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## Management ownership and firm performance —Empirical evidence from the panel data of Chinese listed firms between 2000 and 2004

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**Abstract** This article explores the relationship between management ownership and firm performance. Using the panel data of Chinese listed firms from 2000 to 2004 and the average model, we attempt to avoid some of the deficiencies in research design and performance indicator selection in prior studies. Results show that the proportion of shares held by top management is significantly and positively related to firm performance. Empirical tests of sub-samples in each year confirm the above conclusion.

**Keywords** senior manager, ownership, corporate performance, incentive

**摘要** 采用面板模型和平均模型, 利用上市公司2000–2004共5年的面板数据, 探讨管理层持股与企业绩效的关系, 发现高管人员(经理、董事、监事)持股规模(持股比例及价值)与企业绩效是显著正相关的, 分年度子样本的实证结果进一步支持了该结论。

**关键词** 高管人员, 所有权, 企业绩效, 激励

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## 1 Introduction

The separation of ownership and management in modern enterprises has given rise to a series of principal-agent problems and high agency costs. Performance-based incentive mechanisms have long been regarded as the most effective way to reduce agency costs. Berle and Means (1932) proposed that to align managers' interests with those of shareholders, managers also should be given shares of their companies. Likewise, Jensen and Murphy (1990) agreed that the best way to guarantee CEOs act in the interests of shareholders is to grant shares to them. Zhang's (1999) study confirmed that the most effective way to solve interest conflicts between managers and shareholders is to let managers possess certain proportion of the company shares.

The practice of management ownership, however, has encountered considerable obstacles in China. Due to the immature corporate governance and serious insider control problems, management ownership can be easily employed as a means to usurp company interests. Some scholars thus criticize that stock incentive does firm performance no good, except for producing numerous mega-rich CEOs. A number of domestic researches on the relation between management ownership and firm performance confirmed the above presumption. For instance, when studying the relation between proportions of shares held by managers and company performances, Yu and Gu (2001) found no significant relation between the two. Similar conclusions were drawn from a lot of other studies (e.g. Wei, 2000; Song, et al., 2005; Chen, 2005; Chen and Liu, 2003; Zhou and Sun, 2003; Yu, 2006).

There exist, however, several deficiencies commonly in the prior research of management ownership and firm performance: First, a vast majority of research used the absolute proportion of shares held by top management, which was not meaningful to compare among firms of varying sizes. Second, most of the existing studies only used cross-sectional data in a certain year, or simply aggregated together data of several years, rather than using a more advanced panel model. Third, ignoring the fact that there was an array of factors influencing firm performance, many prior studies failed to control the effects of other variables on performance. Fourth, most extant studies chose only one single performance indicator, which fell short of comparability among companies of different sizes. To overcome these shortcomings and to further explore the relationship between management ownership and firm performance, we plan to improve our research design as below. First, we use both the proportion of shares held by top management and the current market value of these shares to stand for the degree of managerial motivation. In addition, we further divide management ownership into managerial personnel ownership, board director ownership, and

supervisor ownership and study their effects on firm performance respectively. Second, we collect five years' panel data of listed companies from 2000 to 2004 as samples and estimate respectively with panel and average models. Third, we control in this paper effects of other variables (for instance, ownership structure, board characteristics, firm sales, etc.) on firm performance. Fourth, two commonly adopted indicators, namely earnings per share (EPS) and return on assets (ROA) are used to measure firm performance. Our empirical results show that firm performance is positively related to the proportion of shares held by top management (including senior managers, board directors, and supervisors).

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## 2 Theoretical analyses and research hypotheses

In firms with separated ownership and management, if managers own no or too little share rights, there will be conflict of interests between managers and firms, which results in large amount of agency costs. To solve this problem, western researchers have proposed a series of mechanisms, consisting of external and internal governance mechanism. The former focuses on solving information asymmetry, while the latter aims at overcoming problems inside a firm such as incentive compatibility constraints or mismatching between managers' responsibilities and rights, etc (Lin, 2005). Demonstrating with a simple model, Johnson et al. (2000) showed that the higher proportion of shares held by managers, the higher tunneling costs managers suffer, the more likely their interests align with those of the firms. Gao (2006) found that management ownership can prevent controlling shareholders from tunneling. Since management ownership can alleviate incentive incompatibility inside a firm to a certain degree, what about its relation with firm performance? Much to our dismay, prior literature has not reached consistent conclusions. Jensen and Meckling (1976) argued that there is a linear relation between management ownership and agency cost, for management ownership can balance the interests between two share-holding entities, which in turn reduce internal agency costs. Mehran (1995) randomly chose 153 manufacturing companies from 1979 to 1980 as samples and empirically proved that firm performance is positively related to management ownership. Specifically, his results showed that firm performance is actually significantly and positively related to the ratio of returns on shares to the total remunerations received by managers. Recently, some western scholars proposed that there are two effects of management ownership, namely alignment effect and entrenchment effect, the coexistence of which leads to the non-linear relationship between management ownership and firm performance (Demsetz, 1983; Fama and Jensen, 1983; Shleifer and Vishny, 1986). Morck et al.(1988) used Tobin Q value and proportion of shares held by

board directors as indicators of firm performance and management ownership respectively. Their results showed that when the proportion of management ownership is 0%–5%, Tobin Q is positively related to proportion of shares held by board directors; 5%–25%, the relation turns negative; over 25%, the relation becomes positive again. Morck et al explained that at the intervals of 0%–5% and 25%–100%, alignment effect is greater than entrenchment effect, while at the interval of 5%–25%, alignment effect is smaller than entrenchment effect. Similarly, Hermalin and Weibach (1987) found that when the proportion of shares held by CEOs is 0%–1%, there is a positive relation between CEO ownership and Tobin Q; 1%–5%, the relation turns negative; 5%–20%, the relation turns positive again; Over 20%, the relation becomes negative once again.

As most listed firms in China are state-owned, managers of these firms are not the owners. In recent years, most private-owned firms have also gradually separated their ownership and management. Therefore, the principal-agent problem is quite prevailing in China. Corresponding external governance mechanisms, such as product market, manager market, and market for corporate control, are still too immature to exert constraints over managers. Therefore, it is of great importance and necessity to establish effective incentive mechanism to align the interests of management and shareholders. Theoretically, management ownership can be used to effectively reduce the degree of incentive incompatibility and to prompt management to maximize company interests. However, when managers hold no or very few of company shares, they would be more motivated to pursue personal interests, rather than maximize shareholders' interests. With the proportion of shares held by top management increases, firm interests and top management's interests would be bound tightly together. Thus the only way left for top management to improve their incomes is to boost firm performance as best as possible. Drawing on the interest convergence hypothesis, firm performance increases with the proportion of shares held by the management. As the level of management ownership is general low among Chinese listed firms, the entrenchment effect of stock option incentive is quite weak. We thus presume that top management (namely senior managers, board directors, and supervisors) ownership is positively related to firm performance in the Chinese context.

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### **3 Research design and descriptive statistics**

#### **3.1 Data sources**

Financial and corporate governance data used in this research came from CCER data base. Data of management ownership were collected from both CCER and

sample firms' annual reports. Considering that the information disclosure of management ownership was not quite standard and incomplete before the year 2000, we chose only non-financial listed firms from 2000 to 2004 as samples. Together we got 6015 sample firms with complete management ownership data, financial data, and governance data. Samples with abnormal data were eliminated, including 59 firms with abnormal ROA and EPS, 238 with abnormal revenues from primary business and debt-to-assets ratios, and 114 with abnormal management ownership data. Among the 5684 valid samples, 1001 were from the year 2000, 1081 from 2001, 1143 from 2002, 2297 from 2003, and 1262 from 2004.

### 3.2 Variable definitions

We measure firm performance in an accounting sense. Evaluation indexes included EPS and ROA. To control the industry effects on firm performance, all indexes were industrially adjusted. In addition, since most Chinese listed firms are collectively owned, board directors and supervisors are not in possession of firm shares. In reality, however, these board directors and supervisors exert great impacts on firm operation. We thus included in the management ownership variable not only proportion of shares held by managers, but shares owned by directors and supervisors. In the article that follows, the term "managerial personnel" refers to senior managers; "board members" to all directors or supervisors on board; "top management" to all managers, board members and supervisors. Also, since the same proportion of shares has various incentive effects on different-sized firms, the variable of management ownership used in this article included not only the absolute proportion of shares, but also the market value of the shares held by top management, which is estimated by the following equation:

The market value of shares held by top management = number of shares held \* market value of circulated A shares.

Definitions of all variables are shown in Table 1.

**Table 1** Variable definitions

Variables	Definitions
<i>EPS_ADJ</i>	Industry-adjusted EPS: A firm's EPS – the median of industry EPS
<i>ROA_ADJ</i>	Industry-adjusted ROA: A firm's ROA – the median of industry ROA
<i>MSR</i>	Total proportion of shares held by managerial personnel
<i>BSR</i>	Total proportion of shares held by board directors
<i>SSR</i>	Total proportion of shares held by supervisors
<i>ALLSR</i>	Total proportion of shares held by top management

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Variables	Definitions
<i>MSV</i>	Common log of the total market value of shares held by managerial personnel
<i>BSV</i>	Common log of the total market value of shares held by board members
<i>SSV</i>	Common log of the total market value of shares held by supervisors
<i>ALLSV</i>	Common log of the total market value of shares held by top management
<i>BOARDSIZE</i>	Board size: Total number of directors on board
<i>INDEPENDT</i>	Proportion of independent directors on board: The number of directors on board divided by the number of independent directors
<i>TOPONE</i>	Proportion of shares held by the largest shareholder
<i>STATE</i>	Dummy variable: If a listed company is owned by state, it equals 0, otherwise equals 1
<i>INCREASE</i>	Growth rate of main business income: (main business income of this year—main business income of the previous year)/main business income of this year
<i>LEVERAGE</i>	Debt to assets ratio: Total debts/total assets
<i>LNSIZE</i>	Firm size: Common log of total assets

### 3.3 Descriptive statistics of top management ownership

Table 2 shows that, from 2000 to 2004, the proportion of shares held by top management has increased greatly (the overall level is still low though). Meanwhile, the market value of these shares has also boosted up. By comparison, increase in the market value is not as big as that of in proportion of shares. It also needs to be notified that although both the proportion and market value of shares held by top management have been improved to certain degrees, the percentage of listed firms with share-holding top management drops among all listed firms.<sup>1</sup> Table 2 also shows that although proportions of shares held by managerial personnel and supervisors are more or less the same, most board directors hold far more shares than that of managerial personnel and supervisors.

**Table 2** Shares held by top management

	Item	2000	2001	2002	2003	2004
Managerial personnel	A	0.02%	0.01%	0.03%	0.06%	0.16%
	B	5.70E+05	4.50E+05	6.70E+05	1.30E+06	2.50E+06
	C	44.10%	40.10%	39.30%	38.30%	37.00%

(To be continued)  
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<sup>1</sup> A possible explanation may be that after the former share-holding managers' leaving, listed firms do not offer stock options to new managers. Statistics show that, after the year 2000, the number of newly-IPO firms reserving shares for managerial motivation drops, rather than increases.

	Item	2000	2001	2002	2003	2004
Board directors	A	0.05%	0.09%	0.38%	0.99%	2.30%
	B	2.20E+06	3.10E+06	7.60E+06	1.60E+07	3.30E+07
	C	75.60%	67.60%	62.60%	57.90%	55.80%
Supervisors	A	0.01%	0.02%	0.03%	0.07%	0.15%
	B	5.40E+05	5.00E+05	7.00E+05	1.30E+06	2.00E+06
	C	64.10%	57.20%	51.20%	47.60%	44.60%
Top management	A	0.07%	0.11%	0.38%	0.94%	2.14%
	B	2.80E+06	3.50E+06	7.80E+06	1.60E+07	3.10E+07
	C	78.70%	72.80%	69.30%	67.10%	65.80%

Notes: Item A refers to the average proportion of shares held by top management (excluding listed firms with no share-holding top management); Item B refers to the average market value of shares held by top management (excluding listed firms with no share-holding top management); Item C refers to the proportion of listed firms with share-holding top management to the total number of listed firms. Samples with abnormal values were eliminated.

## 4 Empirical results

### 4.1 Regression results of panel model

To overcome the inherent problem of autocorrelation resulted from simple mixed regression model for cross-sectional data and possible deviations in sample selection resulted from balanced panel data model (which requires that the number of samples in each year should be equal), we first of all adopted the method of panel least squares of unbalanced for measuring unbalance panel data to estimate the relationship between proportion of shares held by top management and firm performance. Samples chosen in the panel model included firms (1) became listed before 2000; (2) with complete data from 2000 to 2004. A total 897 sample firms and 4495 sample points were collected.

$$\begin{aligned}
 EPS\_ADJ_{it} = & \alpha + \beta_1 * SHARERATIO_{it} + \beta_2 * TOPONE_{it} + \beta_3 * BOARDSIZE_{it} \\
 & + \beta_4 * INDEPENDT_{it} + \beta_5 * LEVERAGE_{it} + \beta_6 * INCREASE_{it} \\
 & + \beta_7 * LNSIZE_{it} + \beta_8 * STATE_{it} + \Phi + \varepsilon
 \end{aligned} \quad (1)$$

$$\begin{aligned}
 EPS\_ADJ_{it} = & \alpha + \beta_1 * SHAREVALUE_{it} + \beta_2 * TOPONE_{it} + \beta_3 * BOARDSIZE_{it} \\
 & + \beta_4 * INDEPENDT_{it} + \beta_5 * LEVERAGE_{it} + \beta_6 * INCREASE_{it} \\
 & + \beta_7 * LNSIZE_{it} + \beta_8 * STATE_{it} + \Phi + \varepsilon
 \end{aligned} \quad (2)$$

The above two models are used to study the relationship between proportion of shares held by top management and firm performance. In Model (1),  $EPS\_ADJ_{it}$  stands for the  $EPS\_ADJ$  of firm  $i$  in year  $t$ . The meaning of “ $_{it}$ ” in other variables is the same as in  $EPS\_ADJ_{it}$ .  $SHARERATIO$  refers to the total proportion of

shares held by top management, consisting of four sub-variables of *MSR*, *BSR*, *SSR*, and *ALLSR*. Pretests showed that there are strong autocorrelation and serious collinearity among *SHARERATIO* variables. Therefore, in regression analysis, we entered one by one the four sub-variables of *SHARERATIO* and controlled other influencing factors of firm performance, namely *TOPONE*, *BOARDSIZE*, *INDEPENDT*, *LEVERAGE*, *INCREASE*, *LNSIZE*, and *STATE*.  $\Phi$  is the random factor of random effects of the panel model.<sup>2</sup>  $\varepsilon$  is the disturbance.

As the effects of the same share-holding proportions on management incentive vary in different-sized firms, *SHARERATIO* is replaced by *SHAREVALUE*, which is comprised of four sub-variables, namely *MSV*, *BSV*, *SSV*, and *ALLSV*.

Table 3 shows the regression results of the above two panel models (random effects). Among all variables, *MSR* and *ALLSR* are significantly related to *EPS\_ADJ* at the 1% level, *BAR* and *SSR* at the level of 5%, while *MSV*, *BSV*, *SSV*, and *ALLSV* are not significantly related to *EPS\_ADJ* at the 1% level. The results also indicate that: (1) *TOPONE* is significantly and positively related to *EPS\_ADJ*, implying that the higher proportion of shares held by the biggest shareholders, the better firm performance; (2) *BOARDSIZE* is not significantly related to *EPS\_ADJ*, implying that the increase in the number of board members can not enhance firm performance accordingly; (3) the relation between *INDEPENDENT* and *EPS\_ADJ* is not clear; (4) *LEVERAGE* is significantly and negatively related to *EPS\_ADJ*; (5) *LNSIZE* is significantly and positively related to *EPS\_ADJ*; (6) *STATE* is significantly and positively related to *EPS\_ADJ*, implying that the performances of private-owned listed firms are significantly better than those of state-owned ones. Due to limited space, we are not going to discuss control variables in details. As Table 3 shown, when using *SHAREVALUE* to replace *SHARERATIO*, the significance of regression coefficient goes up considerably. To make the results look more concise, only the regression results of *SHAREVALUE* on firm performance are depicted in Table 4.

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<sup>2</sup> Articles using panel model always include a discussion of whether fixed or random effect should be adopted. As a rule, when  $\Phi$  is estimated as a random variable of regression equation or it has no or little correlation with other independent variables, random effect is used in the regression model, while when  $\Phi$  is estimated as an independent variable in the regression equation or it is related to other independent variables, fixed effect is used in the regression model. In the present article, random effect panel model was adopted due to: (1) since our data is mostly cross-sectional, random effects model can precisely denote where errors do occur and reduce the degree of freedom; (2)  $\Phi$  is treated as a random variable rather than an independent variable in our models. We assumed that it has no or little correlation with other independent variables.



**Table 3** Management ownership and firm performance (estimated with random effect panel model, dependent variable = *EPS\_ADJ*)

	Model (1)	Model (1)	Model (1)	Model (2)	Model (2)	Model (2)	Model (2)
<i>MSR(MSV)</i>	114.96*** (4.20)			0.09*** (9.01)			
<i>BSR(BSV)</i>	12.76** (2.25)				0.07*** (8.74)		
<i>SSR(SSV)</i>		40.15** (2.22)				0.07*** (8.05)	
<i>ALLSR(ALLSV)</i>			14.59*** (3.23)				0.07*** (8.97)
<i>TOPONE</i>	0.12** (2.79)	0.07** (2.26)	0.07** (2.21)	0.14 (3.44)	0.08** (2.49)	0.12*** (3.30)	0.08** (2.56)
<i>BOARDSIZE</i>	0.00 (-0.38)	0.00 (-0.42)	0.00 (-0.35)	0.00 (0.51)	0.00 (-0.39)	0.00 (-0.10)	0.00 (-0.26)
<i>INDEPENDT</i>	-0.09** (-2.08)	-0.04 (-1.06)	-0.03 (-0.79)	0.00 (0.02)	0.05 (1.52)	0.06** (1.68)	0.07** (2.01)
<i>LEVERAGE</i>	-0.45*** (-11.05)	-0.42*** (-14.10)	-0.43*** (-14.89)	-0.40*** (-10.06)	-0.38*** (-12.63)	-0.38*** (-11.81)	-0.38*** (-13.14)
<i>INCREASE</i>	0.14*** (10.53)	0.10*** (11.81)	0.10*** (12.67)	0.13*** (10.57)	0.10*** (12.10)	0.10*** (10.91)	0.10*** (12.91)
<i>LNSIZE</i>	0.28*** (14.37)	0.26*** (17.72)	0.25*** (17.70)	0.24*** (12.07)	0.22*** (14.85)	0.21*** (13.13)	0.21*** (14.38)
<i>STATE</i>	0.01 (0.70)	0.04** (2.63)	0.03** (2.24)	0.01 (0.69)	0.03** (2.05)	0.04** (2.86)	0.03** (2.05)
<i>C</i>	-2.46*** (-14.29)	-2.22*** (-17.32)	-2.09*** (-17.28)	-2.60*** (-15.29)	-2.31*** (-18.13)	-2.22*** (-17.97)	-2.18*** (-17.97)
<i>Adj R<sup>2</sup></i>	0.19	0.17	0.16	0.21	0.18	0.17	0.18
<i>F-TTEST</i>	59.58***	80.01***	85.94***	69.75***	91.18***	71.77***	96.25***
<i>OBS</i>	2033	3196	3509	2036	3201	2716	3520

Notes: (1) Numbers in parentheses are the *T* values.(2) \* $p < 0.05$ , \*\* $p < 0.01$ , \*\*\* $p < 0.001$ .

(3) Sample firms with not share-holding top management were excluded.

(4) In Model (1), variables for management ownership are *MSR*, *BSR*, *SSR*, and *ALLSR*.(5) In Model (2), variables for management ownership are *MSV*, *BSV*, *SSV*, and *ALLSV*.

## 4.2 Regression results of the average model

As a long-term stimulating mechanism, the incentive effects of stock option on top management are not likely to take effect right away. In addition, accounting incomes such as *EPS*, *ROA*, etc in a single year can be easily manipulated by managers or big shareholders. Thus in the regression analysis that follows, we used the average value of each variable from 2000 to 2004, rather than data of any single year. The model is thus called average model. As above, sample included exclusively firms with complete data from 2000 to 2004. A total of 897 listed firms were tested.

Table 4 depicts that, the same as those of in the panel model, variables *MSV*, *BSV*, *SSV* and *ALLSV* are all significantly related to *EPS\_ADJ* at the 1% level. The regression results of control variables, however, are slightly different from those of in Table 3, that is, the proportion of independent directors on board is significantly and positively related to *EPS\_ADJ*, while the differences in performance between private-owned and state-owned firms are not statistically significant.

**Table 4** Market value of shares held by top management and firm performance (average model, dependent variable = *EPS\_ADJ*)

Variables	Average model			
<i>MSV</i>	0.45*** (5.45)			
<i>BSV</i>		0.31*** (4.99)		
<i>SSV</i>			0.30*** (4.13)	
<i>ALLSV</i>				0.34*** (5.45)
<i>TOPONE</i>	0.80** (2.47)	0.33 (1.34)	0.47* (1.81)	0.36 (1.50)
<i>BOARDSIZE</i>	0.00 (0.19)	0.01 (0.41)	0.00 (-0.08)	0.01 (0.51)
<i>INDEPENDT</i>	1.19 (1.11)	3.19*** (3.69)	2.53*** (2.74)	2.87*** (3.39)
<i>LEVER</i>	-1.21*** (-3.68)	-1.29*** (-5.10)	-1.18*** (-4.58)	-1.23*** (-4.97)
<i>INCREASE</i>	0.17*** (5.38)	0.17*** (6.92)	0.16*** (6.24)	0.17*** (6.87)
<i>LNSIZE</i>	0.91*** (5.87)	0.94*** (8.19)	0.95*** (7.96)	0.94*** (8.42)
<i>STATE</i>	-0.06	-0.02	-0.04	0.00

(To be continued)

*(Continued)*

Variables	Average model			
	(-0.37)	(-0.16)	(-0.34)	(0.00)
<i>C</i>	-10.81***	-10.74***	-10.51***	-11.03***
	(-8.50)	(-11.18)	(-10.36)	(-11.79)
<i>Adj_R</i> <sup>2</sup>	0.29	0.26	0.25	0.27
<i>F-TEST</i>	20.33***	29.36***	23.90***	31.33***
<i>OBS</i>	389	643	552	656

### 4.3 Sensitivity test

First, we replaced *EPS\_ADJ* with *ROA\_ADJ* as performance indicator and redid the regression of management ownership on firm performance. The results were consistent with the above conclusions. Second, we proceeded to eliminate ST and PT firms from our samples and redid the regression analysis. Again, the results were in line with the above conclusions. Finally, yearly regression results showed that management ownership is still significantly and positively related to firm performance. Due to limited space, relevant analyses are not presented here.

## 5 Conclusions

Based on our empirical analyses of the relationship between proportion of shares held by top management and firm performance, we conclude that management ownership (including managerial personnel, board directors, and supervisors) is significantly and positively related to firm performance. The results remain unchanged when retested with different models and different performance indicators. Regression results of sub-samples in each year also show that the market value of shares held by top management is significantly and positively related to firm performance. Differences in our conclusion and those in prior literature may partly result from diverse estimation methods and samples.

Several problems are also found in using stock options as incentives among Chinese listed firms: first, the proportion of shares/or the market value of the shares held by top management is still pretty low, which reduces the motivating effects of stock option to a large degree; second, most Chinese listed firms do not have formal stock option schemes and do not motivate their managers with stock options; finally, in recently years, the number of firms with share-holding top management has dropped, rather than has increased, implying that Chinese firms lack confidence in using stock option as an effective incentive means.

This research also has some limitations. First, a vast majority of our sample firms are state-owned. Considering the great differences in both internal and external business environment between private-owned firms and state-owned

firms, our conclusion may not be applicable to private-owned firms. Therefore, further study needs to be given to the comprehensive examination of those non-state-owned firms. Second, based on regression analyses, we find that the proportion of shares held by top management is significantly and positively related to firm performance. Yet whether the performances of firms with share-holding top management are necessarily better than those of firms without share-holding top management still remains unclear and hence deserves deeper and more detailed analyses.

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