Executive Compensation, Firm Performance, and Corporate Governance in China: Evidence from Firms Listed in the Shanghai and Shenzhen Stock Exchanges

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Executive Compensation, Firm Performance, and Corporate Governance in China: Evidence from Firms Listed in the Shanghai and Shenzhen Stock Exchanges

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I. Introduction

In light of the mounting interest in the vital role of corporate governance in economic development, it is important to study how firms in developing countries provide incentives to their top executives.[1] For transition economies

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[1] Executive compensation has attracted much attention from economists in the past 2 decades, yet most academic work on executive compensation has been concentrated on a few developed countries such as the United States and the United Kingdom, mainly due to data availability. See, e.g., Murphy (1999) for an excellent survey of the largely empirical literature on top management incentives and Gibbons (1997) for the mostly theoretical literature. For an authoritative survey of earlier work, see Rosen (1990); Rosen concludes his survey by urging scholars to broaden their inquiry beyond the United States to other countries. For an excellent survey of the corporate governance literature in general, see, e.g., Shleifer and Vishny (1997). Bai et al. (2004) find evidence that listed firms in China with better corporate governance measures are associated with higher stock market valuation. Furthermore, the premiums related to better corporate governance are found to be substantially higher than those in other emerging markets in the world. Corporate governance appears to matter in China. For similar studies on other developing and transitional economies, see, e.g., Black (2001), Black, Hasung, and Kim (2003), and Klapper and Love (2004).

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struggling to transform their state-owned enterprises (SOEs) into profitable modern firms through various reform measures, the provision of efficient managerial incentives is especially important.[2] Since the link between executive pay and performance represents the bulk of managerial incentives for top management, a closer look at the nature of the pay-performance link for top management in transitional economies will provide much needed information for evaluating the current reform effort and designing future reform measures.

Aided by two newly available data sets, in this article we study the nature of the pay-performance link for top management in a group of firms from the largest transition economy in the world, China. These are firms listed in China's two stock exchanges, the Shanghai Stock Exchange and the Shenzhen Stock Exchange. On the one hand, since firms aspiring to become listed are required to go through corporate restructuring according to China's Western-styled Corporate Law of 1993 and listed firms are under increasing pressure to adopt certain good corporate structure practices (such as the inclusion of independent directors in the board and the separation of the board chairmanship and the CEO position), the process of getting listed has the potential of enhancing the quality of corporate governance in these firms. On the other hand, the ownership structure of most listed firms in China is still dominated by government shares, which casts doubt on the effectiveness of the corporate restructuring process (or *GongSi GaiZhi* in Chinese). In order to draw some conclusions about China's success in the use of stock market listing as a vehicle for SOE reform, we explore how these firms relate their executive compensation to their firm performance and how such relationships are influenced by their ownership structure.

We begin by estimating two standard measures of pay-performance relations for executives (see, e.g., Murphy 1999), using data on China's listed firms. First, we estimate the sensitivity of pay with respect to shareholder value by regressing the change in executive compensation on the change in shareholder value of the firm. Second, we estimate the elasticity of pay with respect to shareholder value by regressing the change in the log of executive compensation on the change in the log of shareholder value of the firm.[3] To explore the robustness of the pay-performance relationship to other firm performance mea-

[2] Aghion, Blanchard, and Burgess (1994) stress the importance of managerial incentive reform in the successful economic transition of former socialist economies.

[3] Specifically, (1) $\Delta Y_{it} = a + b\Delta V_{it} + u_{it}$, and (2) $\Delta \ln Y_{it} = \alpha + \beta \ln(1 + R_{it}) + u_{it}$, where Y_{it} is executive compensation of firm i in year t; V_{it} is shareholder value of firm i in year t; R_{it} is stock return of firm i in year t; while u_{it} is a normally distributed random error term. As shown in Murphy (1999), the change in the log of shareholder value of the firm is equal to $\ln(1 + R_{it})$, where R_{it} is stock return of firm i in year t.

sures, we also study the relationship between executive compensation and the accounting performance of the firms. Specifically, following the literature, we estimate the semi-elasticity of pay with respect to stock rate of return, sales growth, change in pretax income, and the presence of negative pretax income, by regressing the change in the log of executive compensation on these measures. We then augment the standard CEO pay equations with a variable indicating the degree to which the firm is owned and controlled by the state and an interaction term involving such a state ownership variable and firm performance.

In short, we find statistically significant sensitivities and elasticities of annual cash compensation (salary and bonus) for top executives with respect to shareholder value in China's listed firms. The size of the estimated sensitivities implies that an RMB 1,000 increase in shareholder value yields an RMB 0.045 increase in annual cash compensation, whereas the size of the estimated elasticities suggests that a 10% increase in shareholder value results in 1.7% increase in annual cash compensation for top executives. The estimated pay sensitivity to shareholder value appears to be greater than what is found for the United States (Jensen and Murphy 1990; Murphy 1999), while the elasticity estimate is greater than what Kato and Kubo (2006) report for CEOs of listed firms in Japan in 1986–95 and what Murphy (1999) reports for CEOs of S&P 500 Industrials in the United States in the 1970s (yet not as high as what he reports for later years or the 1980s and 1990s).[4] Although one ought not to conclude that Chinese executives are faced with a greater incentive to pursue the interests of shareholders than are U.S. executives since the bulk of incentives for U.S. executives are in the form of stock options rather than in cash compensation, these results testify to the fact that incentive mechanisms have been in use by at least some of the listed firms in China. In addition, we find that sales growth is significantly linked to executive compensation and that Chinese executives are penalized for making negative profits, although they are neither penalized for declining profits nor rewarded for rising profits insofar as they are positive.

Perhaps even more important, the strength of the link between compensation and performance varies across firms with different ownership structure. We find that the relationship between firm performance and executive compensation is weaker for firms with a higher percentage of government ownership, suggesting that the interests of top executives in firms that are less state-controlled are more in line with those of the shareholders. This is con-

[4] See Sec. V for other potential reasons why Chinese firms tend to have higher pay-performance sensitivity and elasticity.

sistent with the belief that the piecemeal enterprise reform measures adopted in China will need to be supplemented by changes in ownership structure in order to ensure the successful transformation of SOEs into profitable modern corporations.[5]

To our knowledge, this article is the first to look at pay-performance sensitivities and elasticities for Chinese firms based on stock-market data. Systematic research outside the United States on executive compensation is still in its infancy, especially in emerging markets, mostly due to limited data availability. Our study thus contributes to the literature on executive compensation in emerging markets.[6]

Specifically, several previous studies on pay-performance linkage in China focused on SOEs before the stock market era and found a positive and significant link of accounting performance measures to executive compensation (Groves et al. 1995; Mengistae and Xu 2004). Furthermore, some SOE reform measures, such as profit responsibility contracts (Groves et al. 1995) and profit retention (Mengistae and Xu 2004), are shown to have improved the pay-performance linkage, while others, such as autonomy in production and sales decisions (Mengistae and Xu 2004), have not. In contrast, Liu and Otsuka (2004) study top management incentives in the iron and steel industry in four provinces in China and find that the explicit adoption of reward systems for top executives does not lead to firm productivity improvement in these SOEs and Township and Village Enterprises (TVEs). But these reward systems do result in higher executive income. Although the study does not directly address the issue of pay-performance sensitivity and elasticity, the results indirectly imply a lack of significant links between firm performance and executive compensation for the SOEs and TVEs included in their sample.

By exploring pay-performance relations for listed firms in China, our article complements these early pre–stock market studies. In addition to providing the first estimates on pay-performance sensitivities and elasticities using stock

[5] For the inefficacy of China's piecemeal approach to economic reform, see, e.g., Lardy (1998). For specific studies suggesting the importance of ownership structure in China, see, e.g., Chang, McCall, and Wang (2003), who find that Chinese township and village enterprises with better defined ownership have significantly better performance. In addition, Zhang, Zhang, and Zhao (2003) find that state ownership leads to lower R&D and productive efficiency in industrial firms.

[6] For a literature review of prior studies on U.S. CEO compensation, see n. 1. The United Kingdom is one other country for which CEO compensation data are readily available (Conyon 1997). For other countries, in particular Asian countries, data on CEO compensation are typically not publicly available and thus most studies use average pay for all executives. See, e.g., Kaplan (1994), Xu (1997), Ang and Constand (1997), Joh (1999), and Kubo (2004) on Japan; and Kato, Kim, and Lee (2006) on Korea. The rare exception is Kato and Kubo (2006), which uses proprietary data on Japanese CEO compensation.

performance data, we are also able to utilize stock ownership data to study how ownership structure influences pay-performance relations and thus the quality of corporate governance. Our results are largely consistent with the findings from the previous studies. On the one hand, we find that there is a significant link between firm performance and executive compensation, much in line with the findings from Groves et al. (1995) and Mengistae and Xu (2004). On the other hand, such a link is found to be weaker in firms with larger government shares, which is consistent with the findings by Liu and Otsuka (2004).

The structure of the article is as follows. In Section II, we provide relevant institutional information on China's stock market, listed firms, and executive compensation in the context of its enterprise reform, while reviewing the relevant literature. Section III describes data, followed by Section IV, where the main results are presented. Section V concludes by summarizing the findings and discussing their policy implications.

II. Background Institutional Information

A. Emerging Stock Market and Listed Firms in China

We begin with a brief description of the emergence of China's stock market and its listed firms.[7] The interest in the stock market and listing of firms on the market was initially sparked in the late 1980s and early 1990s in China as part of the government's effort to help SOEs raise capital and reduce debt burden. In recent years, however, the development of China's stock market has taken on additional significance, given that the public listing of firms has been heralded as a centerpiece of China's enterprise reform, especially for its largest SOEs.[8]

The Shanghai Stock Exchange was established at the end of 1990, and shortly after that, the Shenzhen Stock Exchange started operating in early 1991, and the first Chinese company went public in 1991. But the rapid development of China's stock market did not begin until the mandate of the Chinese Communist Party's (the CCP) Fourteenth Congress. In contrast to

[7] This section is enriched by a series of interviews we conducted with executives of listed firms and securities firms, staff of government regulatory agencies, and researchers studying corporate governance issues in four Chinese cities—Chengdu (Sichuan), Shanghai, Beijing, and Tianjin—during the summer of 2004. We are grateful for support from these individuals.

[8] The government's policy stance to emphasize the role of the stock market and the listed firms in China's SOE reform can be observed from numerous speeches given by policy makers in charge of enterprise reform. For instance, in a speech given at the "Meeting on How to Establish the Modern Enterprise System in Listed Firms" held in Beijing in December of 2002, the chairman of the Economic and Trade Commission, Rongrong Li, stated that China's enterprise reform and modernization in the coming years will be focused on listed firms.

the largely piecemeal SOE reform measures adopted in the 1970s and 1980s, the CCP's Fourteenth Congress in October 1992 opened a new chapter in China's SOE reform by proposing to establish a modern corporation system that resembles those in the West.[9] This decision was made possible only after the Party accepted "building a market economy with Chinese characteristics" as a target for China's economic reform.

Soon after the Fourteenth Congress, the National Peoples' Congress and its Standing Committee passed the Corporate Law in 1993, which laid out the fundamental rules for corporate governance in modern Chinese corporations and provided blueprints for SOE restructuring and reform. In 1997, the CCP's Fifteenth Congress made the shareholding system a centerpiece of China's enterprise restructuring and public listing a main vehicle to achieve the goal for large SOEs, and this led to a rapid increase in the number of firms listed in the two stock exchanges in China (see, e.g., Jefferson et al. 2003). The development of the stock market was further prompted by the passage of the Securities Law in 1998. By early 2004, China's stock market had emerged as the eighth largest in the world with close to 1,300 listed firms and market capitalization of over $550 billion.[10]

The 1993 Corporate Law of China recognizes two types of corporations: closely held corporations (*youxian zeren gongsi*) and publicly held corporations (*gufen youxian gongsi*), with the latter requiring higher levels of registered capital and a larger number of shareholders. Both types of corporations are required to establish three corporate governing bodies: (i) the shareholders (acting as a body at the shareholder general meeting); (ii) the board of directors; and (iii) the board of supervisors, although a closely held corporation with "few shareholders" and "small capital size" can be an exception to the rules.[11]

[9] Earlier SOE reform measures were mainly designed to align the interests of SOE management and the government, and they include the administrative decentralization and profit retention policies (*fangquan rangli*) in the late 1970s to the early 1980s, the changes in the forms of profit sharing and funding sources for SOEs during the mid- to late 1980s (*ligaishui* and *bogaidai*), and the incentive contracts for managers and workers during the late 1980s (*chenghaozhi*). For a detailed discussion on China's earlier enterprise reform from a historic perspective, see Naughton (1995) and Yang (1997). For a general discussion on enterprise reform in transition economies, see Megginson and Netter (2001).

[10] There were 1,288 firms listed in the Shanghai and Shenzhen Stock Exchanges by the end of April in 2004 (data from the Shanghai and Shenzhen Stock Exchanges). One estimate puts the market capitalization in China's stock markets at about 50% of China's GDP, which is comparable to the ratio in Japan (see Tao 2001). A more conservative estimate discounting values of shares owned by the state and legal persons puts the ratio at 20%.

[11] Specifically, a small closely held corporation can opt to not set up a board of directors. Instead, it suffices to have a single executive director, and the executive director may serve concurrently as the manager. In addition, such a corporation is not required to have an entire

In terms of property rights created by share ownership, the Corporate Law clearly stipulates that shareholder rights include the rights to investment interests, to make decisions regarding corporations' development strategies, and to hire management (Corporate Law, sec. 1, 1993). Although the final source of power in the corporation rests with the shareholder general meeting, the general meeting delegates to the board of directors the rights to make daily operation decisions, including hiring and firing the management and determining the compensation of the management, while the board of supervisors (consisting of both shareholder representatives and company employee representatives) oversees the board of directors and management (Corporate Law, sec. 3, 1993).

Listed firms are publicly held corporations that are permitted by the Chinese Securities Regulatory Commission (CSRC) to issue and trade shares in one of the two stock exchanges in China, the Shanghai Stock Exchange and the Shenzhen Stock Exchange. As such, in addition to abiding by the stipulations in the Corporate Law, listed firms are regulated by the Securities Law of 1998 and other stipulations issued by the CSRC. In particular, the CSRC has various disclosure requirements for listed firms in China, including the publication of annual reports (in which basic information about a firm's ownership structure, investment decisions, and financial conditions is disclosed) in at least two newspapers with large circulations approved by the commission. A firm is also required to provide several measures of executive compensation in its annual report, which makes this study possible.

Although on the surface the corporate structure of listed firms in China looks very much like that of listed firms in the West, the ownership structure of these firms is very different from that in the United States and other market economies, with the most important feature being the dominance of government ownership. Most listed firms are restructured from SOEs, and when going public, state-owned assets in these firms are converted into shares owned directly or indirectly by the government, and in addition they are encouraged to issue new shares to other SOEs. As a result, the government dominates the ownership and control of many listed firms in China (see, e.g., Sun and Tong 2003; and Bai et al. 2004).

B. Executive Compensation Reform in China

We now describe how the mechanism for determining executive compensation in Chinese firms, especially Chinese SOEs, has evolved in the past 2 decades,

board of supervisors. One or two supervisors will suffice. See Corporate Law, sec. 3 (1993). For a detailed discussion on China's Corporate Law of 1993, see Schipani and Liu (2001).

with particular focus on the current form of executive compensation reform in China, the "yearly salary system." Before economic reform started in the late 1970s, executive compensation, as part of the rigid prereform compensation system, was largely determined based on factors that do not reflect either firm performance or individual contributions. These factors include 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. The profit retention policies introduced in the late 1970s and the "profit responsibility contract" system adopted in the 1980s represented the early steps in China's executive compensation reform, where managers were allowed to use a portion of the residual profits to increase compensation for workers and themselves.[12]

Two waves of SOE compensation reforms promulgated in 1985 and 1992 allowed SOEs' wage budget to be linked to its economic performance and permitted SOEs to set their own internal wage structures within the wage budget and thus helped to introduce more profit-oriented incentives to SOE employees in general. One main compensation mechanism that emerged from these reforms is the system of fixed monthly salary plus bonus payment for SOE employees. Two constraints, however, limited the scope of executive compensation reform. The wage budget for SOEs still had to be approved in advance by the former Ministry of Labor (MOL) to avoid paying a wage adjustment tax for the part exceeding the governmental standard wage bill. In addition, management in an SOE still did not have the ability to effectively hire and fire employees. As a result, the bonus payment in this system is largely egalitarian compensation that lacked real incentive effects (Liu and Otsuka 2004).[13]

It was only after the pilot implementation of the yearly salary system in 1992 that substantive executive compensation reform really started to take off in Chinese SOEs. In the same year that the CCP accepted "a market economy with Chinese characteristics" as the target for China's economic reform and a modern corporation system resembling Western corporations as the goal for SOE reform, the State Council approved the Shanghai Hero Pen Company to try out the pilot yearly salary system for its top executives. By 1994, Beijing, Shenzhen, Sichuan, Henan, and Liaoning had also started their own pilot programs, followed by the national pilot program implemented in 100 large

[12] See Groves et al. (1995) and Mengistae and Xu (2004) for empirical evidence that executive compensation was linked to accounting performance measures under the "profit responsibility contract" system.

[13] For a detailed discussion on general compensation reforms in China, see Yueh (2004).

SOEs throughout the country. The pilot experiment was well received, and the yearly salary system thus became the most important form of executive compensation reform in China since 1997, when the former MOL officially advocated "vigorous and smooth implementation" of the system in SOEs.[14]

The compensation for top executives in the yearly salary system consists of two parts: a fixed component (known as the base salary) that depends on both the average wage for ordinary employees and the size of the enterprise, and a variable component (known as the risk salary) that is linked to both the base salary and the performance of the firm in the year. The base salary is paid to executives on a monthly basis, while the risk salary (or at least a large part of it) is distributed at the end of the year.[15] In other words, the pay-performance structure of the variable component in the yearly salary system is much like a "bonus" in the compensation package of a CEO working for a Western firm, and thus the yearly salary system corresponds to a typical cash compensation package in Western firms.

Therefore, in advocating such a system, China's public policy makers appear to recognize the importance of executive compensation as a key incentive mechanism for top management and consider it a vital component of enterprise reform. Being harbingers of the new modern Chinese enterprises, we expect the listed firms to have been among the first to adopt such a system with the implied strong pay-performance link for top managers.

However, despite being conceived as a way to improve SOE performance from the beginning, the effective adoption of the yearly salary system seems to have been hindered by state ownership. First of all, the new compensation system 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 this more progressive compensation system ranged from 15.2% for SOEs to 20.2% for collective firms and 41.4% for privatized firms.[16] Furthermore, there is evidence that SOEs that do link executive compensation to firm performance are more likely to include nonfinancial measures in executives' performance evaluations, thus reducing the weights assigned to stock perfor-

[14] See the former MOL circular "The Main Goals and Policy Measures for Enterprise Compensation Reform during the Ninth Five Year Plan Period" issued in March of 1997.

[15] The discussion on the "yearly salary system" benefited greatly from the actual compensation plans provided by two firms in Sichuan as well as our interviews with Chinese executives in the summer of 2004 in Beijing, Shanghai, and Sichuan Province. For an authoritative discussion on the various components of CEO pay in the United States, see Murphy (1999).

[16] See "Report on Chinese Entrepreneurs: Emergence and Development" ["Zhongguo qiyejia chengzhang yu fazhan baogao"], 27, issued by the Survey System for Chinese Entrepreneurs 2004.

mance and accounting performance measures. Although a systematic study of managerial contracts is beyond the scope of this article, 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 the yearly salary system.[17]

Government policies toward SOEs seem to explain such differences to a large extent. According to the Performance Evaluation Index System for Industrial and Commercial Enterprises in Competitive Sectors issued by the Ministry of Finance in 1999, which is recommended as a criterion for adjusting executive compensation, various accounting performance measures account for two-thirds of the overall performance index, while "soft" subjective measures such as management leadership and social contribution account for the other one-third. For industrial and commercial firms in noncompetitive sectors (the Chinese term for regulated sectors such as public utilities), a much wider range of measures is included in the evaluation system. Executives we interviewed have listed occupational safety and health records, power supply stability, and employment provision, among other additional factors.

C. Corporate Governance in Chinese Listed Firms

Most studies on Chinese listed firms reveal a low quality of corporate governance. For instance, Lin (2001) argues that China's SOE restructuring has failed to facilitate any major improvement in corporate governance. Based on interviews with government officials, stock exchange regulators, CPAs, security and corporate lawyers, and officials at both listed and nonlisted firms, Lin (2001) concludes that corporate governance in listed firms in China is of very low quality, characterized by excessive powers of the CEO and insider control, inadequate safeguards for outsiders, weak managerial incentives, and inadequate transparency and disclosure. According to Lin (2001), the large percentage of company shares owned by the state implies that many listed firms are merely reincarnations of SOEs, which have inherited both the inferior corporate governance and the poor firm performance.[18]

More generally, there are two reasons why listed firms controlled by the state behave differently from more privatized listed firms, as reflected in the reluctance of SOEs to adopt the yearly salary system. First, because state shares

[17] 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 nonfinancial objectives such as employment provision. For a more formal theoretical argument, see Schmidt and Schnitzer (1993).

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

are not tradable on the market, a higher proportion of state-owned stock implies less exposure to market discipline, resulting in poorer corporate governance and a weaker pay-performance link for top management. Second, listed firms with greater state ownership and control face more bureaucratic hurdles in reforms and thus are less quick to adopt new practices.[19]

In the particular case of executive compensation, the existing institutional arrangements make it more difficult for state-controlled listed firms to reform. Specifically, the bureaucratic structure used until very recently for managing government shares in listed firms involves at least three separate government agencies.[20] The CCP's Department of Organization (DO), the State Economic and Trade Commission or the Industrial Commission (SETC), and the Ministry of Finance (MOF) were in charge of the personnel, daily operations, and asset management of the listed firms, respectively. Since each agency has its own line of duties and there is not much communication among them, the determination of executive compensation, which is mainly under the authority of the DO, rarely depends on the firm's performance, which is evaluated by the SETC and MOF. Instead, in determining the level of compensation for top executives, the DO uses the compensation level for government officials at the same rank as a reference and makes certain adjustments based on firm size and the executive's education and working experience. Compensation for other executives will then be certain proportions of the top executive's pay level. For instance, the vice president's salary will be 80% of the CEO's salary, and so on. The compensation figures will then be submitted to the board of directors, which will almost always approve them. Although sometimes the board of directors of a listed firm makes recommendations to give bonuses to executives based on good firm performance, these instances are few and far between.

Note that this pessimistic view contrasts with the belief that the gradual and piecemeal approach adopted by the Chinese government for reforming its SOEs will succeed in the long run without decreasing state ownership and control substantially. Specifically, it implies that China's experiment with publicly listing its large firms without substantially decreasing state ownership and control will not significantly help improve the corporate governance of these firms.

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

[20] It was only in March 2003 that the State Council decided to set up the State Asset Supervision and Administration Commission, which would combine the management of personnel, business operations, and assets of state owned enterprises.

We are, however, also aware of several arguments that may imply positive effects of government ownership on corporate governance. A large percentage of government shares may signal to the market that shareholders' wealth will not be expropriated and thus indicate lower uncertainty for domestic investors (see, e.g., Perotti 1995; and Mok and Hui 1998). In addition, substantial government ownership may prevent large-scale state asset stripping and mitigate rabid rent-seeking behaviors of managers when markets are lacking (see, e.g., Stiglitz 1997; Jefferson 1998; and Lin, Cai, and Li 1998). Finally, it is well known that private firms in China are inferior to SOEs in both their level of management and technology as well as the quality of their employees (see, e.g., Naughton 1995; and Wu 2003). Since superior incentive mechanisms are often initiated by capable executives who have superior managerial skills, it could then be argued that firms with greater state ownership and control are more capable of adopting more efficient incentive measures, including executive compensation reforms.[21]

This more positive view of the role of state ownership, combined with the belief that public listing effectively exposes the listed firms to market discipline, will lead to an optimistic view of the stock market's role in improving Chinese firms' corporate governance. We will verify the two opposing views empirically in the later sections. Previous empirical work has been focused on the effects of ownership structure on firm performance with mixed results. We contribute to the important policy debate by providing the first systematic evidence on the effects on executive pay-performance link (and thus the quality of corporate governance) of state ownership and control of listed firms.[22]

[21] For a summary of arguments on the negative role played by government ownership in firm performance, see Shleifer (1998). For a model implying positive effects of state ownership in SOEs, see Perotti (1995). Megginson and Netter (2001) provide a comprehensive survey of empirical studies on the effects of government versus private ownership on firm performance. Laffont and Tirole (1993) emphasize the importance of empirical studies.

[22] Though not reported in this article due to space limitation, we also studied two additional issues. First, earlier studies on the impact on firm performance of state ownership in China's listed firms often distinguish direct state ownership through state shares and indirect state ownership via legal person shares (Xu and Wang 1997; Chen and Gong 2000; and Sun and Tong 2003). Thus, we examined whether the executive pay-performance link in China's listed firms will become weaker as state ownership becomes more indirect with the expanding use of legal person shares. Second, recommendations for corporate governance reform in developing countries and transition economies often include the appointment of independent directors to the board of directors and the separation of the CEO position from the board chairmanship (Nam and Nam 2004). As such, we investigated whether the appointment of "independent directors" to the board of directors in China's listed firms is effective in making the executive pay-performance link stronger, and whether the separation of the CEO position from the board chairmanship in China's listed firms is effective in making the executive pay-performance link stronger (see Kato and Long [2004] for these additional results). Another potentially important issue is the effect on the pay-performance

III. Data

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 (see, e.g., Bai, Liu, and Song 2003; Sun and Tong 2003; and Bai et al. 2004), yet on our reading of the literature, we are the first to use the Sinofin data set in academic research. Data are available annually for 1998–2002, although information is more complete for later years.

The data allow us to study total cash compensation (including salary and bonus), and our empirical analysis based on cash compensation information leads to two main results.[23] First, there are statistically significant sensitivities and elasticities of executive compensation with respect to shareholder value in China. Second, the ownership structure of China's listed firms has important effects on the pay-performance link in these firms, with state ownership of China's listed firms weakening the pay-performance link for top managers.

Among the several measures of executive compensation provided in the Sinofin database, Average Rate of Pay of Top Three Executives, which includes the total annual cash compensation for CEOs and the two other highest-paid executives (often vice CEOs), is the closest to what most prior studies on executive compensation have used (typically CEO pay) and thus will be the focus of our study.[24] The data also contain information that enable us to provide important and fresh insights on one of the most vital policy issues in transitional economies, that is, the importance of ownership restructuring in enterprise reforms (see, e.g., Estrin 2002; and Jones and Mygind 2004). Spe-

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link of foreign ownership. However, foreign ownership of Chinese company stock is allowed only through B-shares, and such foreign ownership is still in its infancy (only about 3% of total shares are owned by foreign investors according to our data).

[23] According to the rules from the CSRC that regulate the content of listed firms' annual reports, all listed firms are 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.

[24] We also considered two other more aggregate measures of executive compensation, Total Executive Pay (total annual cash compensation for all directors, supervisors, and high-level executives) and Average Executive Pay (Total Executive Pay divided by the number of all directors, supervisors, and high-level executives). The results using these alternative cash compensation measures are similar to the ones reported in the article, although they are somewhat weaker and less significant, as might be expected from such aggregate measures. These and other unreported results are available upon request from the corresponding author (tkato@mail.colgate.edu).

TABLE 1
LEVEL OF EXECUTIVE COMPENSATION AND KEY FIRM CHARACTERISTICS OF CHINA'S LISTED FIRMS, 1998–2002

Variable	Mean	SD	Observations
Executive compensation:			
Average Rate of Pay of Top Three Executives (total annual salary for the three highest-paid executives divided by three)	97,474.220	101,249.100	1,917
Key firm characteristics:			
Number of employees	3,336.687	14,462.350	1,901
Size of board of directors	9.719	2.466	1,917
Size of board of supervisors	4.321	1.386	1,917
Number of directors, supervisors, and executives included in Total Executive Pay	11.192	5.463	1,917
Sales (in thousand RMB)	1.38E+06	9.45E+06	1,917
Value (shareholder value in thousand RMB)	1.70E+06	4.16E+06	1,917
R (stock return)	−.138	.248	1,917
Assets (in thousand RMB)	2,220	11,100	1,917
ROA (pretax profit/assets)	.013	.324	1,917
NEGPROF = 1 if the firm's pretax profit is negative, 0 otherwise	.123	.329	1,917
GVTSHARE (percentage of company shares owned by the state)	59.545	12.532	1,910

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 data set on 937 listed firms over the sample period of 1998–2002. All compensation measures, Value, and Sales are adjusted for inflation using CPI (1995 = 100). Value and Sales are in thousands of 1995 RMB, while all compensation measures are in 1995 RMB.

cifically, the data allow us to calculate for each firm GVTSHARE (percentage of company shares owned by the state).

Table 1 reports descriptive statistics on the level of executive compensation, ownership structure, and several other key firm characteristics, where all value variables are adjusted for inflation using CPI (FY1995 = 100) and are thus expressed in 1995-constant RMBs. These statistics were calculated based on a pooled cross-sectional time series data set on 937 firms.[25] They can be compared to prior studies such as Kaplan (1994) for Japan and the United States; Kato and Kubo (2006) for Japan; and Kato, Kim, and Lee (2006) for Korea that report similar statistics.

In particular, while average cash compensation for the top three executives in Chinese listed firms is much lower (RMB 97,000 or approximately $12,000)

[25] As is commonly done in the literature, we excluded five financial firms (mainly banks) from our sample.

than that for their counterparts in Japan and Korea, the ratio of the average rate of pay of the top three executives to the average worker pay (at around 12) is substantially higher in China. This ratio is also higher than that in other transition economies.[26] Similarly, the average executive in China's listed firms appears to be better paid relative to the average worker in manufacturing (with a ratio of around 7) than their counterparts in Japan and Korea. Using data from Kubo (2004) for Japan and Kato et al. (2006) for Korea, and the International Labour Organisation (ILO) average manufacturing worker wage, we found that the ratio of average executive pay to average manufacturing worker wage was 4.2 for Japan in 1995–96 and 5.6 for Korea in 1998–2001. However, the Chinese ratio as well as its executive pay is still considerably lower than the comparable U.S. figures.[27]

Several other key firm characteristics are also shown in table 1. The average listed firm in China employed over 3,000 workers. Sales revenue of the average listed firm was 1.4 billion 1995-constant RMBs, and the market value of the average listed firm was 1.7 billion 1995-constant RMBs. Over the period of 1998–2002, many listed firms in China experienced poor stock market performance. Thus, the average rate of inflation-adjusted stock return was negative 14% over the sample period. However, return on asset (ROA) was on average positive, although small (0.01). The average probability of China's listed firms reporting a negative before-tax profit was about 12% over 1998–2002. The average sizes of the boards of directors and supervisors were 9.7 and 4.3, respectively, whereas the average number of directors, supervisors, and other top-level executives considered in calculating Total Executive Pay was 11.2, suggesting that there was a nonnegligible number of directors and supervisors who were not paid by the firm.[28]

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 about 60% of its company stock owned by the state.[29]

In addition to cash compensation, two other prevalent components of executive compensation in China are restricted stocks and perquisites. As in

[26] See Jones and Kato (1996, 1998) for Bulgaria, and Jones and Mygind (2004) for Estonia.

[27] See, e.g., Kaplan (1994, table 4) and Murphy (1999, fig. 1) for the comparable U.S. figures.

[28] These are directors and supervisors working for the firm's largest shareholder firms (mostly SOEs) and thus paid by the "parent" firms. Since they are affiliated with related companies, they are not "independent directors."

[29] To abstract from issues related to market segmentation, we excluded from our study approximately 3% of Chinese corporate shares that are denominated in foreign currencies and available only to foreign investors, commonly referred to as B-shares.

most countries outside the United States, the lack of data on these other types of executive compensation prohibits us from analyzing total executive compensation in China. For reasons to be discussed below, however, we expect the above results to be robust even when these other compensation components are considered.

In contrast to its prominent role in executive compensation in the United States, stock options have yet to become a meaningful compensation alternative in China. No listed firms in China had adopted stock options as part of their executive compensation packages as of the end of 2002, the last year covered in our sample. And it was not until early 2003 that the CSRC chose two pilot firms to test run a stock option plan.[30] Our discussion below, therefore, will focus on the implications of excluding equity ownership and perquisites from the analysis. We will first provide some estimates for their relative sizes compared with cash compensation and show that cash compensation is typically the largest component of total compensation for Chinese executives. Then we will explain why our main results will remain robust even if these components could be measured and included.

Data on equity ownership of executives that can be merged consistently with our top executive cash compensation data are presently unavailable. Nevertheless, for the period of 1999–2002 and a large proportion of the listed firms, the Sinofin data set allows us to estimate the value of company shares owned by the entire board of directors at about 70% of their total annual cash compensation, which is a considerably lower figure than what Kaplan (1994) estimates for Japan (117%).[31] The relatively modest size of equity ownership in Chinese executives' total compensation can be further illustrated as follows. The typical contract for top executives in China is a 3-year contract, and thus a top executive contract can be considered worth 3 years of annual cash compensation plus the market value of his or her equity ownership. In other words, a director's stock holdings typically amount to 23.3% of his total wealth generated by being appointed to the top executive position.

According to popular belief in China, the importance of corporate perquisites is another distinctive feature of executive compensation in China. Although anecdotes abound that suggest that perquisites are an important component of total compensation for Chinese executives, there is no empirical evidence on the relative size of these perquisites. We, therefore, attempt to provide a preliminary estimate of the importance of such perquisites using available

[30] *International Finance News* [*Guoji jinrong bao*], April 28, 2003.

[31] The use of stock options was also limited in Japan until recently. Considering all stock-based compensation forms including stock options, executive compensation in both China and Japan is far more cash-based than in the United States.

information. The most common types of corporate perquisites in China include vehicle usage and housing subsidy.[32]

Since vehicle usage is the most cited perk for corporate executives as well as for government officials in China, we start with estimating its size. The annual lease of a Santana, the typical choice of Chinese top executives, costs about RMB 36,000. Assuming the executive employs the corporate vehicle for personal use one-third of the time, most likely an overestimate, this adds RMB 12,000 to the executive's cash compensation.[33] Since the average cash compensation for Chinese executives studied in this article is about RMB 100,000, vehicle usage amounts to 12% of cash compensation for Chinese executives.

For the housing subsidy, Liu (2004) refers to RMB 3,000 per month as an upper-bound estimate, adding RMB 36,000 to a top Chinese executive's cash compensation. A much lower amount of housing subsidy, however, seems to be the norm. Three firms we interviewed in the summer of 2004 in Sichuan Province give 5%–6% of annual salary as the amount of housing subsidy. Using RMB 100,000 as the average annual salary, these numbers translate to much lower amounts of housing subsidy, RMB 5,000–6,000. Thus, the amount of housing subsidy ranges from 5% to 36% of Chinese executives' cash compensation. These numbers give a range of the size of executive perks in China, with the lower bound at RMB 17,000, or 15% of the total annual compensation for Chinese executives (cash compensation plus perquisites) and the upper bound at 48,000, or 32% of total annual compensation.[34] Although perquisites are hardly negligible, cash compensation remains the most important component of total compensation for Chinese top executives.

In short, in China's listed firms cash compensation (salary and bonus) appears to remain the most dominant form of executive compensation, and any study of executive compensation in China's listed firms ought to consider at least cash compensation. Furthermore, we expect that the inclusion of noncash forms

[32] Other types of executive perquisites in China include travel expenses, business gifts, and business attire expenses. These perks tend to have much lower value, according to our interviews with Chinese executives in the summer of 2004.

[33] It is estimated that one-third of government vehicle use is devoted to the top government official executive's personal use, with the rest devoted to official business and the driver in equal proportions. See "Public Finance Reform Is the Key to Government Vehicle Usage Reform," *China Youth Daily* [*Zhongguo qingnian bao*], June 17, 2005.

[34] According to Tower-Perrin's Worldwide Total Remuneration Survey, in 2001–2, perquisites accounted for 11% of the sum of cash compensation and perquisites for the United States, 9% for Japan and the United Kingdom, and 8% for South Korea. Unfortunately, the Tower-Perrrin data are not comparable to our Chinese data, and caution should be used when comparing our preliminary estimate of the value of perquisites in China's listed firms to this international evidence.

of compensation will not change our main results, at least qualitatively. In fact, inclusion of equity ownership is likely to strengthen our main conclusions. First of all, overall we find a statistically significant pay-performance link for top management in China's listed firms when considering only cash compensation. Because the value of company stock is directly related to stock market performance of the firm, including equity ownership of executives will make the executive pay-performance link even more significant. In other words, the pay-performance sensitivity and elasticity that we report can be regarded as lower bounds on the sensitivity and elasticity of total executive compensation in China's listed firms.

Second, we find the executive pay-performance link to be weaker for listed firms with greater state ownership and control than other listed firms. This negative relationship between state ownership and pay-performance link is likely to become more pronounced if we include equity ownership of executives, since equity ownership of executives tends to be more restricted in listed firms with greater state ownership and control.[35] Put differently, sensitivity and elasticity of total compensation to stock market performance in firms with greater state ownership and control are likely to be smaller than those in other firms for two reasons. First, sensitivity and elasticity of cash compensation to stock performance are smaller in firms with greater state ownership. Second, compensation in equity ownership, which is naturally highly sensitive to stock performance, is less common in firms with greater state ownership.

The effects of omitting perquisites from executive compensation are a little more complicated, but we expect our main results to be robust even when perquisites are considered. While no information is available on the allocation of perquisites to executives in China's listed firms, we do know that these perks are usually linked to job titles and position ranks in the company. Because the relationship between perquisites and job titles (or position ranks) does not change much over the years, these perks do not vary much from year to year.[36] Therefore, excluding perks will not bias our estimates on pay-performance

[35] The Chinese government has refused to allow state shares to be used in equity holding plans, and as a result listed firms with a higher percentage of state shares find it more difficult to issue company stock as part of executive compensation packages (see *Shanghai Securities News* [*Shanghai zhengquan bao*], July 30, 2003).

[36] Results reported in Rajan and Wulf (2004) suggest that this is also the case in the United States.

sensitivity in the first-differenced models we use (see the next section for more details on our econometric specifications).[37]

For pay-performance elasticity, however, the exclusion of perquisites from the compensation measure may lead to an overestimation when perks do not change with firm performance, although adding perks will not eliminate the significant positive pay-performance elasticity estimated in this article.[38] In addition, the relative size of perquisites in executives' total compensation suggests that such an overestimation is of modest magnitude. Given that perks amount to 17%–48% of executive cash compensation, the growth rate of cash compensation plus perks may be overestimated by 13.4%–30.5%. In other words, the pay-performance elasticity will be overestimated by about 30% at the most.[39]

As for our second main result of the effect of state ownership, the overestimation of elasticity may be more severe for state-controlled listed firms, because they bear more resemblance to government agencies in China, and hence their executives enjoy more perks than those at privately controlled firms. This suggests that the state-private difference in pay-performance elasticity may be larger than estimated in this article, because perks that are insensitive to firm performance tend to constitute a larger proportion of executive compensation in state-controlled listed firms than in privately controlled ones.[40] In other words, considering perquisites is more likely to strengthen our key finding that the pay-performance link is weaker for state-controlled listed firms.

[37] For instance, see Liu and Otsuka (2004), which provides helpful institutional information on compensation packages provided for steel industry top executives in four provinces in China. Our fieldwork in four Chinese cities during the summer of 2004 also confirms this point.

[38] Let y_t be the executive compensation in period t, y_{t-1} be the executive compensation in period $t-1$, and k be the value of perks that does not vary in time. Because $(y_t + k)/(y_{t-1} + k)$ is a decreasing function in k as long as $y_t > y_{t-1}$ and $k > 0$, omitting k will lead to the overestimation of the growth rate of executive compensation, $\log((y_t + k)/(y_{t-1} + k))$ and, consequently, the estimated pay-performance elasticity. We thank our referee for pointing out this issue.

[39] These numbers are calculated using $\log((y_t + k)/(y_{t-1} + k))$, with the mean values of top executive pay and its annual change as well as the range of values of executive perks estimated above.

[40] Even in cases where perks vary over time, the changes tend to fall in either of the following two categories. First, perquisites may increase over time for all firms, and second, perquisite increases may be positively correlated with firm performance. Omission of the first type of perquisite growth may lead to underestimation of the growth rate of executive compensation, while omission of the second type of perk increase may lead to underestimation of the pay-performance sensitivity and elasticity for Chinese top executives. Consequently, to the extent that increases in these two types of perquisites over time are important, our results presented below offer lower-bound estimates for the growth rate of executive compensation as well as the pay-performance sensitivity and elasticity in China.

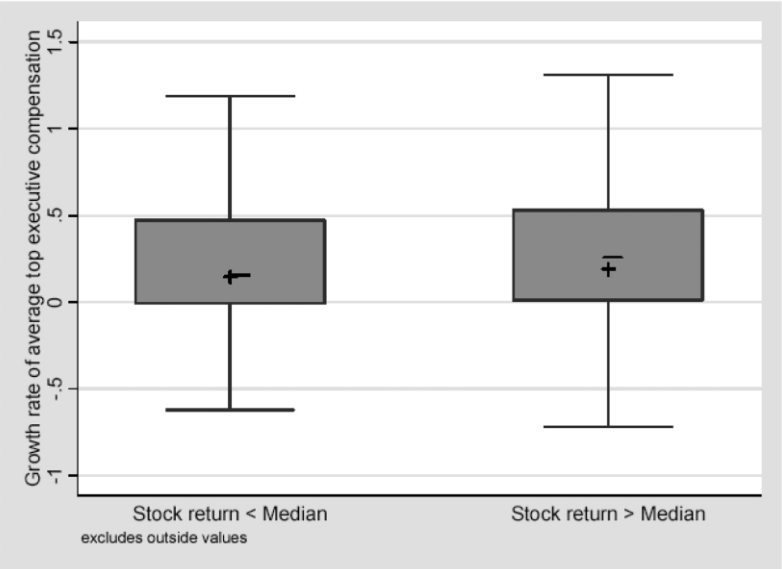

Figure 1. Box-Whisker plot of executive pay growth and stock return. The graphs from left to right correspond to firms with below median stock returns and firms with above median stock returns. The upper and lower ends of the whiskers indicate the upper adjacent value (UAV) and the lower adjacent value (LAV), the upper and lower boundaries of the box indicate the upper quartile and the lower quartile, "+" indicates the median, and "−" indicates the mean value of the growth rate of average top executive compensation.

IV. Results

As a prelude to the full econometric analysis, we first present some Box-Whisker plots to explore how executive compensation relates to firm performance, using the growth rate of Average Rate of Pay of Top Three Executives as the compensation measure. In the plots shown in figures 1–4, the upper and lower ends of the whiskers indicate the upper adjacent value (UAV) and the lower adjacent value (LAV), the upper and lower boundaries of the box indicate the upper quartile and the lower quartile, and "+" indicates the median.[41] In addition, we also indicate the mean value by "−". The Box-Whisker plots using four alternative firm performance measures: stock return, sales growth, ROA growth, and the presence of negative profits are presented in figures 1–4, respectively. To see how the distribution of the growth rate

[41] We follow these steps in order to produce a box plot: (i) calculate the median, m; (ii) calculate the first and third quartile, Q1 and Q3; (iii) compute the interquartile range, $IQR = Q3 - Q1$; (iv) find the lower fence, $LF = Q1 - 1.5 \times IQR$; (v) find the upper fence, $UF = Q3 + 1.5 \times IQR$; (vi) find the lower adjacent value (LAV), the smallest value in the data that is greater than or equal to the lower fence; (vii) find the upper adjacent value (UAV), the largest value in the data that is smaller than or equal to the upper fence; (viii) any values outside the LAV or UAV are considered outliers, which are not shown in our plots.

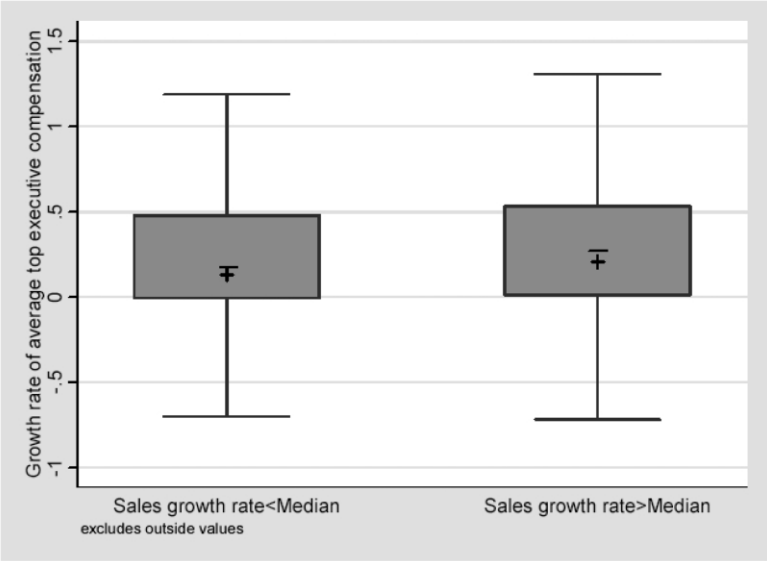

Figure 2. Box-Whisker plot of executive pay growth and sales growth. The graphs from left to right correspond to firms with below median sales growth rate and firms with above median sales growth rate. The upper and lower ends of the whiskers indicate the UAV and the LAV, the upper and lower boundaries of the box indicate the upper quartile and the lower quartile, "+" indicates the median, and "−" indicates the mean value of the growth rate of average top executive compensation.

of Average Rate of Pay of Top Three Executives differs depending on firm performance, we produce such Box-Whisker plots for firms with below median performance and those with above median performance in figures 1–3. In figure 4, we contrast firms with negative pretax income with those with positive pretax income.

Overall, the Box-Whisker plots appear to suggest that better-performing firms have higher upper quartile values, median values, and mean values for growth rate of their executive compensation. A standard two-sample test of means establishes that the differences in the mean values between the two groups of firms are statistically significant at least at the 10% level.

To investigate with more precision the suggestive finding from the Box-Whisker plots, we undertake a number of econometric exercises. Specifically, we begin with estimating two standard measures of pay-performance relations for executives: the sensitivity and elasticity of pay with respect to shareholder value (see, e.g., Murphy 1999). That is,

$$\Delta Y_{it} = a + b\Delta V_{it} + u_{it}, \tag{1}$$

$$\Delta \ln Y_{it} = \alpha + \beta \ln (1 + R_{it}) + u_{it}, \tag{2}$$

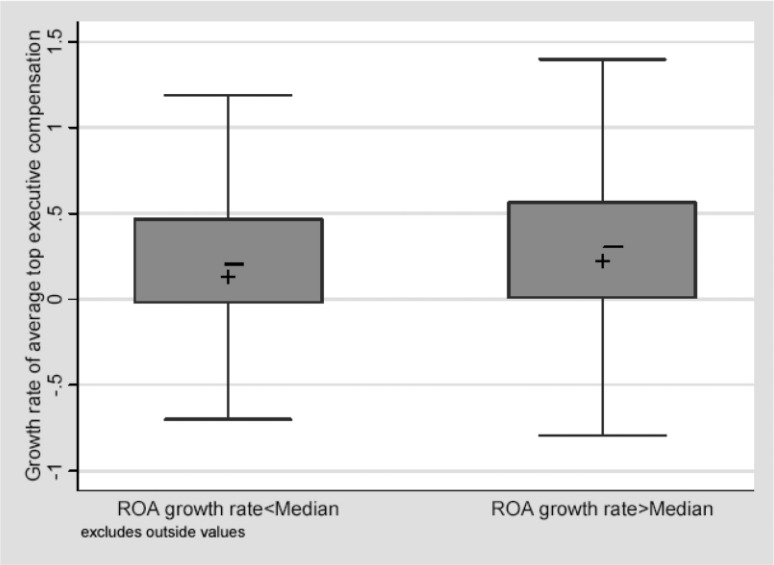

Figure 3. Box-Whisker plot of executive pay growth and ROA growth. The graphs from left to right correspond to firms with below median ROA growth rate and firms with above median ROA growth rate. The upper and lower ends of the whiskers indicate the UAV and the LAV, the upper and lower boundaries of the box indicate the upper quartile and the lower quartile, "+" indicates the median, and "−" indicates the mean value of the growth rate of average top executive compensation.

where Y_{it} is executive compensation of firm i in year t; V_{it} is shareholder value of firm i in year t; and R_{it} is stock return of firm i in year t. We control for time-specific shocks that are common to all firms by including year effects in our regressions. For the disturbance term, u_{it}, we assume $u_{it} \sim \text{NID}(0, \sigma^2)$.

To test the robustness of the pay-performance relationship, we also estimate the semi-elasticity of pay with respect to other performance measures, including stock rate of return, sales growth, change in pretax income, and the negativity of pretax income, by regressing the change in the log of executive compensation on R_{it}, S_{it} (sales growth of firm i in year t), ΔP_{it} (the change pretax income), and N, a dummy variable indicating that the firm's pretax income is negative. We will then augment these standard executive compensation equations by a variable indicating the degree to which the firm is owned and controlled by the state and an interaction term involving such a state ownership variable and firm performance. Various robustness tests of the estimates will be further conducted.

We begin with presenting the OLS estimates of our baseline sensitivity and elasticity equations, equations (1) and (2). Note that both pay and performance variables are first-differenced, so all firm fixed effects that may affect the level of pay are controlled for. We used first-differences to facilitate comparison

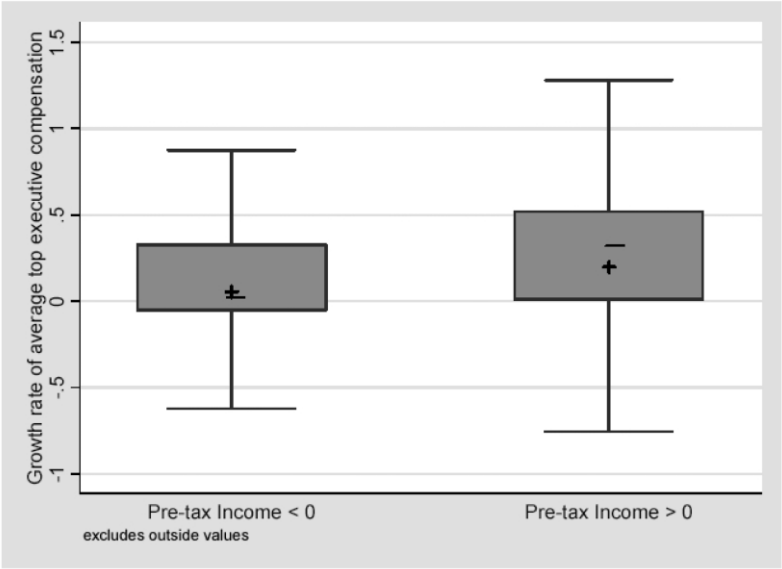

Figure 4. Box-Whisker plot of executive pay growth and negative profit. The graphs from left to right correspond to firms with negative pretax income and firms with positive pretax income. The upper and lower ends of the whiskers indicate the UAV (upper adjacent value) and the LAV (lower adjacent value), the upper and lower boundaries of the box indicate the upper quartile and the lower quartile, "+" indicates the median, and "−" indicates the mean value of the growth rate of average top executive compensation.

with prior studies that tend to use first differences rather than estimating fixed effects directly. This implies that only firms for which data are available for at least 2 consecutive years can be used. Among the 918 firms for which we have data for at least 1 year over the period of 1998–2002, 827 firms provided data for at least 2 consecutive years. A standard two-sample test of means establishes that the new sample of 827 firms does not differ significantly from the original sample of 918 firms with regard to all the compensation and key firm characteristic variables listed in table 1. The bulk of observations in our pooled cross-sectional time series data used for the first-differenced regressions are for 2001–2, since most of the 827 firms do not provide detailed compensation data prior to 2001. Table 2 presents summary statistics of variables used in the regressions.

Over the sample period the average annual pay raise was 14,000 1995-constant RMB per individual. Likewise, executive compensation rose by 25% per year in real terms over the sample period. The table also shows an average fall of 226,000 1995-constant RMB in shareholder value (V) each year and an average fall of 2.6 percentage-points in ROA each year over the sample period. To be consistent, the average annual stock return over the sample

TABLE 2
SUMMARY STATISTICS OF VARIABLES USED IN THE REGRESSIONS

Variable	Mean	SD	Observations
Executive compensation:			
$\Delta Y = \Delta$(Average Rate of Pay of Top Three Executives)	14,292.720	215,754.600	943
$\Delta \ln Y$	.248	.549	941
Stock performance:			
$\Delta V = \Delta$(Value)	−2.260E+05	6.130E+05	1,033
R	−.118	.274	1,033
$\ln(1 + R)$	−.161	.251	1,033
Alternative firm performance measures:			
S = rate of growth of sales from $t-1$ to t	.183	.426	1,017
ΔP = change in ROA from year $t-1$ to year t	−.026	.432	1,033
N = NEGPROF	.135	.341	1,033
Ownership structure:			
G = GVTSHARE	59.408	12.615	1,030
Other firm characteristics:			
A = assets	2, 220	11,100	1,030
I1 = 1 if the firm is in the primary sector (agriculture and mining)	.042		1,030
I2 = 1 if the firm is in the manufacturing sector	.622		1,030
I3 = 1 if the firm is in the public utility sector (public transportation and communications)	.123		1,030
I4 = 1 if the firm is in the commercial sector (retail and wholesale trade and real estate)	.146		1,030
I5 = 1 if the firm is in all other sectors	.067		1,030

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 data set on 827 listed firms. All compensation measures, Value, and Sales are adjusted for inflation using CPI (1995 = 100). Value and Sales are in thousands of 1995 RMB, while all compensation measures are in 1995 RMB.

period was −11.8%. However, sales grew over the sample period by a robust 18.3% per year in real terms. Finally, the sectoral composition of the final sample of firms to be used for our econometric analysis is as follows: (i) 62% of them are in the manufacturing sector, (ii) 15% in the commercial sector, (iii) 12% in the public utility sector, (iv) 4% in the primary sector, and (v) the rest in other sectors.

Columns i and ii of table 3 present the OLS estimates of equations (1) and (2).[42] The estimated sensitivity and elasticity of pay with respect to shareholder

[42] Previous U.S. studies such as Jensen and Murphy (1990) and Murphy (1999) report very low R^2 statistics (typically well below 0.1). This is in large part due to the fact that the literature typically uses first differences instead of estimating fixed effects directly.

TABLE 3
EXECUTIVE PAY-PERFORMANCE SENSITIVITIES AND ELASTICITIES IN CHINA'S LISTED FIRMS

	Dependent Variable			
Independent Variable	ΔY (i)	$\Delta \ln Y$ (ii)	ΔY (iii)	$\Delta \ln Y$ (iv)
ΔV	.045		.054	
	(3.79)**		(4.18)**	
$\ln(1 + R)$		.174		.363
		(2.28)*		(3.67)**
Year dummy variables	No	No	Yes	Yes
Observations	940	938	940	938
R^2	.015	.006	.019	.020

Sources. For sources and variable definitions, see tables 1 and 2.
Note. The data are based on a pooled cross-sectional time series data set on 827 listed firms. Each column represents a different specification (see text for detailed descriptions of each specification). All models include a constant term. All compensation measures are in 1995 RMB. There are four year dummy variables: T1999 = 1 if the observation is for year 1999; T2000, T2001, and T2002 are defined likewise; and T1999 is omitted as a reference year. Absolute values of *t*-statistics are in parentheses.
* Significant at 5%.
** Significant at 1%.

value are positive and statistically significant at the 1% level and at the 5% level, respectively. The size of the estimated sensitivity suggests that an RMB 1,000 increase in shareholder value yields an RMB 0.045 increase per executive in annual cash compensation for the highest-paid three executives.

Our estimate of top management pay sensitivity to shareholder value appears to be greater than what Jensen and Murphy (1990) and Murphy (1999) found for the United States. For example, Murphy (1999) reports that a $1,000 increase in shareholder value leads to a $0.014 increase in the annual cash compensation for CEOs of S&P 500 Industrials in the United States in the first half of the 1990s. We believe that the sensitivity of pay with respect to shareholder value is higher in China than in the United States, in part due to the inverse relationship between pay-performance sensitivities and firm size (see Gibbons and Murphy 1992; and Murphy 1999). Smaller firms tend to have larger sensitivities, and Chinese listed firms are generally substantially smaller than U.S. listed firms.[43]

However, more importantly, the different compositions of executive compensation between China and the United States may account for the higher pay-performance sensitivities observed for Chinese listed firms. While they are

[43] To this end, comparing our sensitivity estimates to what Kato and Kubo (2006) report for Japanese CEOs may be useful, since Japanese listed firms are substantially smaller than U.S. listed firms (Kato and Rockel 1992). Reassuringly, our Chinese sensitivity estimates are closer to the Japanese estimates of 0.034.

rarely available for executives in listed firms in China, stock option plans are widely used for top executives in U.S. corporations. When stock options were taken into account in executive compensation, for instance, Jensen and Murphy (1990) estimated that a $1,000 increase in shareholder value led to a $0.307 increase in total CEO compensation for 73 U.S. manufacturing firms between 1969 and 1983, implying that much higher pay-performance sensitivities exist in U.S. firms than in Chinese firms. Murphy (1999) further reports that since then, total sensitivities have risen rapidly, and that the sharp increase in total sensitivities in the 1990s was mostly due to the rising use of stock options.[44]

The literature tends to argue that pay-performance sensitivities (obtained by regressing the change in executive compensation on the change in shareholder value of the firm) are decreasing in firm size, while pay-performance elasticities (obtained by regressing the change in the log of executive compensation on the change in the log of shareholder value of the firm) are relatively invariant to firm size (see Murphy 1999, for instance). As such, pay-performance elasticities can be said to be more robust to firm size than pay-performance sensitivities (Zhou 2000) and, hence, perhaps more useful for comparisons of pay-performance relations for executives between different countries with differing average sizes of their firms.

As column ii of table 3 shows, the size of our estimated elasticity suggests that a 10% increase in shareholder value results in 1.7% increase in annual cash compensation for the highest-paid three executives. Our elasticity estimates are greater than what Kato and Kubo (2006) report for CEOs of listed firms in Japan in 1986–95 and what Murphy (1999) reports for CEOs of S&P 500 Industrials in the United States in the 1970s (yet not as high as what he reports for later years or the 1980s and 1990s).[45]

Columns iii and iv of table 3 present a robustness test concerning year effects such as time trend, technological change, and other macroeconomic shocks that are common to all firms. Reassuringly, controlling for such year effects makes our estimates regarding the pay-performance link even more significant. Specifically, the estimated sensitivity and elasticity are both positive and statistically significant at the 1% level.[46]

[44] Thus, much of the recent literature on U.S. executive compensation tends to focus on the issue of stock options. See, e.g., Bebchuk and Fried (2003) and Hall and Murphy (2003) for succinct discussions of the recent literature that tends to focus on stock options.

[45] Again, one ought not to conclude that Chinese executives are faced with a greater incentive to pursue the interests of shareholders than U.S. executives, since the bulk of incentives for U.S. executives are in the form of stock options rather than cash compensation.

[46] In the literature there appears to be no strong consensus on the use of year dummy variables. For example, Kaplan (1994) considers year dummy variables, whereas Murphy (1999) does not.

Some prior studies on executive compensation (especially in countries outside of the United States) consider alternative performance measures such as accounting measures and estimate "semi-elasticities" of pay with respect to such alternative performance measures.[47] Following prior studies on other Asian countries (Japan and Korea), we estimate such semi-elasticities of pay with respect to four alternative performance measures.[48] They are as follows: (i) R_{it} = stock return; (ii) S_{it} = rate of growth of sales of firm i from year $t-1$ to year t (in percent);[49] (iii) ΔP_{it} = change in ROA (pretax profit/assets ratio) of firm i from year $t-1$ to year t;[50] and (iv) $N_{it}=1$ if firm i's pretax profit is negative in year t, 0 otherwise.[51]

The OLS estimates of such semi-elasticities are reported in table 4. To be consistent with prior attempts to estimate such semi-elasticities (e.g., Kaplan 1994), we include year dummy variables. Consistent with our pay-performance sensitivity and elasticity estimates above, the estimated coefficients on R (or semi-elasticities of pay with respect to stock return) are positive and statistically significant and the magnitude of the estimated semi-elasticity is comparable to those found in Japan and Korea.[52] The estimated coefficient on S is also positive and statistically significant, with the size of the estimated semi-elasticity somewhat lower than what has been reported for Japan yet substantially higher than what has been reported for Korea. Turning to accounting profitability measures, it appears that Chinese executives are not penalized for a weak showing of ROA, nor are they rewarded for a strong showing of ROA, unlike their counterparts in the United States, Japan, and Korea, whose com-

[47] See Rosen (1990) for the origin of the term "semi-elasticity."

[48] See, e.g., Kaplan (1994), Kubo (2004), and Kato and Kubo (2006) for Japan; Kato et al. (2006) for Korea.

[49] We also try employment growth yet find no statistically significant link of employment growth to executive pay growth.

[50] Sun and Tong (2003) argue that ROA is not an appropriate accounting performance measure due to a peculiar regulatory rule in China's stock market. Because listed firms in China are allowed to have rights issued up to 30% of their outstanding stocks annually, many companies take advantage of such a rule to increase equity capital even in the absence of investment opportunities. ROA, which decreases mechanically with any rights issue, does not reflect accurately the profitability of the firm. Instead, Sun and Tong (2003) suggest the use of ROS, or return on sales. We also use ROS instead of ROA in the regressions and obtain results very similar to those presented below. In addition, we try ROE (return on equity) and find equally similar results.

[51] Kaplan (1994) also considered lagged performance variables. We too considered such lagged performance variables and found that our estimates without such lagged performance variables are robust. As such, our results do not appear to depend on the timing between an observed value for firm performance and the determination of executive compensation.

[52] See Kaplan (1994) and Kato et al. (2006) for comparable estimates on the semi-elasticity of executive pay with respect to alternative firm performance measures in Japan and Korea.

TABLE 4
SEMI-ELASTICITIES OF EXECUTIVE PAY WITH RESPECT TO ALTERNATIVE PERFORMANCE MEASURES IN CHINA'S LISTED FIRMS

Independent Variable	Dependent Variable = $\Delta \ln Y$				
	(i)	(ii)	(iii)	(iv)	(v)
R	.343				.290
	(3.40)**				(2.79)**
S		.179			.137
		(4.07)**			(2.98)**
ΔP			.057		.016
			(1.44)		(.40)
N				−.176	−.103
				(3.32)**	(1.83)+
Observations	938	927	938	938	927
R^2	.018	.024	.009	.018	.037

Source. See tables 1 and 2 for definition of variables.
Note. The data are based on a pooled cross-sectional time series data set on 827 listed firms. Each column represents a different specification (see text for detailed descriptions of each specification). All models include constant term and year dummy variables (there are four year dummy variables: T1999 = 1 if the observation is for year 1999; T2000, T2001, and T2002 are defined likewise; and T1999 is omitted as a reference year). All compensation measures are in 1995 RMB. Absolute values of t-statistics are in parentheses.
+ Significant at 10%.
** Significant at 1%.

pensation is generally found to be significantly related to an accounting measure of profitability. However, like their counterparts in Japan and the United States, they do seem to be penalized when the firm makes a negative pretax profit. Finally, the results do not change even when various alternative performance measures are considered simultaneously, pointing to the robustness of the results.

We now turn to the effects of ownership structure on how executive compensation is determined.[53] Specifically, to discern the impact on managerial contracts and incentives of ownership structure, we will first augment the standard pay-performance sensitivity and elasticity equations, equations (1) and (2), with G (percentage of stock owned by the state) and an interaction term involving G and firm performance.

Columns i and ii of table 5 present the OLS estimates of such augmented

[53] There is a growing literature on the link between ownership structure and executive compensation in advanced industrialized nations. See, e.g., Core, Holthausen, and Larcker (1999), Ke, Petroni, and Safieddine (1999), Bertrand and Mullainathan (2001), Harvey and Shrieves (2001), Cyert, Kang, and Kumar (2002), and Hartzell and Starks (2003) for the United States; Conyon (1997), Cosh and Hugh (1997), and Cragg and Dyck (2003) for the United Kingdom; Kato (1997) for Japan; Elston and Goldberg (2003) for Germany; Brunello, Graziano, and Parigi (2001) for Italy; and Randoy and Nielsen (2002) for Norway and Sweden. For transition economies, see, e.g., Jones and Kato (1996, 1998) for Bulgaria; Jones and Mygind (2004) for Estonia; and Eriksson (2004) for Czech and Slovak Republics.

pay-performance sensitivity and elasticity equations.[54] First, the estimated coefficient on the interaction terms in the sensitivity equation is negative and statistically significant at the 1% level, suggesting that pay-performance sensitivities become stronger as the percentage of stock owned by the state falls. The magnitude of the impact of weakening state control is rather substantial. For example, a 1-percentage point decrease in G will result in a 0.003 increase in the pay-performance sensitivity for the three highest-paid executives. This is hardly negligible, considering the estimated pay-performance sensitivities in this study as well as in earlier studies range from 0.014 (in the United States) to 0.034 (in Japan) to 0.054 (in China) (see Murphy 1999; and Kato and Kubo 2006). The negative impact on the pay-performance link of state ownership is robust to the alternative elasticity specification, and the estimated coefficient on the interaction term in the elasticity equation is also negative and statistically significant at the 5% level, as shown in column ii of table 5.

Columns iii and iv of table 5 provide an account of whether the significant relationship between state ownership and the pay-performance link obtained earlier changes when we add size and sector as well as interaction terms involving performance and additional covariates. Specifically, we use book value asset (A) to measure firm size[55] and five sector dummy variables (primary, manufacturing, public utility, commercial, and all other) to account for possible industry effects.[56] The summary statistics of these additional covariates are included in table 2. It is reassuring that these two columns confirm that the significant negative relationship between state ownership and pay-performance sensitivity/elasticity is insensitive to whether we consider size and sector (and interaction terms involving performance and these additional covariates).

We interpret the negative and significant coefficients on the interaction terms involving state ownership and firm performance as evidence of the negative impact on the executive pay-performance link (and hence the quality of corporate governance) of state ownership. However, an alternative interpretation reversing the causality is possible. In other words, in their attempt to attract more capital from private investors, including foreign investors, listed firms improve the quality of their corporate governance and signal such an improvement to private investors by making their executive pay-performance

[54] We report the results with year dummy variables, yet we found similar results without such year dummy variables.

[55] Following Schaefer (1998), we also considered market value of the firm in addition to A. We found no discernible difference. As a preliminary exercise, we calculated correlation coefficients between G and size (measured by asset and market value). Both asset and market value are found to be significantly correlated with G at the 10% level, suggesting a need to control for size.

[56] We drop the other sector category as a reference in the regressions.

TABLE 5

EXECUTIVE PAY-PERFORMANCE SENSITIVITIES AND ELASTICITIES, AND STATE OWNERSHIP IN CHINA'S LISTED FIRMS

	Dependent Variable				Dependent Variable Using Lagged *G*		Dependent Variable Considering Only Firms in Targeted Industries with Guaranteed Access to State Capital	
Independent Variable	ΔY (i)	$\Delta \ln Y$ (ii)	ΔY (iii)	$\Delta \ln Y$ (iv)	ΔY (v)	$\Delta \ln Y$ (vi)	ΔY (vii)	$\Delta \ln Y$ (viii)
ΔV	.253		.190		.183		.086	
	(4.56)**		(1.71)$^{+}$		(1.66)$^{+}$		(1.73)$^{+}$	
$\Delta V \times G$	−.003		−.003		−.003		−.002	
	(3.69)**		(2.91)**		(2.92)**		(1.77)$^{+}$	
$\ln(1+R)$		1.235		1.429		1.445		2.256
		(3.36)**		(2.77)**		(2.80)**		(2.51)**
$\ln(1+R) \times G$		−.015		−.016		−.016		−.044
		(2.46)*		(2.59)**		(2.64)**		(2.80)**
G	−698.870	−.003	−608.934	−.004	−483.950	−.004	−702.734	−.009
	(1.15)	(1.84)$^{+}$	(.99)	(2.15)*	(.81)	(2.18)*	(1.50)	(2.80)**

A			4.742E-04	4.450E-09	3.620E-04	4.440E-09	.002	7.450E-10
			(.21)	(1.23)	(.16)	(1.23)	(1.40)	(.07)
$\Delta V \times A$			2.990E-10		2.850E-10		2.930E-10	
			(.98)		(.94)		(1.72)$^{+}$	
$\ln(1 + R) \times A$				5.060E-08		5.060E-08		6.860E-09
				(1.48)		(1.48)		(.06)
Sector effect	No	No	Yes	Yes	Yes	Yes	Yes	Yes
Observations	940	938	940	938	940	938	129	129
R^2	.033	.027	.104	.042	.104	.042	.092	.105

Source. See table 1 for variable definitions.

Note. The data are based on a pooled cross-sectional time series dataset of 827 listed firms. Each column represents a different specification (see text for detailed descriptions of each specification). All models include constant term and year dummy variables (there are four year dummy variables: T1999 = 1 if the observation is for year 1999; T2000, T2001, and T2002 are defined likewise; and T1999 is omitted as a reference year). Value is in thousands of 1995 RMB, while all compensation measures are in 1995 RMB. Absolute values of *t*-statistics are in parentheses. The sector effects are captured by adding four sector dummy variables (primary, manufacturing, public utility, and commercial; other sector category excluded as a reference) and four interaction terms involving each sector dummy variable and firm performance. For specifications vii and viii, the primary sector dummy variable is omitted since no primary sector firm is in targeted industries.

$^{+}$ Significant at 10%.

* Significant at 5%.

** Significant at 1%.

link stronger. As a result, those firms with a stronger pay-performance link will end up attracting more private capital, making the percentage of stock owned by the state lower.

For several reasons, we think this reverse causality signaling interpretation is less relevant to listed firms in China. First, ownership structure appears to be less endogenous in the Chinese context because in general the introduction of different ownership structures is often policy-induced and motivated by political considerations rather than by economic logic. For instance, Han (1997) discusses how the quota system plagued with political idiosyncrasies determines which companies get listed on the stock market and how many shares can be issued. In addition, reassuringly Sun and Tong (2003) report econometric evidence that the percentage of company shares of Chinese listed firms owned by the state is not significantly affected by their prior firm performance. Furthermore, more recently, Wei, Xie, and Zhang (2005) and Guo and Yao (2005) provide evidence largely consistent with the studies of Han (1997) and Sun and Tong (2003).

Moreover, to confirm that the reverse causality signaling interpretation may be less relevant to the Chinese listed firms studied here, we consider two additional specifications. First, we reestimate our augmented sensitivity and elasticity equations, using a lagged state ownership variable, G_{it-1}, with the results summarized in columns v and vi of table 5. Reassuringly, even after controlling for size and sector effects, the percentage of stock owned by the state in the previous year is significantly related to the current pay-performance link, which is more consistent with the causality from ownership structure to pay-performance link than the reverse causality from pay-performance link to ownership structure.

Second, we limit our sample to include those listed firms in government-targeted industries where they have guaranteed access to capital through the state and hence have little need to signal the high quality of corporate governance (and strong pay-performance link) to private investors in order to attract private capital.[57] For these firms, the alternative signaling interpretation is less relevant. As the last two columns of table 5 show, in spite of a substantially reduced sample size ($n = 129$), we still obtain a statistically significant and negative coefficient on the interaction term involving firm performance and G in both the sensitivity and elasticity specifications even after accounting for the size and sector effects.

[57] Following the "Decision of the 4th Plenum of the CCP's Fifteenth Congress," as cited in Xiao (2003), we consider raw materials and energy, public utilities, banking and finance, pharmaceutical, and agriculture as the "government-targeted industries" where access to capital is guaranteed by the state.

Overall, we have obtained systematic evidence that the relationship between firm performance and executive compensation is weaker for firms with a higher percentage of government ownership. In addition, as mentioned before, given that firms with a lower percentage of government shares tend to offer more company shares to their top executives, these results are expected to be robust even if equity holdings are taken into consideration when computing executive total compensation.

V. Conclusions and Policy Implications

Given that the goal of China's SOE reform is to transform SOEs into modern corporations that can compete successfully in the global market, measuring the quality of corporate governance for Chinese firms will help evaluate the effectiveness of the reform. Because executive compensation is a major component of the firm's incentive structure and at the core of the firm's corporate governance, our study on executive compensation helps evaluate the quality of corporate governance and in turn the success of SOE reform in China. Furthermore, both economic theory and empirical evidence show that an efficient compensation system involves close links between firm performance and executive compensation; therefore we attempt to determine the existence and magnitude of such links in China's listed firms in this study.

We have found consistently for firms listed in China's emerging stock market statistically significant sensitivities and elasticities of cash compensation for the highest-paid executives with respect to shareholder value. The size of the estimated sensitivities and elasticities is comparable to or greater than what has been found for other countries (particularly the United States, Japan, and Korea). Among other firm performance measures, we have found evidence that sales growth is linked to executive compensation in China's listed firms and that Chinese executives are penalized for making negative profits although they are neither penalized nor rewarded for changes in profit insofar as it is positive.

The significant pay-performance link for top management in China's listed firms is overall encouraging news for current policy makers in China, who consider public listing in the stock market as a key mechanism of achieving such a goal for large SOEs. However, not all news is good. Perhaps most important, we have found that the pay-performance link for top managers is weaker in listed firms with a higher percentage of government ownership. This suggests that government ownership is possibly making China's listed firms less effective in solving the agency problem.

These findings have important implications for China's enterprise reform. Listed firms in China seem to be aligning the interests between top managers

and shareholders to a certain degree, and such an interest alignment is stronger when accompanied by a reduction in government ownership of listed firms and thus a better defined bundle of property rights. Therefore, ownership restructuring may be needed for China to successfully transform its SOEs into efficient modernized corporations and reform its overall economy.

Two concerns, however, call for caution in evaluating these policy implications. First, the weaker pay-performance links observed in government-controlled listed firms may be due to the social responsibilities these firms are required to shoulder. These social welfare functions need to be addressed when conducting any ownership structure adjustment. Second, there might be concerns that China's emerging stock market has yet to develop an efficient pricing mechanism and thus the focus on the link between executive compensation and shareholder value is somewhat misplaced. Although numerous studies have testified directly or indirectly to the efficiency of the stock market in China (Chen, Kwok, and Rui 2001; Bai et al. 2004; Lima and Tabak 2004), we recognize that it is a continuing debate and our results need to be interpreted with caution.[58]

Finally, an alternative way to align the interests between top executives and shareholders is to tie their employment to firm performance. A full understanding of the incentive structure of top executives in China's listed firms will thus require an examination of the link between executive turnover and firm performance and how such a link is affected by ownership structure. To do so will require the collection of new data on top executive turnover in China's listed firms that can be matched with our CSMAR and Sinofin databases, a project we plan to do in the near future.

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[58] See Ma (2004), e.g., for evidence that China's stock market is not efficient.

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