in academic research. Data are available annually for 1998 through 2002, although information is more complete for later years.

We use the Sinofin database to compute executive compensation including salary and bonus for two levels of top management: (i) level I consisting of the top three highest-paid executives (some of whom may also hold positions in the board of directors or board of supervisors); and, (ii) level II consisting of all other top executives in the corporation, including those at the deputy level of the CEO (such as COO, CFO, and division heads), the chair and vice-chair of the board of directors, as well as the president and the vice-president of the board of supervisors.[14] We assume that level II executives are competing for promotion to level I positions. Reassuringly, we confirm by studying the profiles of 50 randomly selected level I executives that nearly all level I executives were level II executives in the same firm prior to promotion. In addition, we also obtain the average age of non-CEO executives for each firm in our sample and compare it with the age of the firm's CEO. The non-CEO executives are on average two years younger than the CEO (47 years old v. 45 years old) and the difference is statistically significant (with a t-value of 12), consistent with the former being the legitimate contestants for the latter's position.[15]

A possible weakness of the data used in the study is that we do not observe individual pay but only average pay for two levels in the corporate hierarchy, and that such aggregate data are subject to standard aggregation bias: changes in the composition of the board (or level II executives in the context of our study) will affect the average pay of level II executives, and hence the tournament prize. An obvious example of such aggregation bias is the age effect (or with a seniority wage system, simply having more senior level II executives will result in a higher average pay for level II executives and hence a lower tournament prize, other things being equal). As discussed below, reassuringly even when we account for the age effect, our key results change little. As such, the aggregation bias is probably not too serious.

The average compensation for level I executives in salary and bonus (total compensation for level I, divided by three) was 110,062 in 1995 RMB, whereas the average compensation for level II executives (total compensation for level II, divided by the total number of level II executives) was 79,212.26 in 1995 RMB. Following Eriksson (1999), we measure the prize of promotion tournament, PRIZE, by log of the ratio of the average compensation for level I executives to the average compensation for level II executives. Thus, the cash prize for promotion to level I from level II in China's listed firms amounts to an average increase of about 40% in salary and bonus. The total prize may be larger, however, for equity ownership and perquisites (such as vehicle usage and housing subsidy) are usually linked to job titles and position ranks in the company.[16]

In addition to cash compensation, two other prevalent components of executive compensation in China are restricted stocks and perquisites. As in most countries outside the U.S., the lack of data on these other types of executive compensation prohibits us from analyzing total executive compensation in China. As explained in Kato and Long (2006b), however, focusing on salary and bonus and neglecting equity-based compensation and perquisites is less problematic in the Chinese context. First, for the time period studied in this paper, stock options were not permitted in China. Second, stock-holding by executives were more prevalent for private firms than for SOEs, and in most firms executives of higher level receive higher amount of stock holdings. This implies that our results of stronger tournaments for private firms could be even stronger if stock holdings are included in executive compensation. Finally, although perquisites are not negligible, cash compensation remains the most important component of total compensation for Chinese top executives (Kato & Long, 2006b).

As presented in the previous section, we hypothesize that the efficient promotion tournament mechanism which generates adequate incentive for tournament contestants (or managers aspiring to become top executives) is still non-existent in Chinese listed firms that are owned and controlled by the state, whereas such a mechanism can be found in China's listed firms that are privatized. Specifically, we modify the empirical tournament model by Eriksson (1999) to reflect the important reality of Chinese listed firms (the continued ownership and control by the state for many listed firms in China). We then estimate the augmented tournament model using the aforementioned data:

$$PRIZE = \alpha + \beta \mathrm{POOL} + \gamma NOISE + \delta STATE + \rho POOL^{*}STATE + \tau NOISE^{*}STATE + \mathbf{Z\theta} + u \quad (1)$$

[13] See, for instance, Sun and Tong (2003), Bai et al. (2004), and Bai, Liu, and Song (2003).

[14] According to the rules from the CSRC (China Securities Regulatory Commission) that regulates the content of listed firms' annual reports, all listed firms have been required to report executive compensation including salary and bonus. Unfortunately they are not required to report salary and bonus separately and hence we are unable to analyze these two main components of cash compensation separately as Kato and Kubo (2006) did for their study of Japanese CEO compensation.

[15] We thank a referee for suggesting to us this test to substantiate our argument for Level-II executives as contestants for the top executive position.

[16] Other types of executive perquisites in China include travel expenses, business gifts, and business attire expenses. These perks tend to have much lower values, according to our interviews with Chinese executives.

Table 1-1
The effect on PRIZE of POOL SIZE and NOISE: summary statistics.

Variable	Mean	s.d.	N
ln(PRIZE)	0.270	0.339	3158
POOL SIZE	11.159	4.528	3158
NOISE	0.250	0.206	3158
STATE	58.118	13.448	3158
AGE_CEO	46.954	5.981	1414
AGE_NONCEO_EXEC	45.063	4.258	1414
AGE DIFFERENCE	1.891	5.927	1414
ln(SALE)	20.039	1.277	3158
FIRMAGE	4.885	2.612	3158

Sources: accounting and financial data are from the China Stock Market and Accounting Research Database (CSMAR) developed by Shenzhen GTA Information Technology Company. Data on executive compensation are from the database developed by Sinofin Information Services.
Note: the data are based on a pooled cross-sectional time series dataset on 923 listed firms. SALE is measured in RMB and adjusted for inflation using the CPI with 1995 as the base year.

where POOL is the size of the tournament pool, measured by the total number of level II executives; NOISE is the coefficient of variation of sale over the previous three years (a similar measure was used by Eriksson, 1999)[17]; STATE is the proportion of shares owned by the state (in percent); $\boldsymbol{Z}$ is a vector of control variables; α, β, γ, δ, ρ, and τ are the coefficients to be estimated; $\boldsymbol{\theta}$ is a column vector of coefficients on the control variables; and u is the disturbance term which we assume $u \sim \mathrm{NID}(0, \sigma^2)$.

Additional control variables, $\boldsymbol{Z}$, include the size of the firm (measured by the log of sales) and the age of the firm. In one specification, we also include the difference between the age of the firm's CEO and the average age of the other top executives. One explanation for the higher CEO salary is that they have more working experience, which can be taken into account by including the age difference among our explanatory variables. In another specification, we also include the company's foreign share, as the influence of international markets may affect the promotion tournament.[18] In addition, we include year dummy variables to control for year-specific common macro shocks to all listed firms, and industry dummy variables to control for other factors that affect each of the sectors specifically.

As shown in Eriksson (1999), we expect that tournament prize will rise with the size of contestant pool, for the probability of winning will fall as the number of contestants grows, which will in turn result in lower effort put forth by each contestant. To prevent the effort level from falling, the firm will need to increase the size of the winner's prize. We hypothesize that such an efficient response of the size of the prize to changes in the size of the contestant pool is more evident in China's listed firms that are less subject to state ownership and control, and hence more sensitive to economic performance. A negative and significant estimated coefficient on POOL*STATE supports the hypothesis.

Likewise the tournament winner will be decided on the contestant's observable relative performance measure. When the performance measure has more randomness (or is noisier), the tournament contestant feels he/she has less control over his/her performance and hence the ultimate winning of the tournament. In such a noisy environment, the contestant is less likely to exert much effort to win the tournament. To offset such an effort reduction due to an increase in noise, the firm will need to increase the winner's prize. As in the case of the sensitivity of the prize to the size of the contestant pool, we hypothesize that the sensitivity of the prize to noise will be greater for China's listed firms that are less subject to state ownership and control (or we expect the estimated coefficient on NOISE*STATE to be negative and significant).

Summary Statistics are provided in Table 1-1. The average size of the contestant pool (or the average number of level II executives) during 1998–2002 was 11.2 and the coefficient of variation during the past three years was 0.25. Sales revenue of the average listed firm was 1.1 billion of 1995-constant RMBs. The average age of China's listed firms was 4.9 years, reflecting the simple fact that listing of firms in China's stock exchanges started only recently. The CEOs are on average two years older than their fellow top executives, with the CEOs at the age of 47 and the others at 45. Finally, data on ownership structure reveals that the public listing of SOEs in stock exchanges has not substantially reduced the dominance of state ownership. The average listed firm still has 58% of its company stock owned by the state.[19]

Table 1-2 presents the OLS estimates of Eq. (1), where Column (1) provides our baseline results, Column (2) includes the age difference as an additional explanatory variable, Column (3) uses the same sample as Column (2) but reverts to the baseline specification, and Column (4) includes the firm's foreign shares. All the results are qualitatively similar, pointing to the robustness of our results, while the different sizes of the estimated coefficients obtained in Columns (2) and (3) are accounted for by the smaller sample used in these two specifications.

Throughout the specifications, the estimated coefficient on POOL is positive and statistically significant at the 1% level, suggesting that tournament prize will increase significantly with the size of the contestant pool for fully privatized firms with

[17] As in the case of Eriksson (1999), we assume that the level of noise in individual manager's performance measure will be greater when the firm operates under a more volatile market environment.
[18] We thank our referees for suggesting these robustness tests.
[19] To abstract from issues related to market segmentation, we excluded from our study the around 3% of Chinese corporate shares denominated in foreign currencies and available only to foreign investors, commonly referred to as B-shares.

Table 1-2
The effect on PRIZE of POOL and NOISE: OLS estimates dependent variable = prize.

	(1) Baseline specification	(2) Including age difference as additional explanatory	(3) (with the same sample as (2))	(4) Including FDI% as additional explanatory
	PRIZE	PRIZE	PRIZE	PRIZE
POOL SIZE	0.045***	0.060***	0.061***	0.045***
	(0.006)	(0.009)	(0.009)	(0.006)
NOISE	0.191	0.318**	0.315**	0.204*
	(0.118)	(0.147)	(0.147)	(0.119)
STATE	0.006***	0.010***	0.010***	0.006***
	(0.001)	(0.002)	(0.002)	(0.002)
POOL*STATE	−0.000***	−0.001***	−0.001****	−0.000***
	(0.000)	(0.000)	(0.000)	(0.000)
NOISE*STATE	−0.004**	−0.005**	−0.005**	−0.005**
	(0.002)	(0.002)	(0.002)	(0.002)
AGE DIFFERENCE		0.002*		
		(0.001)		
Foreign share				0.001
				(0.001)
ln(SALE)	0.009*	0.005	0.006	0.008*
	(0.005)	(0.007)	(0.007)	(0.005)
FIRMAGE	−0.012*	−0.008	−0.008	−0.011
	(0.007)	(0.010)	(0.010)	(0.007)
Constant	−1.004***	−0.510*	−0.522*	−1.015***
	(0.265)	(0.280)	(0.280)	(0.265)
Observations	3158	1414	1414	3158
Adjusted R-squared	0.14	0.19	0.19	0.14

Sources: accounting and financial data are from the China Stock Market and Accounting Research Database (CSMAR) developed by Shenzhen GTA Information Technology Company. Data on executive compensation are from the database developed by Sinofin Information Services.
Note: the data are based on a pooled cross-sectional time series dataset on 923 listed firms. All value variables are measured in RMB and adjusted for inflation using the CPI with 1995 as the base year. All models include constant term, industry dummy variables and year dummy variables.
*** Significant at the 1% level.
** Significant at the 5% level.
* Significant at the 10% level.

STATE = 0. The estimated coefficient on an interaction term involving POOL and STATE is always negative and statistically significant at the 1% level, supporting our hypothesis that the sensitivity of tournament prize to the size of the contestant pool is significantly lower for listed firms with a higher proportion of stocks owned by the state.[20]

Regarding NOISE, the estimated coefficient on NOISE itself is positive and almost statistically significant at the conventional level, suggesting that tournament prize needs to increase in order to compensate for the use of performance measure with greater noise at least for firms with STATE = 0. As in the case of POOL, the estimated coefficient on an interaction term involving NOISE and STATE also has an expected sign (negative) and is statistically significant at the conventional level, supporting our hypothesis that the sensitivity of tournament prize to noise is lower for listed firms with a higher proportion of stocks owned by the state.

Additional results from Columns (2)–(4) point to the robustness of the above results by showing that our key results on the contestant pool, noise and their interplay with state ownership change little even when we consider additional controls. In addition, the age difference between the CEO and their top level colleagues is found to have a positive and significant effect on the compensation gap between the former and the latter, mostly reflecting the CEO's higher seniority and the greater working experience. And the firm's foreign share is found to have a positive effect on the compensation gap, but the effect is not quite significant.

As the specifications in Columns (2) and (3) rely on a smaller sample, we will use the baseline results to assess the magnitude of the effect of state ownership and control. Specifically, we use the estimated coefficients in Column 1 to evaluate how the size of the tournament prize, PRIZE, will change when the size of the contestant pool increases from the 25th percentile to the 75th percentile. Most importantly we do so for four distinct levels of state ownership: (i) wholly state-owned (STATE = 100); (ii) majority state-owned (STATE = 50); (iii) one-quarter state-owned (STATE = 25); and (iv) wholly private-owned (STATE = 0). As shown in Table 2, on one hand for wholly state-owned firms, the winner's prize will change little even if the contestant pool increases considerably from the 25th percentile to the 75th percentile. For wholly privately-owned firms, on the other hand, the same increase of the contestant pool from the 25th percentile to the 75th percentile will result in a substantial increase in the winner's prize (tripling from 0.31 to 0.95). As expected, for one-quarter state-owned firms, the prize will still increase rather

[20] Being connected to the government and other SOEs, executives in SOEs may have more career opportunities outside their own firms. As a result, the total number of level II executives may be a noisier measure for the real contestant pool for state-controlled listed firms than for other listed firms, which may account in part for the weaker link between the size of the pool and the prize value in the tournament for state-controlled listed firms in China. Unfortunately, our data do not allow us to identify those level II executives in state-controlled firms who should not be considered a contestant for the top management promotional tournament. We thank a referee for pointing out this possibility.

Table 2
The Size of the Effect on PRIZE of POOL and NOISE with different levels of STATE.

		POOL = 25th	POOL = 75th	NOISE = 25th	NOISE = 75th
STATE = 100	PRIZE	0.567	0.577	0.594	0.538
STATE = 50	PRIZE	0.482	0.600	0.532	0.525
STATE = 25	PRIZE	0.376	0.855	0.501	0.519
STATE = 0	PRIZE	0.318	0.948	0.470	0.513

Sources: accounting and financial data are from the China Stock Market and Accounting Research Database (CSMAR) developed by Shenzhen GTA Information Technology Company. Data on executive compensation are from the database developed by Sinofin Information Services.
Note: based on the estimated coefficients in Table 2.

substantially from 0.38 to 0.86 when the number of contestants rises from the 25th to the 75th percentile, although the sensitivity of the prize to the size of the contestant pool is not as large as for wholly privately-owned firms. The sensitivity of the winner's prize to the pool size further falls when we consider majority state-owned firms (the same increase in the pool size from the 25th to the 75th percentile resulting in an expansion of the prize from 0.48 to 0.60). For Chinese listed firms, ownership structure appears to still play a crucial role in shaping up internal managerial incentives and organizational efficiency.

Table 2 also shows similar yet much less pronounced results for NOISE. An increase in NOISE from the 25th percentile to the 75th percentile will result in an increase (though modest) in the prize for wholly privately-owned firms and majority privately-owned firms, whereas we find no such increase in the prize for wholly state-owned firms and majority state-owned firms (in fact, the prize falls rather than rises). Admittedly our NOISE variable is quite indirect, requiring that noise in individual manager's performance measure is positively correlated with market volatility of firm performance. The less pronounced results for NOISE may be simply a reflection of our less than perfect measure of noise in individual manager's performance.

Finally, to discern the impact of tournament incentives in China's listed firms, we estimate the effect on firm performance of the winner's prize.[21] Following the same approach, we augment a performance equation of Eriksson (1999) by our state ownership variable (STATE):

$$PERFORMANCE = \alpha + \beta PRIZE + \gamma STATE + \delta PRIZE^{*}STATE + \mathbf{Z\theta} + u \tag{2}$$

where PERFORMANCE is firm performance (measured by a variety of stock market performance measures as well as accounting performance measures); and $\boldsymbol{Z}$ is a vector of control variables; α, β, γ, and δ are the coefficients to be estimated; $\boldsymbol{\theta}$ is a column vector of coefficients on the control variables; and u is the disturbance term which we assume $u \sim \mathrm{NID}(0, \sigma^2)$. For $\boldsymbol{Z}$, our data allow us to consider log of average managerial pay, industry dummy variables, and year dummy variables which control for year-specific common macro shocks to all listed firms. The sign and significance of the estimated coefficient on PRIZE*STATE will indicate whether the performance effect of PRIZE is greater or smaller for China's listed firms with less control of the state.

As shown in Table 3-1, the data allow us to consider five firm performance measures. There are two standard stock market performance measures; (i) industry adjusted stock return or RETURN; and (ii) annual change in shareholder value of the firm or ΔVALUE. In addition, there are three standard accounting profitability measures; (i) industry adjusted return on asset or ROA; (ii) annual change in ROA or ΔROA; and (iii) incidence of negative profit or NEGATIVE PROFIT = 1 if the firm's profit is negative, 0 otherwise (Kato & Long, 2006a,b,c).[22] The summary table indicates that the average industry and inflation adjusted annual stock return over the sample period was 3.6% and that the average firm increased its shareholder value by 64,500,000 RMB per year. Furthermore, regarding accounting profitability, the average industry adjusted annual ROA over the sample period was a little over 1% with the average annual change of negative 0.8 percentage-points; and almost 9% of firms showed negative profit over the sample period.

Eq. (2) is estimated using OLS regression for all performance measures except NEG, for which a logistic estimation is conducted, with the results summarized in Table 3-2. When RETURN is used to measure firm performance, the estimated coefficient on PRIZE is positive and statistically significant at the 1% level, suggesting that for wholly privately-owned listed firms in China, firms offering greater prize for the promotion tournament winner tend to enjoy higher stock return than other firms. The estimated coefficient on PRIZE*STATE is, however, negative and statistically significant at the 1% level, confirming our expectation that the performance effect of PRIZE is smaller for firms that are still strongly controlled by the state. The relative size of the estimated coefficient on PRIZE to the one on PRIZE*STATE implies that the performance effect of PRIZE continues to fall as the proportion of shares owned by the state rises and that it is actually zero for listed firms that are majority-owned by the state.

The table also shows the results are robust to the use of an alternative stock market performance measure, ΔVALUE with the positive and highly significant coefficient on PRIZE and the negative and highly significant coefficient on PRIZE*STATE. Consistent with Kato and Long (2006b) showing the relative importance of stock market measures to accounting performance measures in pay-performance sensitivities, we also find less significant association between PRIZE and accounting profitability measures although the estimated coefficients on PRIZE and STATE*PRIZE are of expected signs.

[21] Studies looking at whether performance pay affects firm performance are scarce. An early and useful reference is Abowd (1990).
[22] We also considered profit margin (profit/sales) instead of ROA and found similar results. These as well as all other unreported results are available from the authors upon request.

Table 3-1
Firm performance and PRIZE: summary statistics.

Variable	Mean	s.d.	N
RETURN	.0364357	.1871855	2594
ΔVALUE	6.45e+07	7.36e+08	2341
ROA	.0109185	.1635432	2627
ΔROA	−.0080075	.1658523	2347
NEGATIVE PROFIT	.0898363	.2860016	2627
ln(PAY)	11.03733	.8152924	2627

Sources: accounting and financial data are from the China Stock Market and Accounting Research Database (CSMAR) developed by Shenzhen GTA Information Technology Company. Data on executive compensation are from the database developed by Sinofin Information Services.
Note: the data are based on a pooled cross-sectional time series dataset on 835 listed firms. All variables except for NEGATIVE PROFIT (=1 if the firm's profit is negative, 0 otherwise) are measured in RMB and adjusted for inflation using the CPI with 1995 as the base year.

Admittedly, the causality discussed above could potentially go the other way, i.e., firms with better performance also tend to run stronger tournaments with larger prizes. Unfortunately the absence of reliable instruments for firm performance prevents us from accounting for this endogeneity issue fully. However, our results on the interaction between state ownership and prize suggest that the causality from tournament to performance is probably more plausible. Specifically, from the view point of the causality from tournament to performance, the results on the interaction term involving tournament prize and state ownership point to a perfectly plausible interpretation that executive tournament as used in modern firms in the West is less likely to work in those Chinese firms that are still state-controlled. Moreover, as discussed above, this interpretation is consistent with prior studies on Chinese corporate governance. An alternative interpretation of the results on the interaction from the view point of the reverse causality (from performance to tournament) is still possible yet appears to be somewhat less obvious.

4. Concluding remarks

The promotion tournament as a potentially important incentive mechanism for top management in transition economies has not been examined by the emerging literature on managerial incentives in transition economies. This paper is the first attempt to fill this important gap in the literature. The paper has begun with modifying the previously-derived empirical predictions from the tournament theory to the context of transition economies in which state ownership still plays a significant role in listed firms. Specifically, we have tested two hypotheses: (i) the sensitivity of the winner's prize to the size of the contestant pool is greater for listed firms that are less owned and controlled by the state; and (ii) the sensitivity of the winner's prize to noise in performance measure used to determine the tournament winner is also greater for such less state-owned listed firms. Using comprehensive financial and accounting data on China's listed firms from 1998 to 2002, augmented by unique data on executive compensation and ownership structure, we have found evidence in support of both hypotheses. The winner's prize will need to increase in order to prevent each contestant from lowering his/her effort level in the face of expanding contestant pool. Such an optimal response of the winner's prize to the size of the contestant pool has been found to be more evident for China's listed firms that are less owned and controlled by the state. Likewise, the winner's prize will also need to rise in order to prevent each contestant from reducing his/her effort level when faced with rising noise in performance measure that is used to decide on the tournament winner. Again,

Table 3-2
Firm performance and PRIZE.

	Dependent variable				
	RETURN	ΔVALUE	ROA	ΔROA	NEGATIVE PROFIT
PRIZE	0.160***	5.447e+08***	0.058	0.021	−0.143*
	(0.054)	(206100000.000)	(0.047)	(0.050)	(0.081)
STATE	0.001*	8027957.797***	4.09e−4	5.14e−4	−0.002**
	(0.000)	(1630443.457)	(3.67e−4)	(3.99e−4)	(0.001)
PRIZE*STATE	−0.003***	−9532690.544***	−2.32e−4	−3.39e−5	0.001
	(0.001)	(3482477.033)	(7.82e−4)	(8.51e−4)	(0.001)
ln(PAY)	0.026***	96136536.934***	0.015***	4.41e−4	−0.068***
	(0.005)	(21208179.628)	(0.005)	(5.18e−3)	(0.008)
Observations	2594	2341	2627	2347	2627
R-squared	0.09	0.18	0.09	0.04	0.11

Sources: accounting and financial data are from the China Stock Market and Accounting Research Database (CSMAR) developed by Shenzhen GTA Information Technology Company. Data on executive compensation are from the database developed by Sinofin Information Services.
Notes: OLS estimation was conducted in the first four columns, whereas the last column is from a logistic estimation.
The data are based on a pooled cross-sectional time series dataset on 835 listed firms. All variables except for STATE and NEGATIVE PROFIT (=1 if the firm's profit is negative, 0 otherwise) are measured in RMB and adjusted for inflation using the CPI with 1995 as the base year. All models include constant term, industry dummy variables and year dummy variables.
*** Significant at the 1% level.
** Significant at the 5% level.
* Significant at the 10% level.

we have found that such an efficient response of the prize to noise does not occur for China's listed firms insofar as they are still majority state-owned.

Finally, we have also found evidence suggesting that an increase in the winner's prize will result in enhanced managerial effort and hence improved firm performance, and that the performance effect of the winner's prize is greater for China's listed firms that are less controlled by the state.

As such, we have provided yet another piece of evidence that ownership restructuring may be needed for China to successfully transform its SOEs to efficient modernized corporations and reform its overall economy.

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