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Article

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China Journal of Accounting Research

Provided in Cooperation with:

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Suggested Citation: Wan, Hualin; Zhu, Kai; Chen, Xinyuan (2015) : Career concerns, shareholder monitoring and investment efficiency: From the perspective of compensation contract rigidity in Chinese SOEs, China Journal of Accounting Research, ISSN 1755-3091, Elsevier, Amsterdam, Vol. 8, Iss. 1, pp. 59-73,
<https://doi.org/10.1016/j.cjar.2015.01.003>

This Version is available at:

<https://hdl.handle.net/10419/187634>

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China Journal of Accounting Research

journal homepage: www.elsevier.com/locate/cjar

Career concerns, shareholder monitoring and investment efficiency: From the perspective of compensation contract rigidity in Chinese SOEs



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ARTICLE INFO

Article history:

Received 1 February 2013

Accepted 7 January 2015

Available online 7 February 2015

JEL classification:

M12

M52

O16

Keywords:

Career concerns

Shareholder monitoring

Investment efficiency

Compensation contract rigidity

SOEs

ABSTRACT

This paper presents theoretical analysis of how career concerns and shareholder monitoring affect chief executive officer (CEO) agency costs. We investigate investment efficiency prior to CEO retirement based on a sample of Chinese state-owned enterprises (SOEs) during the 1999–2007 period and find that there is a significant decline in investment efficiency prior to CEO retirement, relative to other periods, and that this decline becomes less significant under stronger shareholder supervision. Our research furthers understanding of the significance of SOE incentive and monitoring mechanisms.

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1. Introduction

The debate surrounding China's retirement system has heated up in recent years, particularly regarding the issue of whether the country should introduce a flexible retirement system. Some scholars believe that it would

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<http://dx.doi.org/10.1016/j.cjar.2015.01.003>

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be reasonable to raise the retirement age and implement a flexible retirement system to compensate for the rising average life expectancy in China (Li, 2012).¹ In addition to this macroeconomic viewpoint, it is important to investigate the issues involved from a microeconomic perspective, considering, for example, whether a more flexible retirement system could alleviate CEOs' lack of career concern incentives resulting from the mandatory retirement age, reduce agency costs and maintain or improve the performance of Chinese state-owned enterprises (SOEs). These issues are in urgent need of theoretical and empirical evidence.

In theory, career concern incentives have dual effects. On the one hand, early in CEOs' careers, such incentives help to mitigate agency costs between CEOs and shareholders (Fama, 1980; Holmström, 1999). On the other hand, when CEOs are approaching retirement, a lack of career concern incentives can lead to a horizon problem for CEOs and increase agency costs, which can be characterized as a decline in investment efficiency, increased private benefits of control gained through insider trading, excessive remuneration and increased perquisite consumption. Because investment is an important source of corporate value, a decrease in investment efficiency equates to a loss in value. Thus, a change in investment efficiency offers a useful perspective for examining agency costs immediately before CEOs retire.

Many studies have discussed the rigidity of the compensation contracts awarded to CEOs of Chinese SOEs and the consequences thereof (Chen et al., 2005; Xin et al., 2007; Wan and Chen, 2012). Here, we analyze how the lack of career concern incentives influences investment efficiency under the mandatory retirement of SOE CEOs from the perspective of compensation contract rigidity.² We also investigate whether shareholder supervision can serve as a substitute to reduce agency costs and increase investment efficiency.

Our theoretical analysis leads to the conclusion that investment efficiency often declines immediately before SOE CEOs retire, although that decline becomes insignificant in the presence of stronger shareholder supervision. Empirical analysis of investment efficiency as CEOs approach retirement in a sample of 256 publicly listed SOEs in the 1999–2007 period produces further support for this conclusion.

The remainder of the paper is organized as follows. We review the literature in Section 2, discuss the background to the study and propose hypotheses in Section 3, outline our research design in Section 4 and display our empirical results and analysis in Section 5. Section 6 concludes the paper.

2. Literature review

2.1. Managerial labor market and career concerns

Managerial labor market mechanisms include the CEO appointment mechanism, compensation and incentive mechanism, and dismissal and exit mechanism. Prior research shows that although the managerial labor market for Chinese SOEs is still controlled to a certain extent (Liu, 2001; Chen, 2003), its efficiency has gradually improved, as indicated by the marketization of compensation, increased pay-performance sensitivity (Zhou, 2003; Zhou and Huang, 2006; Lv and Zhao, 2008; Wu and Wu, 2010; Chen and Li, 2011) and a more efficient appointment and dismissal mechanism (Zhu, 2002; Fang et al., 2007).

In addition, researchers have recently turned their attention to the prescriptive 60-year-old retirement age for SOE CEOs in China. Although it may seem reasonable, this mandatory retirement age can have adverse effects on the performance of SOEs. Thus, it needs to be discussed as a critical problem in the SOE reform process. Previous studies have investigated perquisite consumption immediately before the retirement of SOE CEOs (Wan and Chen, 2012) and find that the imminent retirement of its CEO is associated with lower SOE performance (Zhang, 2010). However, further research is needed to determine how career concern incentives affect the financial decisions of SOEs, particularly with regard to the crucial issue of investment efficiency.

¹ As reported in (Li, 2012), some scholars hold the opinion that as average life expectancy rises in China, raising the retirement age and introducing a flexible retirement system will provide an ideal solution to the retirement age issue. While other scholars propose that China should implement a flexible retirement system, but note that the opinions of individuals and employers should be consulted rather than simply sorting by industries or groups.

² Career concern incentives include both external labor market incentives, such as the CEO's positions outside his/her current firm, and internal labor market incentives, such as how fast and by what means the CEO can get promoted inside that firm (Brickley et al., 2006). Because dismissal or demotion can cause negative incentives, career concern incentives can be viewed as opportunities for CEOs to take positions outside the company and to be promoted or remain inside the company.

2.2. *Dynamic adjustment of incentive contracts and compensation contract rigidity*

The effectiveness of an incentive contract and its influence on CEO behavior are of great interest in the corporate governance literature. Incentive contracts include not only the explicit incentive of compensation, but also the implicit incentive of career concerns (or the managerial labor market). Fama (1980) believes that a CEO can realize his/her value through market pricing if the CEO market is efficient, in which case the marginal utility of explicit incentives must equal that of implicit incentives. Whereas, Holmström (1999) maintains that the managerial labor market cannot completely resolve the problem of incentives, as a CEO may work hard early in his/her career and then become a buck-passer later on. To overcome the shirking problem, Gibbons and Murphy (1992) propose strengthening pay-performance sensitivity as a CEO ages, particularly when he/she is approaching retirement, thereby making special arrangements to eliminate opportunistic behavior in the retirement term. The aforementioned studies view explicit and implicit incentives as substitutive in nature. More importantly, they state that if a compensation contract can be adjusted flexibly, then CEOs should be offered more explicit incentives late in their careers to guarantee the effectiveness of compensation contracts, mitigate agency costs and sustain or increase firm value.

A CEO's incentive contract should take into consideration the effect of his/her current work on both his/her current and future pay. The former embodies compensation incentives (explicit incentives), whereas the latter embodies career concern incentives (implicit incentives). In theory, an optimal incentive contract should optimize total incentives and if contracts can be adjusted to various environments, then different types of contracts can apply to different contract environments while leading to the same effects. In other words, such optimal contracts always achieve optimal effects regardless of the circumstances. For instance, Choe (2006) examines optimal CEO compensation contracts in different conditions and finds that when return on investment (ROI) is considered, the best contract includes base pay, a severance package and a bonus. When ROI is not factored in, restricted shares and stock options are alternatives. Both types of contracts achieve the same effects. Hence, the optimality of an incentive contract is determined by whether it can be flexibly adjusted as incentive circumstances or contract factors change.

Most international research in this area assumes the precondition of a mature managerial labor market and flexible compensation contracts, and thus their results may not apply to China. Chinese researchers realize that SOEs are bound by compensation regulations, which can have significant effects on a CEO's perquisite consumption and investment decisions. The rigidity of Chinese SOE incentive contracts also mean that firms cannot revise CEO compensation contracts to optimize total incentives in the absence of career concern incentives.

2.3. *Incentive contracts, shareholder monitoring, and investment efficiency*

Prior research shows that incentive contracts exert a significant effect on both investment decisions (Larcker, 1983; Chen and Clark, 1994) and mergers and acquisitions (M&As) (Lewellen et al., 1985; Tehrani et al., 1987). Incentive contracts not only influence the motivation for and scale of investments, but also their efficiency. In general, a pay-performance-sensitive contract aligns the interests of CEOs and shareholders, prompting CEOs to make investment decisions that boost firm value (Morck et al., 1990; McConnell and Servaes, 1990; Jensen and Murphy, 1990). Bliss and Rosen (2001) find that younger CEOs tend to engage in more M&As, evidence for the important role that implicit incentives play in M&As. Minnick et al. (2011) show that firms with higher pay-performance sensitivity experience higher abnormal returns when announcing an M&A decision and higher subsequent performance. These findings indicate that an effective incentive contract, whether explicit or implicit, can motivate M&As and boost M&A efficiency.

Research on shareholder monitoring and investment efficiency indicates that financial constraints on investment can be influenced by both ownership structure (Zheng et al., 2001) and the controlling shareholder's stockholding (Rao and Wang, 2006). Moreover, if a company's majority shareholder is stated-owned, excessive investments occur more frequently, whereas a higher tradable stock proportion results in the opposite (Xu and Zhang, 2009). Dou et al. (2011) find that under the condition of joint control by multiple large shareholders, mutual monitoring can mitigate excessive investment.

Chinese research that takes the rigidity of SOE compensation contracts into consideration finds that such rigidity can affect investment efficiency. However, because SOE CEOs have access to implicit compensation in the form of perquisite consumption and implicit incentives in the form of career concern incentives, contract rigidity may be compensated for to some extent. Theoretical models show that, of the two means of keeping the issue of CEOs' moral hazard under control, the weight given to incentive mechanisms versus supervisory mechanisms depends on the trade-off between their costs (Demougin and Fluet, 2001). However, in the absence of career concern incentives, further theoretical analysis and empirical evidence are needed to determine whether shareholder monitoring can serve as a substitute in controlling agency costs.

2.4. Current study and its contributions

Our review of the literature suggests that most Western research in this area is largely inapplicable to the SOE managerial labor market in China, and the characteristics of the compensation incentives discussed therein and conclusions drawn are thus not generalizable to China. Compensation incentive rigidity is quite common in China and thus offers a useful perspective and foundation for the study reported herein. Such rigidity can result in principals' inability to adjust compensation contracts in a timely fashion in response to a particular CEO's conditions. It also means that SOEs are deficient in CEO incentives. Previous research has paid attention to the economic consequences of compensation rigidity, but is largely silent on career concern incentives, the main type of implicit incentive. Here, we examine changes in investment efficiency and the role that shareholder monitoring plays when SOEs face the dual constraints of compensation contract rigidity and a lack of career concern incentives as CEOs approach retirement. We are particularly interested in the last term before retirement, which we call the "retirement term" for short. This paper contributes to the CEO market and career concern incentives literature by offering a financial decision-making perspective.

3. Theoretical analysis and hypotheses

3.1. Career concern incentives and investment efficiency under compensation contract rigidity

The foregoing literature review shows that if compensation contracts can be adjusted flexibly, optimal incentives can in theory be achieved for CEOs regardless of whether they are close to retirement,³ and investment efficiency may not necessarily deteriorate. Our interest here, however, is how career concern incentives influence investment efficiency under the rigidity of the compensation regulations in place for Chinese SOEs.

On the one hand, an absence of career concern incentives can result in underinvestment. Because the Chinese SOE managerial labor market is regulated, SOE compensation contracts generally lack pay-performance sensitivity. At the same time, increases in cash compensation are constrained by various kinds of political power. Therefore, it is quite difficult to make special arrangements for CEOs before their retirement. Further, equity incentives are usually insufficient and overly related to specific positions. They are thus unable to successfully render future firm performance endogenous to current CEO pay, and CEOs are unable to enjoy future compensation arising from current successful investments. The absence of career concern incentives in conjunction with a lack of alternative explicit contracts, and no motive to collect information on investment opportunities, can lead CEOs to shirk their responsibilities in their retirement term. SOE underinvestment is the result.

On the other hand, compensation contract rigidity is more likely to have the opposite effect, namely, overinvestment, as it can serve as a convenient way to obtain private benefits of control. Wan and Chen (2012) find that SOE CEOs enjoy more perquisite consumption rights before retirement (when there is a lack of shareholder monitoring), which may be caused by their stronger rent-seeking motive in their retirement term. Gaining private benefits of control via investment is a more typical form of agency problem than

³ For example, Gibbons and Murphy (1992) investigate the characteristics of optimal incentive contracts when imminent retirement has resulted in horizon problems and a lack of career concerns in CEOs. They conclude that, as implicit incentives decline when a CEO gets close to retirement, it is better to strengthen pay-performance sensitivity to reinforce implicit incentives, including stock incentives (Dechow and Sloan, 1991), or confer more options, thereby increasing pay-R&D sensitivity (Cheng, 2004).

rent-seeking through perquisite consumption. Jensen and Meckling (1976) and Shleifer and Vishny (1989) believe that CEOs who lack equity incentives are more impelled to invest excessively. Hao et al. (2010) survey a number of papers in this area and conclude that excess investment is quite common in capital investment decisions because CEOs are motivated to consolidate and expand their benefits of control. As Chinese SOEs have yet to establish a mature incentive and supervisory mechanism, and lack an effective system of accountability, CEOs seldom pay the price for investment failures. Hence, CEOs are driven to gain more private benefits of control, which can lead to abuse of free cash flows and to overinvestment.

Thus, a lack of career concern incentives brings about a lower degree of investment efficiency under the condition of compensation contract rigidity. In theory, post-retirement employment can help to mitigate or eliminate the horizon problems of CEOs caused by retirement and increase investment efficiency. Brickley et al. (2006) investigate CEOs' pre-retirement agency costs from the perspective of post-retirement position incentives (continuing to serve as a director of the current or another company), and consider that such incentives do help to reduce these costs. They find that CEOs who exhibit better performance are more likely to be appointed as directors after retirement. However, this mechanism is uncommon among Chinese SOEs. As the SOE managerial labor market is far from well-established, CEOs have no opportunities to remain with their company or work in another after retirement (Wan and Chen, 2012). In addition, the prescriptive retirement age for SOE CEOs lacks flexibility, which renders it difficult in China to mitigate the agency problem induced by retirement through post-retirement re-employment plans or flexible retirement plans.

Compared to retirement term CEOs, those who quit their jobs have more career concern incentives. When these incentives are in place, the reputation mechanism works to some extent regardless of the efficiency of the managerial labor market. Accordingly, a CEO who resigns from his/her position with one company can usually take up a position with another SOE under the existing SOE executive appointment system. Hence, they have an opportunity to remain or be promoted within the SOE system,⁴ and are more likely to reap the benefits (or suffer the consequences) of successful (or failed) investments. Such CEOs must thus take into consideration the influence of current investments on future career prospects, and are more likely to make decisions in accordance with their company's investment opportunities, which can in turn increase investment efficiency. The end result is that agency costs may not rise systematically and there may be little reduction in investment efficiency.

To sum up, SOE CEO compensation contracts are not optimal in the run-up to retirement. Both under- and over-investment decrease investment efficiency. But, CEOs who resign from their jobs rather than retire appear to face a different situation.

This discussion leads us to propose Hypothesis 1: When SOE CEOs are approaching retirement, a lack of career concern incentives and compensation contract rigidity results in a decline in firms' investment efficiency.

3.2. Shareholder monitoring and investment efficiency before CEO retirement

Can shareholder monitoring have a constrictive effect when the approaching retirement of CEOs leads to a decline in investment efficiency? Firth et al. (2002) suggest that Chinese firms are more reliant on internal than external control mechanisms to restrict a CEO's adverse behavior. Theoretically, internal control mechanisms are achieved primarily through equity restrictions and board supervision. However, an important feature of the corporate governance landscape in China is a strong controlling shareholder combined with a weak board (Corporate Governance Evaluation Team within Corporate Governance Research Center of Nankai University, 2004). Zeng and Chen (2006) show that board independence has almost no influence on a company's agency costs, whereas the nature of the ultimate controller does. This paper is concerned primarily with the influence of the controlling shareholder.

Researchers have demonstrated that the financial constraints of investment within a company are affected by its ownership structure (Zheng et al., 2001), that the majority shareholder's shareholding has an effect on investment (Rao and Wang, 2006) and that majority state ownership is likely to cause

⁴ A minority of SOE CEOs can go into politics or take positions in private enterprises, which gives them similar career concern incentives to work in SOEs. However, most will not do so, with only 2% turning to private enterprises (Wan and Chen, 2012). Hence, we do not consider the influence of post-retirement employment on investment.

excessive investment, whereas the proportion of tradable shares can curb it (Xu and Zhang, 2009). Dou et al. (2011) find excessive investment behavior to be mitigated when firms are under the control of multiple large shareholders, if mutual supervision exists among them. Thus, in the case of state-owned controlling shareholders, equity restrictions help to reduce excessive investment and improve investment efficiency. The CEO of the firm is assigned by the state-owned controlling shareholder (Group) and thus there is always a strong internal control feature. If CEOs make inefficient investments before retirement, the controlling shareholders (Groups) find it difficult to engage in effective supervision. As an alternative mechanism, in the presence of equity restrictions, the other shareholders must be able to effectively restrain those inefficient investments for their own interests. Conversely, if equity restrictions are lacking, the other shareholders cannot restrict the large shareholders' decisions effectively and cannot supervise CEOs' investment behavior before retirement, thus resulting in a significant decline in investment efficiency.

Accordingly, we propose Hypothesis 2: In the absence of equity restrictions, business investment and efficiency decline significantly when SOE CEOs are close to retirement.

4. Research design

4.1. Research design and sample selection

The main issue of interest in the study is whether the investment efficiency of SOEs declines significantly just before the retirement of their CEOs.⁵ The research sample thus comprises “retirement” firms with a CEO in his/her retirement term during the research period,⁶ and the control sample comprises “severance” firms with a CEO that leaves office but does not retire.⁷ To ensure the comparability of the research and control samples, the two sets of firms are matched by industry and size. Retirement term, pre-retirement term, departure term and pre-departure term are determined as follows. If a CEO aged 58–61 leaves office after his/her tenure, he/she enters the retirement term category, the term before it enters the pre-retirement term category. If no CEOs are facing retirement, the severance term is chosen, and the term before it is chosen as the pre-severance term. Both the retirement and severance terms are named as outgoing terms, and both the pre-retirement and pre-severance terms are named as pre-outgoing terms. The recording of in-office CEOs begins in 1999. Because the global financial crisis that began in 2008 is likely to have exerted considerable effects on both the investment level and efficiency of SOEs, the sample period ends in 2007.

To ensure the robustness of the conclusions in this paper, firms with missing values for investments, growth opportunities, operating cash flow, firm size and CEO age are excluded from the sample. The final sample consists of panel data from 256 listed SOEs and 1,174 firm-years. The research sample comprises 128 companies and 582 firm-years, and the control sample 128 companies and 592 firm-years. The observations for different years are relatively balanced. At 75 firms, 1999 contains the fewest; and at 169 firms, 2003 contains the most. Industry classification is based on the Industry Classification Guidance for Listed Companies issued by the China Securities Regulatory Commission in 2001. Because the manufacturing industry includes many listed firms and there are big differences between second-level classification companies, manufacturing companies are classified by their second-level classification and all other industries are classified according to their first-level classification. The industry distribution of the sample is representative, with sample firms representing 19 of the 22 industries. The machinery, equipment, and instrumentation industry accounts for the largest number of firms (240), followed by the metal and non-metal industries (167) and the petroleum, chemical and plastics industries (133). Other

⁵ Both chairperson and general manager are taken as CEO for our research purpose, so either of them facing retirement in SOEs will be included in our research sample.

⁶ Retirees who are over the age of 61 when they left office are excluded. Because the statutory retirement age is 60, if a CEO/chair candidate is 57 years old, he/she can remain in position for an additional term, but must retire if he/she is 58 years old. Hence, the retirement age will be no more than 61 years old. If a CEO does not retire at that age, then the company may be special in some way, and was thus deemed inappropriate for inclusion in the research sample.

⁷ A decline in investment efficiency caused by outgoing CEOs may also exist in the severance sample, and thus including a control sample based on outgoing non-retiring CEOs helps to control for the general influence of outgoing CEOs on investment efficiency.

manufacturing (7), agricultural (8), and communication and culture (15) are the industries with the fewest observations.

4.2. Model selection and variable measurement

According to the classical investment literature, if a company's investments and growth opportunities are positively correlated, its investments are deemed efficient (Tobin, 1969; Hayashi, 1982; Hubbard, 1998). Durnev et al. (2004) and Chen et al. (2006) follow this body of literature in their study of investment efficiency. They measure companies' growth opportunities with Tobin's Q and investigate the influence of share price information and the sensitivity of share prices on companies' investment efficiency. With reference to these studies and the models therein, the current study investigates the influence of incentive rigidity on investment efficiency by examining the effects of CEO retirement on a company's investments and the sensitivity of its share prices (Tobin's Q). Since Fazzari et al. (1988), a large body of empirical research has shown that a company's operating cash flow is an important corporate investment decision factor. Accordingly, in this study, we control for operating cash flow as a possible influential factor in a firm's investment decisions.

In accordance with the previous literature and the needs of the study, we use the following variables. $Inv_{i,t}$, a proxy for investment, is calculated by "cash outflows on the purchase and construction of fixed assets, intangible assets and other long-term assets" plus "net cash flows on the acquisition of subsidiaries or other operating units," minus "net cash flows on the disposal of fixed assets, intangible assets and other long-term assets," minus "net cash flows on the disposal of subsidiaries and other business units," minus the total sum of "fixed asset depreciation, the depletion of oil and gas assets and productive biological assets," "the amortization of intangible assets," and "the amortization of long-term unamortized expenses" divided by total assets. All of the company investments considered are additional investments in long-term assets. As Hao et al. (2010) point out, fixed assets, intangible assets, equity and R&D investments may be tools that the major shareholder or CEOs can use to obtain private benefits. The total investment amount contains both ongoing and additional investments. As ongoing investments are a prerequisite for the maintenance of existing value, whereas additional investments are the core of future company growth, the latter is the main study object in this research. $RetireFirm_{i,t}$ represents a firm in the retirement sample. If the CEO of the sample firm retires in the sample period, the variable takes a value of 1, and 0 otherwise. $Leave_{i,t}$ represents an outgoing CEO. For both the retirement and severance samples, if a CEO leaves office after his/her tenure, the variable takes a value of 1 and 0 otherwise.

$TobinQ_{i,t-1}$ stands for growth opportunities⁸ calculated by (market value of tradable shares + Net assets \times the proportion of non-tradable shares + book value of liabilities)/(Net assets + book value of liabilities). The book value of liabilities is the total sum of short-term loans, long-term loans and bonds payable. All of the data are from the beginning of the year. $Cashflow_{i,t-1}$ stands for operating cash flow and is calculated by "net cash flow from operating activities" divided by the opening amount of total assets. $Size_{i,t-1}$ stands for firm size calculated by the natural logarithm of the opening amount of total assets. $Inv_{i,t-1}$ stands for lagged investment, which is used to control for the influence of investment stickiness on current period investments. $Lev_{i,t-1}$ is the lagged debt ratio and controls for the influence of financial structure. Finally, $Balance_{i,t-1}$ is the proportion of the shares held by the second largest shareholder group relative to those held by the largest group, and is included to control for the influence of equity restrictions.⁹

⁸ Sales growth is a commonly used proxy variable for measuring investment opportunity. However, in this study, sales growth may be endogenous to investment (for example, overinvestment by CEOs who are in their retirement term may lead to a higher level of sales growth), and its use was therefore inappropriate.

⁹ Theoretically, local GDP, whether a firm's external auditor is one of the Big Four or one of China's Big Ten, and other corporate governance variables may also affect a firm's investments and the efficiency of those investments. However, this study does not adopt them as control variables because local GDP is more likely to reflect the local investment level rather than investment efficiency. At the same time, because this study is interested in the difference between firms, the difference between districts is absorbed. External audits and other corporate governance variables can reflect differences in corporate governance, but lack adequate empirical evidence for the exogenous nature and effectiveness of governance, particularly when it comes to investment efficiency. Here, the focus is on retirement and the influence of equity restrictions on investment efficiency. The role of corporate governance mechanisms is a potential direction for future research.

A positive coefficient of $TobinQ_{i,t-1}$ indicates that the investments of a sample firm are efficient. The focus of the study reported herein is on whether the investment efficiency of CEOs in the retirement sample ($RetireFirm_{i,t}$) is significantly lower than that of their counterparts in the severance sample, i.e., whether the sign of $RetireFirm_{i,t} \times Leave_{i,t} \times TobinQ_{i,t-1}$ is significantly negative. For model completeness, the interactions of these three variables, i.e., $RetireFirm_{i,t} \times TobinQ_{i,t-1}$, $Leave_{i,t} \times TobinQ_{i,t-1}$, and $RetireFirm_{i,t} \times Leave_{i,t}$, are also controlled. The regression model used in this study is as follows.

$$\begin{aligned} Inv_{i,t} = & \alpha + \beta_1 * TobinQ_{i,t-1} + \beta_2 * RetireFirm_{i,t} + \beta_3 * Leave_{i,t} + \beta_4 * RetireFirm_{i,t} * TobinQ_{i,t-1} + \beta_5 \\ & * Leave_{i,t} * TobinQ_{i,t-1} + \beta_6 * RetireFirm_{i,t} * Leave_{i,t} + \beta_7 * RetireFirm_{i,t} * Leave_{i,t} * TobinQ_{i,t-1} \\ & + \beta_8 * Balance_{i,t-1} + \beta_9 * Cashflow_{i,t-1} + \beta_{10} * Lev_{i,t-1} + \beta_{11} * Inv_{i,t-1} + \beta_{12} * Size_{i,t-1} \\ & + \Sigma_i Industry_i + \Sigma_i Year_i + U_{i,t} \end{aligned}$$

To avoid the influence of industry-year factors on variable measurement, $Inv_{i,t}$, $Inv_{i,t-1}$, $TobinQ_{i,t-1}$, $Lev_{i,t-1}$, $Size_{i,t-1}$ and $Cashflow_{i,t-1}$ are adjusted by their industry-year medians. In addition, to avoid the influence of extreme values, all variables are winsorized at the 1% level. All data are obtained from the CSMAR database, except that data on ultimate controlling shareholders are hand collected.

5. Empirical results and analysis

5.1. Descriptive statistics and correlation of variables

Table 1 lists the descriptive statistics of the variables for the 1,174 firm-years. It shows that investment to total assets ($Inv_{i,t}$) has a mean (median) of 3.9% (1.4%) and a standard deviation of 9.2%, which means there are considerable differences among the investment levels of the sample firms. The outgoing term subsample ($Leave_{i,t} = 1$) accounts for around 53% of firm-years and the retirement subsample ($RetireFirm_{i,t} = 1$) around 50%.

Table 2 indicates that investment is highly positively correlated with growth, operating cash flow, and lagged investment, with correlation coefficients of 12%, 21% and 45% respectively, and is significantly negatively correlated with financial leverage (correlation coefficient is -14%), which is consistent with the previous literature (e.g., Fazzari et al., 1988; Chen et al., 2006). $Leave_{i,t}$ is negatively correlated with investment (coefficient of 1.5%; insignificant), which shows that firm investment increases when a CEO is about to leave office, but not to a statistically significant extent. $RetireFirm_{i,t}$ is positively related to investment (coefficient is 5%, significant at the 10% level), which means the investment level of the retirement sample is significantly higher than that of the severance sample.

Fig. 1 reveals the influence of retirement (severance) on investment efficiency by comparing efficiency in the retirement (severance) term and pre-retirement (pre-severance) term subsamples. It shows that the investment efficiency of the retirement sample is 23.3% in the pre-retirement term, declining to -7.2% in the retirement term, for a difference of 30.5%. In the severance sample, in contrast, investment efficiency declines from 17.8% to 15.6%, a difference of just 2.1%. We can thus infer that CEOs who are close to retirement significantly reduce a company's investment efficiency. These results provide preliminary support for Hypothesis 1.

Table 1
Main variables and summary statistics.

Variables	Mean	Median	Std.	1% percentile	99% percentile
$Inv_{i,t}$	0.039	0.014	0.092	-0.081	0.368
$Leave_{i,t}$	0.526	1	0.5	0	1
$RetireFirm_{i,t}$	0.496	0	0.5	0	1
$Balance_{i,t-1}$	0.216	0.084	0.263	0.002	0.958
$TobinQ_{i,t-1}$	1.562	1.408	0.673	0.864	3.746
$Cashflow_{i,t-1}$	0.07	0.058	0.151	-0.169	0.389
$Lev_{i,t-1}$	0.457	0.448	0.194	0.096	0.888
$Inv_{i,t-1}$	0.073	0.05	0.082	-0.041	0.4
$Size_{i,t-1}$ (in 100 millions)	21.333	21.259	0.932	19.342	23.673

Table 2
Pearson and Spearman correlation coefficients.

	$Inv_{i,t}$	$Leave_{i,t}$	$RetireFirm_{i,t}$	$TobinQ_{i,t-1}$	$Cashflow_{i,t-1}$	$Balance_{i,t-1}$	$Lev_{i,t-1}$	$Inv_{i,t-1}$
$Leave_{i,t}$	0.015 (0.614)							
$RetireFirm_{i,t}$	0.048* (0.099)	0.021 (0.474)						
$TobinQ_{i,t-1}$	0.120*** (<0.01)	0.021 (0.464)	-0.028 (0.346)					
$Cashflow_{i,t-1}$	0.211*** (<0.01)	-0.019 (0.509)	0.057** (0.050)	0.096*** (<0.01)				
$Balance_{i,t-1}$	-0.045 (0.122)	0.007 (0.818)	-0.082*** (<0.01)	0.081*** (<0.01)	-0.077*** (<0.01)			
$Lev_{i,t-1}$	-0.144*** (<0.01)	0.033 (0.266)	-0.073** (0.012)	-0.104*** (<0.01)	-0.099*** (<0.01)	0.033 (0.256)		
$Inv_{i,t-1}$	0.446*** (<0.01)	0.021 (0.475)	0.064** (0.029)	0.036 (0.224)	0.105*** (<0.01)	-0.045 (0.124)	-0.084*** (<0.01)	
$Size_{i,t-1}$	0.019 (0.521)	0.056* (0.057)	0.098*** (<0.01)	-0.268*** (<0.01)	0.073** (0.013)	-0.071** (0.015)	0.145*** (<0.01)	0.108*** (<0.01)

Note: Below the parameter estimates are t -values (already heteroskedasticity-adjusted according to White (1980)).

* The parameter estimates indicate the level of statistical significance: that the parameter estimates are significant at the 10% level (two-tailed test).

** The parameter estimates indicate the level of statistical significance: that the parameter estimates are significant at the 5% level (two-tailed test).

*** The parameter estimates indicate the level of statistical significance: that the parameter estimates are significant at the 1% level (two-tailed test).

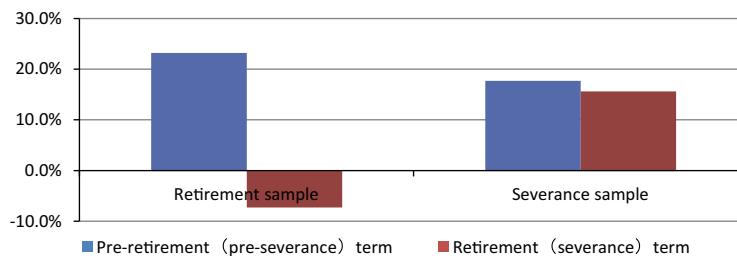


Figure 1. Time-series differences investment efficiency.

5.2. Regression results and analysis: full sample

The first column of Table 3 lists the regression results for the retirement and severance samples. The coefficient of $TobinQ_{i,t-1}$ is 0.012 (significant at the 1% level), which means that the greater the growth opportunities, the more investments there are and the greater the overall investment efficiency of the SOE in question. It also means that increases (decreases) of one standard deviation lead to increases (decreases) of 1% in investments ($Inv_{i,t}$), which equals a quarter of investment's mean value (3.9%). The implication is that investment efficiency, which is measured by the sensitivity of investment opportunities, is economically significant. The coefficient of $RetireFirm_{i,t}$ is 0.003, indicating that the retirement sample has an insignificantly higher investment level than the severance sample (approximately 7.6% of the mean value). Hence, we can conclude that there are no big differences between the retirement and severance samples, thereby excluding the possibility that the results presented herein are the result of biased sample selection. The coefficient of $Leave_{i,t}$ is 0.001, indicating that the investment level increases slightly for outgoing CEOs, but not to a significant extent either statistically or economically. Hence, outgoing CEOs, in general, do not significantly influence the

Table 3
Regression results for full sample (OLS model).

Dependent variable: $Inv_{i,t}$				
	(1) Full sample	(2) Retirement sample	(3) Severance sample	
Tobin $Q_{i,t-1}$	0.012 ^{***} (3.30)	0.015 ^{**} (2.43)	0.013 ^{***} (3.62)	
Leave $_{i,t}$	0.001 (0.25)	-0.001 (-0.23)	-0.000 (-0.04)	
RetireFirm $_{i,t}$	0.003 (0.38)			
Leave $_{i,t} \times$ Tobin $Q_{i,t-1}$	0.001 (0.18)	-0.025 ^{***} (-2.94)	0.002 (0.32)	
Leave $_{i,t} \times$ RetireFirm $_{i,t}$	-0.006 (-0.59)			
RetireFirm $_{i,t} \times$ Tobin $Q_{i,t-1}$	0.004 (0.61)			
Leave $_{i,t} \times$ RetireFirm $_{i,t} \times$ Tobin $Q_{i,t-1}$	-0.027 ^{**} (-2.45)			
Balance $_{i,t-1}$	-0.007 (-0.90)	-0.007 (-0.48)	-0.008 (-0.86)	
Cashflow $_{i,t-1}$	0.132 ^{***} (4.01)	0.133 ^{***} (2.54)	0.133 ^{***} (3.92)	
Lev $_{i,t-1}$	-0.032 ^{***} (-2.82)	-0.040 ^{**} (-2.17)	-0.023 (-1.62)	
Inv $_{i,t-1}$	0.446 ^{***} (11.56)	0.381 ^{***} (7.26)	0.505 ^{***} (9.14)	
Size $_{i,t-1}$	-0.001 (-0.25)	-0.005 (-1.41)	0.004 (0.93)	
Observations	1,174		1,174	
Adj. R2	24.8%		25.2%	

Note: Below the parameter estimates are t -values (already heteroskedasticity-adjusted according to White (1980)).

OLS = ordinary least squares. * The parameter estimates indicate the level of statistical significance, i.e., that the parameter estimates are significant at the 10% level (two-tailed test).

** The parameter estimates indicate the level of statistical significance, i.e., that the parameter estimates are significant at the 5% level (two-tailed test).

*** The parameter estimates indicate the level of statistical significance, i.e., that the parameter estimates are significant at the 1% level (two-tailed test).

investment level. The coefficients of both $Leave_{i,t} \times RetireFirm_{i,t-1}$ and $Leave_{i,t} \times TobinQ_{i,t-1}$ approach 0, which indicates that, compared with former tenure, neither investment level nor investment efficiency decrease significantly, thereby precluding the possibility that the study was influenced by the outgoing CEO factor. The coefficient of $RetireFirm_{i,t} \times TobinQ_{i,t-1}$ is only 0.001, which means that an increase (decrease) in investment level brought by one standard deviation of $TobinQ_{i,t-1}$ is 0.1% higher in the retirement sample, an increase too small to reach statistical significance. We can thus conclude that there are no significant differences in investment efficiency between the retirement and severance samples and that the retirement sample does not suffer from sample selection bias. If our prediction that investment efficiency declines in the retirement term holds, then that decline can be taken to result from the lack of incentives arising from the rigidness of compensation contracts and retirement problems in Chinese SOEs.

The coefficient of the study's main variable, i.e., $RetireFirm_{i,t} \times Leave_{i,t} \times TobinQ_{i,t-1}$, is -0.027 and significant at the 1% level, which indicates that, compared with severance companies, retirement companies' investment efficiency decreased significantly in the outgoing term of their general managers. Economically, the investment efficiency of the severance companies during their executives' severance term is the sum of $TobinQ_{i,t-1}$ and $Leave_{i,t} \times TobinQ_{i,t-1}$, that is, 0.013, and its economic meaning is the same as the coefficient of $TobinQ_{i,t-1}$. The investment efficiency of the retirement companies during the retirement term should be the sum of $TobinQ_{i,t-1}$, $Leave_{i,t} \times TobinQ_{i,t-1}$, and $RetireFirm_{i,t} \times Leave_{i,t} \times TobinQ_{i,t-1}$, that is, -0.012. In

other words, a one standard deviation¹⁰ in investment opportunities ($\text{TobinQ}_{i,t-1}$) increases (decreases) investments ($\text{Inv}_{i,t}$) by 1.1%, which is equal to 28% of investment's mean value. Investments and investment opportunities change inversely, and the change is economically significant. The implication is that investments remain efficient during the severance term of companies, but are inefficient during the retirement term of companies. Columns 2 and 3 of Table 3 present the regression results of the retirement and severance samples separately. They are consistent with the regression results for the full sample. Moreover, in the separate regressions, the coefficient of $\text{Leave}_{i,t} \times \text{TobinQ}_{i,t-1}$ is significant at the 5% level, which further verifies the credibility of the results presented above. Taken together, our results indicate that a lack of incentives resulting from the rigidity of compensation contracts and retirement problems leads to decreases in investment efficiency and that these decreases do not arise from the outgoing CEO factor or sample selection bias.

In the regression of the full sample, the coefficient of the control variable $\text{Cashflow}_{i,t-1}$ is 0.132 (significant at the 1% level), which means a company's operating cash flow exerts a significant influence on its investment level. Further, a one standard deviation change in $\text{Cashflow}_{i,t-1}$ leads to an investment change of 1.3% (which equals 33% of the mean value), which is significant both statistically and economically. The coefficient of $\text{Lev}_{i,t-1}$ is -0.032 (significant at the 1% level), meaning that more highly leveraged companies are less likely to invest. A one standard deviation change in $\text{Lev}_{i,t-1}$ leads to a 2.8% change in investments, which is both statistically and economically significant. The coefficient of $\text{Inv}_{i,t-1}$ is 0.446 (significant at the 1% level), which suggests that investments are sticky. A one standard deviation change in $\text{Inv}_{i,t-1}$ leads to a 3.3% change in investments, which is significant both statistically and economically. The results of the foregoing variables are the same as those in Chen et al. (2006) and Xin et al. (2007).

5.3. Influence of equity restrictions

Chen and Wang (2004) and Tang et al. (2005) find that the second largest shareholder in a firm can restrict entrenchment and other opportunistic behavior by the largest shareholder. Based on data of the ten largest shareholders, Hong and Xue (2008) further define the first and second largest shareholder groups, and investigate how the second largest shareholder group suppresses the opportunistic behavior of the first. Dou et al. (2011) find that, conditional upon a number of large shareholders jointly controlling a firm, if those shareholders mutually supervise one another, overinvestment behavior is alleviated. In this paper, we argue that the closer the proportion of shares held by the second largest shareholder group relative to the largest shareholder, the greater the former's power to supervise the latter and the more likely they are to supervise the CEOs appointed by the latter. Accordingly, to further test Hypothesis 2, we use the proportion of shares held by the second largest shareholder group to those held by the largest group as a proxy for equity restrictions (denoted $\text{Balance}_{i,t-1}$). To avoid the endogenous effect of outgoing CEOs on investment efficiency and equity restrictions, we use the mean of a company's pre-outgoing term (denoted $\text{Balance_Mean}_{i,t-1}$) as the basis for calculating the median ($\text{Balance_Median}_{i,t-1}$). If $\text{Balance_Mean}_{i,t-1} \geq \text{Balance_Median}_{i,t-1}$, the company's equity restrictions are considered to be strong, and otherwise weak.¹¹

Table 4 presents the results by group. In the low equity restriction group, the coefficient of $\text{RetireFirm}_{i,t} \times \text{Leave}_{i,t} \times \text{TobinQ}_{i,t-1}$ is -0.043 (significant at the 1% level), indicating that, compared with a severance company, a retirement company's investment efficiency decreases significantly in the retirement term relative to the pre-retirement term. In the high equity restriction group, the coefficient of $\text{RetireFirm}_{i,t} \times \text{Leave}_{i,t} \times \text{TobinQ}_{i,t-1}$ is 0.011, indicating that compared with the severance sample, investment efficiency in the retirement sample experienced no significant decline when CEOs are in their retirement term rather than the pre-retirement term. The difference between the foregoing coefficients was 5.4%, and an *F*-test shows the difference to be significant at the 1% level. These results validate Hypothesis 2, which posits

¹⁰ Because the variables in the regression model were already median-adjusted, when calculating significance (standard deviations of correspondent coefficients \times independent variables), we adopt the standard deviations after median-adjustment rather than those before, as in Table 1. The standard deviation of Tobin's Q is 0.91 in the regression sample.

¹¹ As the actual controlling shareholding data in the CSMAR database begin from 2003, we replace data before 2003 with data for 2003. Although this missing data may have introduced some degree of bias, it is more likely to be "biased against" the results reported in this paper.

Table 4
Regression results grouped by equity restriction level (OLS model).

Dependent variable: $Inv_{i,t}$	(1) Equity restriction \geq median	(2) Equity restriction $<$ median
TobinQ $_{i,t-1}$	0.014** (2.05)	0.010*** (2.64)
Leave $_{i,t}$	-0.003 (-0.38)	0.006 (0.72)
RetireFirm $_{i,t}$	-0.002 (-0.27)	0.008 (0.91)
Leave $_{i,t} \times$ TobinQ $_{i,t-1}$	-0.010 (-1.25)	0.012 (1.14)
Leave $_{i,t} \times$ RetireFirm $_{i,t}$	0.010 (0.82)	-0.017 (-1.37)
RetireFirm $_{i,t} \times$ TobinQ $_{i,t-1}$	0.003 (0.26)	0.006 (0.64)
Leave $_{i,t} \times$ RetireFirm $_{i,t} \times$ TobinQ $_{i,t-1}$	0.011 (0.77)	-0.043*** (-2.91)
Cashflow $_{i,t-1}$	0.138*** (2.76)	0.125*** (2.92)
Lev $_{i,t-1}$	-0.039** (-2.11)	-0.025* (-1.79)
Inv $_{i,t-1}$	0.440*** (8.07)	0.448*** (8.25)
Size $_{i,t-1}$	0.001 (0.27)	-0.001 (-0.39)
Observations		1,174
Adjusted R-squared		24.9%

Note: Below the parameter estimates and those in parentheses are t -values (heteroskedasticity-adjusted according to White (1980)).

* The parameter estimates indicate the level of statistical significance: that the parameter estimates are significant at the 10% level (two-tailed test).

** The parameter estimates indicate the level of statistical significance: that the parameter estimates are significant at the 5% level (two-tailed test).

*** The parameter estimates indicate the level of statistical significance: that the parameter estimates are significant at the 1% level (two-tailed test).

that weaker equity restrictions reduce large shareholders' ability to supervise CEOs effectively, and thus the investment efficiency decline arising from incentive contract rigidity cannot be reduced.

In summary, the enforced retirement of SOE CEOs result in incentive contract rigidity, and the loss of contract efficiency results in a decline in investment efficiency. Further investigation shows the consequences of a rigid incentive contract to vary by shareholder supervision. When equity restrictions are stronger, the second largest shareholder groups have relatively stronger power to restrict the largest shareholder, which helps to strengthen the supervision on CEOs and compensate for a lack of flexibility in retirement term incentive contracts. Accordingly, in this case, there is no significant decline in investment efficiency. If, in contrast, non-ultimate controllers' supervisory power is insufficient to make up for the reduced efficiency arising from incentive contract rigidity, the result is a significant decline in investment efficiency.

5.4. Further discussion and sensitivity analysis

If the retirement of CEOs causes a decline in investment efficiency, are there any differences between central and local SOEs, whose ultimate controllers are the central and local government, respectively? In this paper, we argue that, on the one hand, the supervision of central SOE shareholders may be stronger because of the government's policy to "retain the large, release the small," thereby alleviating the decline in investment efficiency caused by CEOs' retirement. On the other hand, because of the monopoly position of central enterprises and their greater reliance on administrative means, the market compensation mechanism is more likely to exist in local SOEs than in central SOEs, thereby leading to greater compensation rigidity in central

SOEs and hence greater managerial myopia and a more severe decline in retirement-induced investment efficiency. The answer depends on which influence dominates. The results presented in this paper primarily support the latter prediction (although the difference between central and local SOEs is statistically insignificant). In other words, the retirement of CEOs in central SOEs may lead to a decline in investment efficiency because of the salary rigidity in these SOEs.¹²

The overinvestment model in Richardson (2006), the most commonly used empirical research model at present, influences the study reported herein in the following ways. First, the establishment of the optimal investment level had the preconditions of no information asymmetry or agency problems. However, when estimating additional investments, with the exception of the investment opportunity variables, the variables caused the estimates of expected investments to deviate from the theoretically optimal investment level. The estimated optimal investment level includes a return variable. Accordingly, if the market expects enterprises with managerial retirement issues to suffer more severe agency problems, it will underestimate the theoretically optimal investment level, and thus overestimate overinvestment or underestimate underinvestment. Second, the model includes one-period-lagged investments. Because the outgoing term is related to three consecutive years, if overinvestment exists in the first year, overinvestments in previous years are taken as the normal level in estimating overinvestment in subsequent years, thus leading to underestimation of subsequent years' overinvestment, which is detrimental to the accuracy of the research results. We use the Tobin's Q model in this study to investigate the sensitivity coefficient between investments and investment opportunities, which is not affected by the aforementioned factors.

To ensure the reliability of our conclusions, we perform the following sensitivity analyses, which result in no changes to the main conclusions. First, in the measurement of Tobin's Q, we calculate the market value of equity by all shares multiplied by the share price, and the market/book value of liabilities including all liabilities rather than just including loans and bonds. Second, we group companies according to power by the proportion of the second largest shareholder groups' shareholding relative to that of the largest shareholder, dividing the groups by 20% and 50% rather than by the sample median. Third, we identify the equity structure by calculating the total shareholding of the second- to fifth-largest shareholder groups divided by the shareholding of the largest shareholder group. Fourth, in accordance with Milnor and Shapley (1978), we calculated the Shapley index of different largest shareholder groups, and grouped companies according to the sum of the Shapley index of the second- to tenth-largest shareholder groups divided by that of the largest shareholder group. Finally, we carried out regressions on outgoing chairpersons and general managers separately.

6. Conclusions

This paper theoretically analyzes how career concerns and shareholder monitoring affect CEO agency costs. Efficient compensation contracts help to reduce agency costs, but a lack of incentives owing to imminent retirements cannot be remedied by adjusting compensation contracts because of the constraints imposed by contract rigidity in the Chinese SOE context. Shareholder monitoring as an internal governance mechanism helps to alleviate agency costs, particularly when incentives are insufficient, and contract efficiency can be improved to some extent through shareholder monitoring. In Chinese SOEs, compensation contracts suffer rigidity, and the problem of managerial myopia is exacerbated by the retirement-age regulation. Empirical analysis of these issues is of both theoretical and practical significance.

This paper reports the empirical results of systematic examination of the effects of rigid compensation contracts on firms' investment efficiency based on a sample of Chinese A-share listed companies from 1999 to 2007. The results reveal a significant decrease in investment efficiency in the retirement term of the CEO relative to the previous term. However, stronger shareholder monitoring can effectively restrict the agency problems of CEOs approaching retirement, thereby improving investment efficiency.

This paper is of theoretical significance. In Chinese SOEs, promotion opportunities or the possibility of staying on constitute important incentives for executives because the private benefits of control arising from

¹² To save space, this paper does not report the relevant results, but they are available from the authors upon request.

promotion (or staying on) can compensate for the lack of other forms of explicit or implicit compensation. The incentive contracts in SOEs remain optimal despite compensation regulations. However, promotion incentives decline as CEOs approach retirement and compensation contract rigidity induces greater agency costs and diminishes investment efficiency in the retirement term. In the presence of compensation contract rigidity, shareholder monitoring can serve as an effective alternative mechanism.

The paper is also of practical significance. One of the most important topics in SOE reform is the demand to establish and improve incentive and monitoring systems. We currently lack sufficient empirical evidence to determine whether shareholder monitoring can improve contract and investment efficiency in the face of compensation contract rigidity, and thus reduce agency costs. The results reported herein show that compensation contract rigidity increases agency costs, although shareholder monitoring can alleviate these costs, thereby improving contract efficiency and enhancing firm competitiveness. The debate over the demand for a more flexible retirement system in Chinese SOEs has become increasingly fierce in recent years and this paper adds supporting evidence for the requirement for greater flexibility. Implementing a more flexible retirement system may help to strengthen the efficiency of incentive contracts and decrease the agency costs induced by compensation contract rigidity.

Acknowledgments

This paper received support from the National Natural Science Foundation of China (Nos. 70972060, 71102013 and 71272008), National Accounting Leader (Reserve) Personnel Training Plan (Academic Class), Humanities and Social Science Research Foundation of the Ministry of Education of China (Nos. 11JJD790008, 13YJC790041 and 14JJD630005), Innovation Program of the Shanghai Municipal Education Commission (Nos. 11ZS186 and 14ZS157) and the “Shu Guang” project supported by the Shanghai Municipal Education Commission and Shanghai Education Development Foundation (No. 10SG54). It is also included in the “211” Key Project of the Shanghai University of Finance and Economics. We owe many thanks to Prof. Bin Ke (Nanyang Technological University) and Prof. Hongjun Zhu (Shanghai University of Finance and Economics) for their enlightening advice. Nevertheless, we three co-authors take full responsibility for the paper. We also gratefully acknowledge Junzi Zhang (Lancaster University) for her assistance in data collection and excellent work in general.

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