Aims and Scope

The focus of the *China Journal of Accounting Research* is to publish theoretical and empirical research papers that use contemporary research methodologies to investigate issues about accounting, finance, auditing and corporate governance in China, the Greater China region and other emerging markets. The Journal also publishes insightful commentaries about China-related accounting research. The Journal encourages the application of economic and sociological theories to analyze and explain accounting issues under Chinese capital markets accurately and succinctly. The published research articles of the Journal will enable scholars to extract relevant issues about accounting, finance, auditing and corporate governance relate that to the capital markets and institutional environment of China.

China Journal of Accounting Research

Website: http://www.cnjar.com
http://www.cb.cityu.edu.hk/research/cjar

5/2 China Journal of Accounting Research Vol. 5/2 (2012) 101–198

ELSEVIER

Volume 5 • Issue 2 • June 2012

China Journal *of* Accounting Research

Production and hosting by Elsevier

Available online at www.sciencedirect.com
SciVerse ScienceDirect

ISSN 1755-3091

Production and hosting by Elsevier
Radarweg 29, 1043 NX Amsterdam, The Netherlands

ISSN 1755-3091

Founded by Sun Yat-sen University and City University of Hong Kong

Sponsored by: CPA Hong Kong Institute of Certified Public Accountants 香港會計師公會

Published quarterly in March, June, September, and December

Guidelines for Manuscripts Submitted to The China Journal of Accounting Research

The **China Journal of Accounting Research** "CJAR" (ISSN 1755-3091) publishes quarterly. It contains peer-reviewed articles and commentaries on accounting, auditing and corporate governance issues that relate to the greater China region.

We welcome the submission of both theoretical and empirical research papers pertinent to researchers, regulators and practitioners. Authors should note:

1 Submissions must be original contributions and not under consideration by any other journal. The author must state the work is not submitted or published elsewhere.

2 Authors submitting articles, notes and comments will be entitled to two free copies. Each author of a book review will receive a copy of the relevant issue.

3 Authors should submit their manuscripts (in Word format) via email to china.jar@gmail.com. All text, including endnotes, must be double-spaced. Authors will be notified when manuscripts are received by *CJAR*.

4 Authors should note:

- a cover page showing the title of the paper, the author's name, title and affiliation, e-mail address, and any acknowledgement should be included.
- to promote anonymous review, author(s) should confine his/her identify (such as name, affiliation, biographical information, and acknowledgment) to the cover page only.
- supply an abstract of about 120 words, stating the study's findings, sample and methodology in that order.
- key terms used in the text should be defined or explained as early as possible after they are first introduced.
- words in a foreign language are to be in italics.
- all citations in the text should refer to the author's (or authors') name and the year of publication.

  Examples: "the debt contracting explanation for conservatism (Watts and Zimmerman, 1986; Basu, 1997; Ahmed et al, 2002). Using the Basu (1997) asymmetric timeliness regression"
- include a list of reference for works cited as follows:
  - reference to a journal publication:

    Basu, S., Waymire, G.B., 2006. Record keeping and human evolution. Accounting Horizons 20 (3), 201–229.
  - reference to a book:

    Watts, R.L., Zimmerman, J.L., 1986. Positive accounting theory. Prentice Hall, Englewood Cliffs, NJ.
  - reference to a chapter in an edited book:

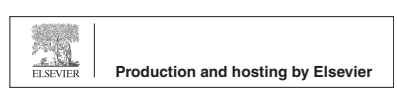
    Ball, R., 2001. Infrastructure requirements for an economically efficient system of public financial reporting and disclosure, 127–169. In: Litan, R., Herring, R. (Editors), Brookings-Wharton Papers on Financial Services. Brookings Institution Press, Washington, DC.
- omit all full stops in abbreviations. Example: 'eg', 'ie', 'Co', 'Ltd', 'etc'
- dates are in the order – date, month, year, eg '5 May 1975'
- quotation marks are single, but within a quotation are double.
- use endnotes rather than footnotes.
- put each table on a separate sheet; do not embed in the text but indicate where the table would best be inserted.

5 China Journal of Accounting Research copyright in works published by *CJAR*.

For additional information, please contact Irene Li, Department of Accountancy, City University of Hong Kong, Tat Chee Avenue, Kowloon Tong, Hong Kong. Telephone: +852 3442 7932. Fax: +852 3442 0349. E-mail: acwoo@cityu.edu.hk.

CHINA JOURNAL OF ACCOUNTING RESEARCH

Volume 5/2 (2012)



China Journal of Accounting Research 5 (2012) 101–125

Contents lists available at SciVerse ScienceDirect

China Journal of Accounting Research

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

State control, access to capital and firm performance

Oliver Zhen Li [a], Xijia Su [b], Zhifeng Yang [c,*]

[a] Department of Accounting, NUS Business School, National University of Singapore, Singapore
[b] Department of Accountancy and Finance, China Europe International Business School, China
[c] Department of Accountancy, City University of Hong Kong, Hong Kong SAR, China

ARTICLE INFO

Article history:
Received 9 May 2012
Accepted 9 May 2012
Available online 12 June 2012

JEL classification:
G30
G32
G38

Keywords:
State control
Access to capital
Firm growth
Regulation

ABSTRACT

We study the effect of state control on capital allocation and investment in China, where the government screens prospective stock issuers. We find that state firms are more likely to obtain government approval to conduct seasoned equity offerings than non-state firms. Further, non-state firms exhibit greater sensitivities of subsequent investment and stock performance to regulatory decisions on stock issuances than state firms. Our work suggests that state control of capital access distorts resource allocation and impedes the growth of non-state firms. We also provide robust evidence that financial constraints cause underinvestment.

1. Introduction

The global financial and economic crisis between 2007 and 2010 triggered a fresh debate about the role of the government in the economy and highlighted the importance of understanding how financing frictions affect firm investment and the economy (Kashyap and Zingales, 2010; Duchin et al., 2010; Campello et al., 2010). To shed some light on this issue, we investigate how government control affects capital allocation

* Corresponding author.
E-mail addresses: bizzhenl@nus.edu.sg (O.Z. Li), suxijia@ceibs.edu (X. Su), zhifeng@cityu.edu.hk (Z. Yang).

1755-3091/$ - see front matter © 2012 China Journal of Accounting Research. Founded by Sun Yat-sen University and City University of Hong Kong. Production and hosting by Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.cjar.2012.05.001

and firm investment in China. China has a long history of government intervention in economic affairs. Even after three decades of privatization, state-owned firms still make up the bulk of China's economy. China's heavily government-controlled economy, together with an emerging and rapidly developing private sector, provides us with an excellent opportunity to examine this issue. Specifically, we examine whether during the regulatory screening process of seasoned equity offering (SEO) applications, non-state-controlled and state-controlled firms are treated differently, and how their subsequent investment and stock performance are affected differently by regulatory decisions.

We find that state firms are more likely than non-state firms to receive regulatory approval to conduct SEOs, even though state firms have fewer growth opportunities than non-state firms. Specifically, during the period between 1999 and 2003, about 57% of firms successfully passed the regulatory screening process and completed stock offerings. However, the success rate for state firms is about 39% higher than that for non-state firms.

Further, we find that non-state firms' investment and stock performance are more sensitive to regulatory decisions than those of state firms. Specifically, the median growth rate in net property, plant and equipment in non-state firms which successfully pass the screening process is 35% (16%) in the first (second) year after receiving regulatory decisions, whereas the rate for non-state firms denied approval is only 3% in each year. In contrast, state firms denied approval to issue equity do not invest less than state firms receiving approval to issue equity. Furthermore, in the 2-year period following regulatory decisions, non-state firms receiving approval to issue equity outperform size-matched non-SEO firms by about 26%, whereas non-state firms denied approval underperform the benchmark by about 11% during the same period. In contrast, the long-run stock performance of state firms is barely affected by regulatory decisions and is not different from that of non-SEO firms.

Finally, we find that political connections help non-state firms overcome regulatory hurdles when they seek additional capital. Non-state firms with political connections have a significantly greater chance of surviving the screening process than those without political connections. Further, the chance of surviving the screening process for politically connected non-state firms is comparable to that of state firms.

Financial economists argue that capital allocation skewed toward constrained firms or individuals will disproportionately benefit them and therefore improve allocation efficiency (Galor and Zeira, 1993; Aghion and Bolton, 1997; Galor and Moav, 2004; Claessens and Perotti, 2007; Zia, 2008). Financially constrained non-state firms should benefit more from raising equity capital than state firms. Giving priority to state firms distorts capital allocation and hampers the growth of non-state firms.

We contribute to the growing literature which examines how political forces affect capital allocation around the world (Claessens and Perotti, 2007).[1] Our work differs from extant studies in two ways. First, we identify a mechanism, the screening of stock issuers, through which the government directly controls capital allocations. Thus, we are able to obtain direct evidence on how government control affects the allocation outcome. In contrast, extant studies often compare financial outcomes between politically connected and non-politically connected firms, and indirectly infer politicians' influence on capital allocations. Second, we focus on the allocation of equity capital, whereas most extant studies examine the allocation of bank credit. Governments in many countries have a significant influence on equity capital allocation. Our work provides new and direct evidence that assists researchers and regulators in gaining a better understanding of how political forces affect access to finance and capital allocation efficiency.

Further, our work is linked to the literature on the impact of financial constraints on firms' investment and growth. Most studies on financial constraints focus on firm characteristics such as cash flow and leverage, and interpret the response of investment to changes in these characteristics as evidence that financial constraints affect investment (Fazzari et al., 1988; Campello et al., 2010). However, changes in these characteristics are likely correlated with the availability of investment opportunities (Kaplan and Zingales, 2000). This endogeneity issue can be mitigated by comparing the response of firms with differing degrees of financing constraints to the same shock. China has two types of firms, controlled by the state and the private sector (non-state entrepreneurs) respectively, which have differing degrees of financial constraints (Allen et al.,

[1] Studies along this line include La Porta et al. (2002), Johnson and Mitton (2003), Sapienza (2004), Dinc (2005), Khwaja and Mian (2005), Leuz and Oberholzer-Gee (2006), Claessens et al. (2008), Zia (2008), and Fan et al. (2008).

2005).[2] Regulatory decisions regarding SEO applications significantly affect capital availability to SEO applicants. Comparing the responses of non-state and state firms to regulatory decisions generates robust evidence about the impact of financial constraints on investment.

In addition, we provide direct evidence that political connections bring benefits to non-state firms. This result furthers our understanding of the rationale for businesses to build political ties (Fisman, 2001; Faccio, 2006; Faccio and Parsley, 2009). Our study also provides evidence corroborating the notion that the development of the private sector in China is likely supported by informal financing channels (Allen et al., 2005).

Finally, our paper is relevant to the current debate on the role of the government in the economy amid a global financial and economic crisis. To combat the current global economic recession, countries around the world have been expanding the role of the government. While various measures aimed at stimulating the economy may temporarily ease problems such as high unemployment, a frozen credit market and a potential collapse of major industries or firms, they come with their own unique agency problems. These agency problems may steer resources away from sectors where they are most needed and thus can be used more efficiently. For example, one concern raised by industry leaders is the presence of conflicts of interest when governments become both the regulator and the regulated. Small and non-state firms could face difficulties competing against firms owned by the government.[3] While the economic and institutional setting in China is different to that of developed countries and we are hesitant to extrapolate excessively, results from our analysis could be of reference to these economies.

The rest of the paper proceeds as follows. Section 2 explains SEO regulations in China and develops our hypotheses. Section 3 describes our sample and data. Section 4 presents the main empirical results. Section 5 extends our main analysis and presents results of robustness tests. Section 6 concludes.

2. Institutional background and hypothesis development

2.1. Seasoned equity offering regulations in China

Chinese listed firms seeking to issue new shares must go through a lengthy approval process. First, a firm's board of directors has to approve the SEO plan. Once the plan has received board approval, the firm must immediately announce the preliminary offering plan. The preliminary plan usually details the type of offering proposed, the estimated number of shares to be offered, the estimated offering proceeds and the projects to be funded.[4] The firm then calls a shareholder meeting to seek approval of the plan from shareholders. Because controlling shareholders usually dominate both at the board meeting and at the shareholder meeting, a plan that has received board approval is almost invariably approved at the shareholder meeting.[5] The first shareholder meeting notice must be sent out at least one month before the scheduled meeting date. The minimum time interval between the board announcement and the shareholder meeting resolution is therefore one month. After obtaining approval at the shareholder meeting, the firm's management will invite investment bankers, auditors and lawyers to prepare an offering application. The offering application must first be endorsed by the local office of the China Securities Regulatory Commission (CSRC) in the region where the firm is incorporated. After obtaining the local regulatory endorsement, the firm's management is required to submit the application to the CSRC for approval. The application typically includes the offering plan and financial statements from the past 3 years. The offering is usually made within a few days of CSRC approval.

[2] Besides Allen et al. (2005), Brandt and Li (2003), Li et al. (2007), and Wang et al. (2008) also argue that private firms (non-state firms) are discriminated by state banks, and thus more constrained financially than state firms.

[3] Phillips, Maha Khan. The new political economy. CFA Magazine September–October 2009.

[4] Chinese companies can issue new shares to existing shareholders (right offerings) or to all public investors (general offerings). In our sample period, both rights offerings and general offerings are present.

[5] A new regulation issued in 2004 requires an offering plan be approved by both the majority of all outstanding votes and the majority of all outstanding public votes. Some offering plans proposed after this date received board approval but failed to be approved at the shareholders meeting because of opposition from public shareholders (Chen et al., 2011). We focus on firms announcing SEO proposals before 2004 to avoid the confounding impact of this regulation.

The CSRC has issued guidelines governing the equity offering process. During our sample period, these guidelines include CSRC [1999] 12, CSRC [2000] 42 and CSRC [2001] 43. These regulations specify positive requirements that SEO applicants must meet and negative criteria that may result in approvals being denied. These qualifications typically include both hard requirements, such as profitability thresholds, and soft requirements, such as governance quality. Other than profitability requirements, the positive and negative criteria specified in the various guidelines are mostly similar. CSRC [1999] 12 requires SEO applicants to have a minimum average ROE of 10% over the past 3 years and a minimum ROE of 6% in any of the past 3 years. CSRC [2001] 43 lowers the profitability threshold, requiring an average ROE of no lower than 6% over the past 3 years. We list the mandatory criteria under CSRC [1999] 12 in Appendix A. These guidelines suggest that the screening process is aimed at identifying high-performing, well-governed firms. However, the guidelines also leave sufficient room for regulators to exercise their discretion in selecting applicants.

Firms seeking equity offerings may also be forced to cancel their offering plans before they submit applications to the CSRC due to explicit or implicit signals from regulators that their proposals are unlikely to be approved. Such signals can be conveyed via unfavorable regulatory decisions made with respect to similar firms, informal discussions with regulators or regulators' informal policy announcements.

2.2. Analytical framework

To assess capital allocation efficiency, we follow the analytical framework of Claessens and Perotti (2007). They suggest that financially constrained firms or individuals should benefit more from the relaxation of financial constraints than unconstrained firms. Therefore, giving preferred capital access to constrained firms or individuals improves capital allocation efficiency and facilitates economic growth. This analytical framework is built on Galor and Zeira (1993), Aghion and Bolton (1997) and Galor and Moav (2004). To apply this analysis, scholars usually compare the responses of two types of firms with differing degrees of financial constraints to exogenous shocks to capital availability and then make inferences. Zia (2008) presents a specific example of applying this analytical framework by comparing the production and performance between public and private firms subsequent to the removal of subsidized government export loans in Pakistan. He finds that the performance and production of public firms, which are considered less financially constrained than private firms, are not affected by the removal of subsidized loans, while the production and performance of private firms are greatly adversely affected. This is because public firms are able to substitute subsidized loans with commercial bank credit, while private firms are not. He thus concludes that the initial allocation of subsidized loans to public firms is inefficient. Following this framework, we first examine whether non-state and state firms are treated differently in the regulatory process regarding their SEO applications, and then examine how their subsequent investment and stock performance are affected differently by regulatory decisions.

2.3. Hypothesis development

2.3.1. Political forces and capital allocation

A growing literature examines how political forces affect capital allocation. This literature generally concludes that capital is allocated based on political favoritism if politicians can exert a significant influence over the allocation process (La Porta et al., 2002; Johnson and Mitton, 2003; Sapienza, 2004; Dinc, 2005; Khwaja and Mian, 2005; Faccio et al., 2006; Leuz and Oberholzer-Gee, 2006; Claessens et al., 2008; Zia, 2008; Fan et al., 2008). Both intuition and anecdotal evidence suggest that governments or politicians likely intervene in regulators' decisions in an effort to ensure that priority is given to state firms in their pursuit of capital. When the government controls the capital allocation process, state firms could receive favorable treatment for several reasons. First, state firms are often required to fulfill social objectives such as supporting employment, investing in public projects and maintaining social stability. In exchange, the government gives financial support to state firms. When necessary, the government can also intervene in regulatory decisions and give favorable treatment to state firms. Second, state firms are more likely than non-state firms to have political connections. Executives of state firms are often de facto government officials and are thus more likely to have ties with regulators (Fan et al., 2007). Political connections enable state firms to influence regulatory decisions. Third, regulators are more willing to approve state firms' equity issuance requests because potential liabilities

regulators face when allocating capital to state firms are less onerous than those they face when allocating capital to non-state firms. For example, state firms are less likely to go bankrupt because the government is more likely to bail out state firms in financial distress than they are to rescue non-state firms. Even when state firms can also go bankrupt, regulators face less onerous liabilities when they allocate state resources to failed state firms than to failed non-state firms. Extant studies find that state banks lend more to state firms or politically connected firms for the above reasons (La Porta et al., 2002; Dinc, 2005).

Previous studies suggest that in comparison with their state counterparts, non-state firms in China are discriminated against by state banks. Allen et al. (2005) show that the amount of bank credit extended to the non-state sector in China is much lower than that extended to the state sector, in spite of the fact that the former account for a larger share of production than the latter. Wang et al. (2008) suggest that because state-controlled firms in China have preferential access to bank credit and are more likely to be bailed out in the event of financial distress, they lack incentives to employ high-quality auditors. We examine how government intervention impacts the availability of equity to state versus non-state firms and propose our first hypothesis below:

Hypothesis 1. State firms are treated more favorably by regulators in the seasoned equity offering screening process than non-state firms.

2.3.2. Sensitivities of investment and stock performance to regulatory screening decisions

Even though state firms are likely treated more favorably by the government in the equity allocation process, they are often less financially constrained than non-state firms. They can more easily access state banks and receive other forms of government favors, such as tax rebates or subsidies than non-state firms (Khwaja and Mian, 2005; Allen et al., 2005). Therefore, state firms are financially less reliant on the seasoned equity market. Non-state firms, on the other hand, have difficulties obtaining bank loans. They are less likely to obtain direct financial support from the government. Receiving approval to raise capital through issuing new shares enables them to capture investment opportunities and achieve growth, whereas failure to receive approval to raise capital forces them to abandon valuable investment opportunities and therefore forfeit growth. The finance literature suggests a negative association between financial constraints and firm investment (Fazzari et al., 1988; Lang et al., 1996; Stein, 2003; Desai et al., 2008; Almeida and Campello, 2010). We use the ultimate controlling shareholder, state versus non-state owners, as a proxy for financial constraints and examine firms' responses to regulatory decisions on equity issuances. We predict that financially constrained non-state firms should exhibit a more pronounced sensitivity of investment to regulatory decisions regarding SEO applications than state firms.

We also predict that non-state firms' post-decision stock performance is more sensitive to regulatory decisions than that of state firms. Realizing that non-state firms may have difficulties implementing investment opportunities, investors rationally discount the value of those opportunities before observing regulatory decisions. If non-state firms receive approval to issue equity, then investors revise upward their expectations that investment opportunities will be realized and therefore drive up these firms' stock prices. Otherwise, stock prices plunge for non-state firms denied approval because investors become increasingly concerned about the ability of such firms to capture investment opportunities. Stock performance of state firms is less likely to be affected by regulatory decisions because investors are less likely to worry about state firms' ability to implement investment projects and thus are less likely to discount their value before receiving regulatory decisions. Based on the above argument, we propose our second hypothesis below:

Hypothesis 2. The sensitivities of subsequent investment and stock performance to regulatory decisions on the seasoned equity offering screening process are more pronounced for non-state firms than for state firms.

3. Sample and data

3.1. Sample selection

We manually collect stock offering proposals announced between 1999 and 2003 in the corporate announcement database in WIND, which is a leading integrated financial data service provider in China.

Table 1
Sample selection. The original sample contains all firms that announced stock offering plans from 1999 through 2003. A firm is defined as a state firm if its ultimate controlling shareholder is the government or as a non-state firm if its ultimate controlling shareholders are individuals.

Original sample		883
Exclude:		
Firms for which the ultimate controlling shareholders cannot be identified or for which required accounting or stock return data is missing	42	
Firms which did not put their proposals to a shareholder vote	44	
Firms for which the ultimate controlling shareholders are universities, foreigners or collective enterprises	61	
Final sample		736
Of which:		
Non-state firms		88
State firms		648

The sample period starts from 1999 because corporate announcements made before 1999 are not available in the WIND database. We end the sample period before 2004 because most SEO plans announced in 2004 and 2005 were not processed by the CSRC due to a share reform that began in 2005.[6] As detailed below, we examine the operating and stock performance of firms 2 years after they receive regulatory decisions. The accounting and stock return data used in this study, hence, are up to 2006. We track each proposal to determine whether it was submitted to be voted on at a shareholder meeting and implemented within a year of receiving shareholder approval. Accounting and stock return data are obtained from the China Stock Market and Accounting Research (CSMAR) database. The ultimate controlling shareholder(s) of each sample firm is (are) manually collected from annual reports and we classify them into the following types: state, universities, collective enterprises (including town–village enterprises), domestic individuals and miscellaneous. A firm is defined as a non-state firm if its ultimate controlling shareholders are domestic individuals, and defined as a state firm if its ultimate controlling shareholder is the government.

We obtain a total of 883 firms which announced SEO proposals between 1999 and 2003. We delete 42 firms whose ultimate controlling shareholders cannot be identified or for which required accounting or stock return data is missing, 44 firms which did not forward their proposals for shareholder approval and 61 firms whose ultimate controlling shareholders were universities, town–village enterprises or miscellaneous types. If a proposal was not submitted for shareholder approval, we assume that the firm voluntarily cancelled its stock offering plan. Such firms are excluded because we study regulatory decisions. The ratio of voluntarily cancelled proposals to all proposals (about 5%) is close to that in the United States (Clarke et al., 2001). Universities and town–village enterprises are different from non-state firms in that they are quasi-state-owned, which makes it possible that firms controlled by universities or collective enterprises receive favorable treatment from the government. For example, Brandt and Li (2003) find that town–village enterprises in China are more likely to obtain bank credit than privately owned firms. We exclude these firms from our tests. The final sample consists of 736 firms. Among these firms, 648 are state firms and 88 are non-state firms. This statistic is consistent with the fact that the majority of listed firms in China are still government-controlled. In fact, Bortolotti and Faccio (2009) find that, contrary to conventional wisdom, many partially privatized firms in OECD countries remain in government hands. Table 1 shows the sample selection process.

A proposal approved by a firm's shareholders is subject to a validity period of, in most cases, 1 year from the date on which shareholders approve the proposal. A firm must announce a new proposal and call another shareholder meeting to approve it if the proposal is not implemented within the validity period but the management still wants to issue shares. We therefore define a firm as a successful firm if its proposal is implemented within a year of shareholder approval. Likewise, a firm is defined as an unsuccessful firm if its

[6] In the early stage of China's stock markets, shares held by pre-IPO owners were not tradable. Only stocks held by public shareholders could be legally traded. In 2005, the Chinese government announced its intention to convert all non-tradable shares into tradable shares. This share reform program began in 2005 and was largely completed by 2007. Since then, all shares have been tradable. The CSRC suspended the processing of IPO applications in 2005 and resumed it in mid-2006.

Table 2
Descriptive statistics. A firm is defined as a state firm if its ultimate controlling shareholder is the government or as a non-state firm if its ultimate controlling shareholders are individuals. *Success* equals 1 if a firm successfully offers stock within 1 year of receiving shareholder approval for an offering proposal and 0 otherwise. *Return on Assets* is the average return on assets for the 3 years immediately before the year in which the board announces an offering proposal. *Cash Ratio* is the ratio of cash and cash equivalents to total assets. *Leverage* is the ratio of total liabilities to total assets. Capitalization is the market value of equity. Growth in sales, cash ratio, leverage, assets, sales, and capitalization are based on the corresponding values in the year immediately preceding the year of the board announcement on the offering proposal. *Market Run-up* is the equal-weighted market return over the 12-month period before the board announcement date. Differences in means (medians) between state and non-state firms are compared and *p*-values are reported in the last two columns. *P*-values that are 0.10 or smaller are highlighted in bold (two-sided tests).

Variable	All ($N = 736$)		Non-state firms ($N = 88$)		State firms ($N = 638$)		Difference	
	Mean	Median	Mean	Median	Mean	Median	Mean	Median
Success	0.57	1	0.45	0	0.59	1	**0.02**	**0.02**
Growth in Sales	27%	20%	36%	29%	26%	18%	**0.01**	**0.00**
Return on Assets	7%	7%	8%	7%	7%	7%	0.39	0.28
Cash Ratio	13%	11%	13%	12%	14%	11%	0.39	0.94
Leverage	42%	42%	44%	45%	42%	42%	0.20	0.21
Assets (*Million*)	1580	1045	1033	772	1654	1141	**0.00**	**0.00**
Capitalization (*Million*)	3354	2579	3137	2529	3384	2604	0.46	0.30
Sales (*Million*)	555	506	363	398	589	531	**0.00**	**0.00**
Market Run-up	20%	23%	14%	13%	21%	23%	**0.05**	**0.05**

proposal is not implemented within a year of shareholder approval. Based on this classification scheme, 420 firms, or 57% of the final sample, are successful firms, and 316, or 43% of the final sample, are unsuccessful firms.[7]

3.2. Descriptive statistics

Table 2 reports descriptive statistics for the whole sample and for the two sub-samples of state and non-state firms separately. We find that the success rate for state firms (59%) is significantly higher than that for non-state firms (45%). We also report statistics on growth potential, profitability, internal fund status, leverage, market conditions and firm size because the guidelines issued by the CSRC suggest that these are important factors influencing regulators' decisions or, as predicted by capital structure theories, they are important determinants of firms' decisions to issue equity. Capital structure theories (Myers, 2003) suggest that firms with investment opportunities issue equity if they are already highly levered and do not have sufficient internal funds.[8] Booth et al. (2001) show that major capital structure theories are portable to developing countries. Following Morck et al. (1988), many studies use Tobin's Q as a proxy for investment opportunities. Tobin's Q, however, is endogenous to corporate governance quality and financial constraints (Durnev and Kim, 2005). In our setting, Tobin's Q also suffers from an endogeneity problem since we argue that stock valuation prior to receiving regulatory decisions regarding SEOs reflects investors' expectation about the likelihood of the approval of the offering plan. Hence, Tobin's Q is not a good measure for investment opportunities in our setting. We use *Growth in Sales* as a proxy for investment opportunities, following Durnev and Kim (2005). We use *Return on Assets* to measure profitability. We use *Cash Ratio* as a proxy for internal fund sufficiency and *Leverage* as a proxy for debt capacity. Firm size, as measured by the market value of equity, total assets or total sales, is used as another proxy for debt capacity because large firms have a

[7] Chen and Yuan (2004) investigate whether regulators are able to see through earnings management by rights offering applicants. Their sample period is from 1996 to 1998. They obtain their data from the CSRC and show that about 25% of firms which submit applications to the CSRC are denied approval. The unsuccessful rate in our sample is 43%, which is higher than theirs. Our classification approach considers those SEO proposals that are implicitly or explicitly rejected by the CSRC before the firms submit those proposals, and those that are rejected by regional offices of the CSRC.

[8] Major capital structure theories include pecking order theory, trade-off theory, and agency theory (see a review by Myers (2003)). These theories generally agree that firms with growth opportunities but having difficult financing them with internal funds or new loans are good candidates for new equity issuance.

greater ability to provide collaterals for loans. Finally, we consider market run-up. Favorable market conditions may imply the presence of investment opportunities (Pastor and Veronesi, 2005). The definitions of major variables are given in Appendix B. The distribution of growth rates, including *Growth in Sales* and *Growth in PPE/Growth in Assets* (defined later), are highly skewed. To minimize the influence of outliers, we winsorize growth rates at the top and bottom 5% levels.

Table 2 shows that non-state firms experience faster sales growth than state firms, suggesting that the former have more investment opportunities than the latter. State firms are larger than non-state firms when measured by total assets or sales, but not in terms of market capitalization, suggesting that investors value non-state firms more than state firms. This is likely due to the fact that non-state firms grow more rapidly than their state-owned counterparts. Market conditions before offering announcements are typically better for state firms than for non-state firms. Overall, univariate results suggest that non-state firms are less likely to pass the screening process than their state-controlled counterparts, although they appear to have more investment opportunities.

4. Main analysis

4.1. Determinants of successful offerings

We run the following logistic regression to determine whether state and non-state firms are treated differently in the SEO regulatory screening process:

$$Prob(Success_{it}) = \alpha_0 + \alpha_1 State_{it} + \alpha_2 Growth\ in\ Sales_{it} + \alpha_3 Returns\ on\ Assets_{it} + \alpha_4 Market\ Run\text{-}up_{it} + \alpha_5 Cash\ Ratio_{it} + \alpha_6 Leverage_{it} + \alpha_7 Log\ of\ Capitalization_{it} + \alpha_8 Period_{it} + e_{it}, \quad (1)$$

where the dependent variable, *Success*, is a dummy variable that equals one for a successful firm and zero otherwise. We include *State* to indicate the type of ultimate controlling shareholder. *State* equals one for a state firm and zero otherwise. The control variables include *Growth in Sales*, *Return on Assets*, *Market Run-up*, *Cash Ratio*, *Leverage* and *Log of Capitalization*. As discussed earlier, the 2001 CSRC guidelines lowered the basic profitability requirement firms must meet to qualify for stock offerings. To control for the

Table 3
Determinants of successful offerings. The dependent variable is *Success*. *Success* equals 1 if a firm successfully offers stock within 1 year of receiving shareholder approval for its offering proposal and 0 otherwise. *State* equals 1 if a firm's ultimate controlling shareholder is the state and 0 otherwise. *Return on Assets* is the average return on assets for the 3 years immediately before the year in which the board announces an offering proposal. *Cash Ratio* is the ratio of cash and cash equivalents to assets. *Leverage* is the ratio of liabilities to assets. *Capitalization* is the market value of equity. Growth in sales, cash ratio, leverage, and capitalization are based on the corresponding values in the year immediately preceding the year of the board announcement on the offering proposal. *Market Run-up* is the equal-weighted market return over the 12-month period before the board announcement date. *Period* equals 1 if a board announcement is made after 2001 and 0 otherwise. *P*-values that are 0.10 or smaller are highlighted in bold (two-sided tests).

	All	
	Estimate	*p*-Value
Intercept	8.81	**0.00**
State	0.64	**0.01**
Growth in Sales	−0.39	0.14
Return on Assets	18.83	**0.00**
Market Run-up	1.45	**0.00**
Cash ratio	−2.24	**0.02**
Leverage	1.64	**0.03**
Log of Capitalization	−0.50	**0.00**
Period Dummy	−0.67	**0.02**
N	736	
Pseudo R-square	19.00%	

possible impact of the increased number of SEO candidates on regulators' approval decisions, we include *Period* which takes the value of one if a stock offering plan announcement was made after 2001 and zero otherwise.

Results, reported in Table 3, confirm findings of our univariate tests, i.e., state firms are much more likely to survive the screening process than non-state firms. The coefficient on *State* is positive and significant (0.64, $p = 0.01$), supporting Hypothesis 1. This coefficient estimate means that if the values of all the other variables are held at their sample means, the probability of a state firm surviving the screening process is 57%, whereas that for a non-state firm is 41%. Hence, a representative state firm is 39% [(57% − 41%)/41%] more likely to pass the screening process than a typical non-state firm.

Among the control variables, it appears that market conditions play an important role in regulators' decisions. The coefficient estimate on *Market Run-up* is positive and significant (1.45, $p = 0.00$), suggesting that a firm is much more likely to receive approval when market conditions are favorable. The coefficient on *Leverage* is positive and significant (1.64, $p = 0.03$) and the coefficient on *Cash Ratio* is significantly negative (−2.24, $p = 0.02$), suggesting that regulators tend to approve equity issuance applications made by firms with insufficient internal funds or high leverage. The coefficient on *Period* is negative and significant (−0.67, $p = 0.02$), suggesting that the success rate fell after the CSRC relaxed its profitability requirement, probably due to an increase in the number of qualified SEO candidates. The major proxy for investment opportunities, *Growth in Sales*, however, is not significantly related to regulatory decisions (−0.39, $p = 0.14$).

4.2. Investment growth after regulatory decisions

In this subsection, we investigate new investment made during the period after regulatory decisions regarding SEO applications. We define the year in which the screening outcome is determined as Year 0 and examine growth in investment in Year 1 and Year 2.[9] Investment includes expenditure on property, plant and equipment (PPE), as well as on inventories, sales credit and research and development (Stein, 2003). Hence, growth in investment is manifested in growth in PPE and growth in accounts receivable, inventories and intangible assets. Following Desai et al. (2008), we use growth in net PPE to capture new capital expenditure and use growth in total assets to capture total new investment. Total assets include cash and cash equivalents that are not normally considered investment. We therefore calculate growth in total assets adjusted for cash and short-term investment. Specifically, these measures are constructed in the following way:

$$Growth\ in\ PPE_{i,t} = \frac{PPE_{i,t} - PPE_{i,t-1}}{PPE_{i,t-1}}, \tag{2}$$

$$Growth\ in\ Assets_{i,t} = \frac{Adj.\ Assets_{i,t} - Adj.\ Assets_{i,t-1}}{Adj.\ Assets_{i,t-1}}. \tag{3}$$

Fig. 1 plots *Growth in PPE* and *Growth in Assets* for non-state and state firms. These figures demonstrate that both capital expenditure and total investment grow more rapidly in successful non-state firms than in unsuccessful non-state firms. Although the investment of successful state firms also grows faster than that of unsuccessful state firms, the difference is not as pronounced as that between successful and unsuccessful non-state firms.

In Table 4, we present results of formal tests for the difference between the groups in the growth rate of investment. Panel A shows that investment in successful non-state firms grows much faster than it does in unsuccessful non-state firms. The mean (median) growth rate in PPE for successful non-state firms is 36% (35%) in Year 1 and 27% (16%) in Year 2, whereas the mean (median) growth rate in PPE for unsuccessful non-state firms is 12% (3%) in Year 1 and 6% (3%) in Year 2. Although successful state firms also invest more than unsuccessful state firms, the gap between them is not as pronounced as that between successful and unsuccessful non-state firms. The mean (median) growth rate in PPE for successful state firms is 20% (14%) for Year 1 and 15% (10%) for Year 2, whereas the mean (median) growth rate in PPE for unsuccessful

[9] Because most sample firms do not formally announce the cancellation of stock offering proposals, we estimate the year when regulatory decisions are made. The estimation procedure is described in detail in a later section.

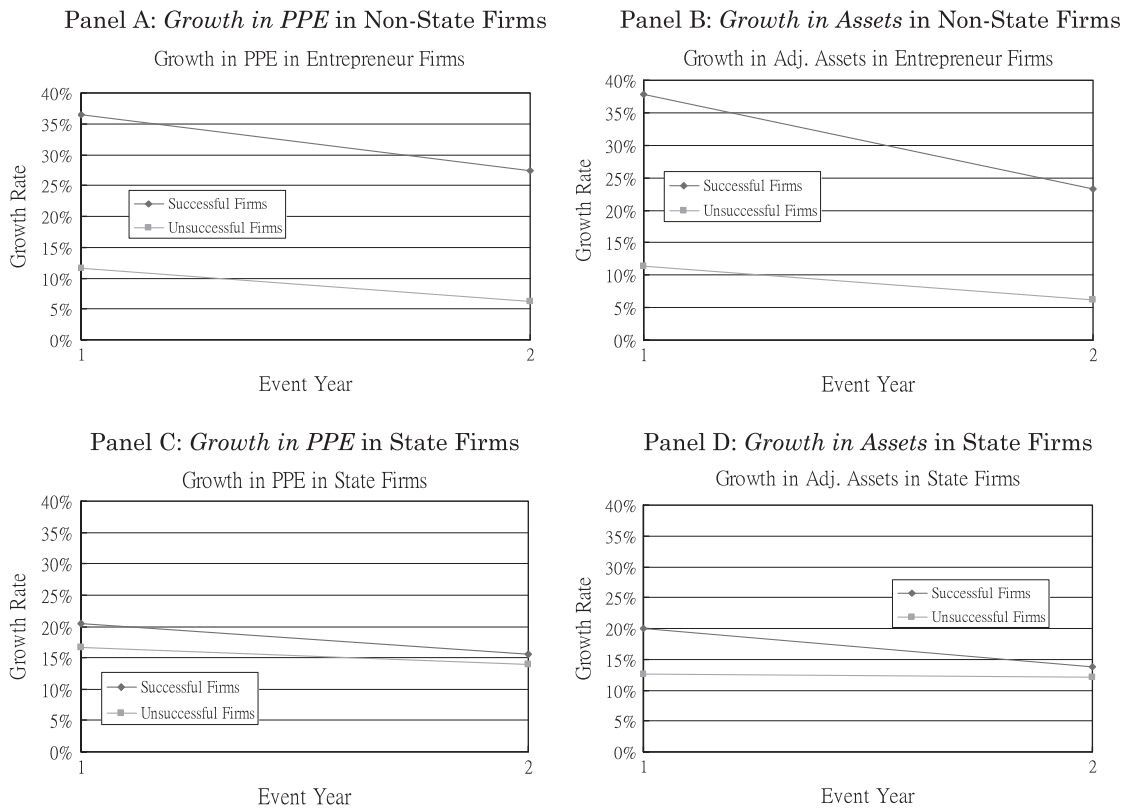


Fig. 1. Investment growth after regulatory decisions. A firm is defined as a successful firm if it successfully offers stock within 1 year of receiving shareholder approval for the proposal and is defined as an unsuccessful firm otherwise. A firm is defined as a state firm if its ultimate controlling shareholder is the government or as a non-state firm if its ultimate controlling shareholders are individuals. Year 0 is the year in which the regulatory decision on a firm's stock offering proposal is made. *Growth in PPE* and *Growth in Assets* (adjusted by Cash and short-term investments) are calculated in the following ways:

$$Growth\ in\ PPE = \frac{PPE_t - PPE_{t-1}}{PPE_{t-1}}$$

$$Growth\ in\ Assets = \frac{Adj.\ Assets_t - Adj.\ Assets_{t-1}}{Adj.\ Assets_{t-1}}$$

Panels A and B plot *Growth in PPE* and *Growth in Assets* by non-state firms, respectively; Panels C and D plot *Growth in PPE* and *Growth in Assets* by state firms, respectively.

state firms is 17% (10%) for Year 1 and 14% (6%) for Year 2. We observe a similar pattern for growth in adjusted assets.

Because investment is affected by other factors such as the presence of investment opportunities and funds from other sources which could also be associated with regulatory decisions, we run the following multivariate regression to determine the impact of regulatory decisions on investment among SEO applicants in the long run:

$$\begin{aligned} Growth\ in\ PPE_{it}/Assets_{it} = {} & \beta_0 + \beta_1 State_{it} + \beta_2 Success_{it} + \beta_3 State_{it} * Success_{it} + \beta_4 Growth\ in\ Sales_{it} \\ & + \beta_5 Return\ on\ Assets_{it} + \beta_6 Market\ Run\text{-}up_{it} + \beta_7 Cash\ Ratio_{it} \\ & + \beta_8 Leverage_{it} + \beta_9 Log\ of\ Capitalization_{it} + \beta_{10} Period_{it} + f_{it}, \end{aligned} \quad (4)$$

Table 4
Investment growth after regulatory decisions. A firm is defined as a successful firm if it successfully offers stock within 1 year of receiving shareholder approval for the proposal and is defined as an unsuccessful firm otherwise. A firm is defined as a state firm if its ultimate controlling shareholder is the government or as a non-state firm if its ultimate controlling shareholders are individuals. Year 0 is the year in which the regulatory decision on a firm's stock offering proposal is made. *Growth in PPE* and *Growth in Assets* (adjusted by cash and cash equivalents) are calculated in the following ways:

$$Growth\ in\ PPE = \frac{PPE_t - PPE_{t-1}}{PPE_{t-1}}$$

$$Growth\ in\ Assets = \frac{Adj.\ Assets_t - Adj.\ Assets_{t-1}}{Adj.\ Assets_{t-1}}$$

P-values that are 0.10 or smaller are highlighted in bold (two-sided tests). In Panel B, *p*-values are after correction for heteroskedasticity.

N	All	Non-state firms			State firms		
		Successful	Unsuccessful	Difference	Successful	Unsuccessful	Difference
	736	40	48		383	265	
Panel A: Univariate analysis							
Mean growth in *PPE*							
Year 1	19%	36%	12%	**0.00**	20%	17%	**0.09**
Year 2	15%	27%	6%	**0.00**	15%	14%	0.46
Median growth in *PPE*							
Year 1	12%	35%	3%	**0.00**	14%	10%	**0.03**
Year 2	8%	16%	3%	**0.00**	10%	6%	**0.07**
Mean growth in *Adj. Assets*							
Year 1	18%	38%	11%	**0.00**	20%	13%	**0.00**
Year 2	13%	23%	6%	**0.00**	14%	12%	0.30
Median growth in *Adj. Assets*							
Year 1	14%	40%	6%	**0.00**	18%	9%	**0.00**
Year 2	10%	22%	4%	**0.00**	11%	8%	**0.03**

Variable	Year 1				Year 2			
	Growth in PPE		*Growth in Assets*		*Growth in PPE*		*Growth in Assets*	
	Estimate	*p*-Value	Estimate	*p*-Value	Estimate	*p*-Value	Estimate	*p*-Value
Panel B: Multivariate analysis for the whole sample								
Intercept	0.10	0.20	0.25	**0.00**	−0.06	0.45	0.10	**0.06**
State	0.08	**0.09**	0.01	0.71	0.09	**0.02**	0.06	**0.04**
Success	0.24	**0.00**	0.24	**0.00**	0.20	**0.00**	0.15	**0.00**
State ∗ Success	−0.22	**0.00**	−0.17	**0.00**	−0.20	**0.00**	−0.16	**0.00**
Growth in Sales	0.13	**0.00**	0.07	**0.00**	0.12	**0.00**	0.05	**0.05**
Return on Assets	−0.01	0.99	−0.09	0.77	0.80	**0.08**	0.17	0.62
Market Run-up	0.07	0.16	−0.02	0.64	0.08	**0.07**	0.09	**0.00**
Cash Ratio	−0.08	0.51	−0.07	0.44	0.12	0.33	0.00	0.99
Leverage	−0.10	0.30	−0.28	**0.00**	−0.07	0.39	−0.18	**0.00**
Log of Capitalization	0.00	0.76	0.00	0.15	0.00	0.71	0.00	0.91
Period	−0.02	0.56	−0.01	0.56	0.03	0.41	0.00	0.88
N	736		736		736		736	
Adj. R-square	4.63%		11.47%		5.18%		6.71%	

where *Success* is set to one for successful firms and zero otherwise. We include *State, Success* and an interaction term between them, *State ∗ Success*. We include all control variables used in the regulatory decision model for two reasons. First, these variables are proxies for investment opportunities and the availability of capital from other sources, which affect investment. Second, by including the same set of controls in both the

screening and investment models, the coefficient on *Success* potentially captures the impact of an exogenous or unpredicted shock to capital availability on firm investment. In a subsequent section, we use another approach to further address the endogeneity issue, following Faulkender and Petersen (2009).

Panel B, Table 4 reports regression results. The coefficient on *State* is positive and in most cases significant (0.08, $p = 0.09$ for Year 1 and 0.09, $p = 0.02$ for Year 2 using growth in PPE; 0.01, $p = 0.71$ for Year 1 and 0.06, $p = 0.04$ for Year 2 using growth in adjusted assets), suggesting that state firms invest more than non-state firms if both are denied approval to issue equity. The coefficient on *Success* is significantly positive (0.24, $p = 0.00$ for Year 1 and 0.20, $p = 0.00$ for Year 2 using growth in PPE; 0.24, $p = 0.00$ for Year 1 and 0.15, $p = 0.00$ for Year 2 using growth in adjusted assets), suggesting that successful non-state firms invest more than unsuccessful non-state firms. The coefficient on the interaction between *State* and *Success* is significantly negative (-0.22, $p = 0.00$ for Year 1 and -0.20, $p = 0.00$ for Year 2 using growth in PPE; -0.17, $p = 0.00$ for Year 1 and -0.16, $p = 0.00$ for Year 2 using growth in adjusted assets), suggesting that successful state firms invest less than successful non-state firms. Collectively, these findings support Hypothesis 2 that non-state firms exhibit greater sensitivities of investment to regulatory decisions than state firms.

Results for control variables are consistent with theoretical predictions and previous empirical findings. For example, the coefficient on *Growth in Sales* is positive and highly significant, suggesting that fast-growing firms invest more. *Return on Assets* is positive and significant in Year 2 using growth in PPE. *Market Run-up* is positive and significant in Year 2, consistent with investment in a high return state. *Leverage* is negative and significant using growth in adjusted assets, suggesting that firms with low debt capacity invest less. *Cash Ratio*, *Log of Capitalization* and *Period* are insignificant.

4.3. Stock performance after regulatory decisions

In this subsection, we examine stock performance over a 2-year period after regulatory decisions. We choose a 2-year period because we believe it is long enough for investors to gain a full understanding of whether a firm's planned investment projects can be implemented and yield results. For successful firms, the start date of the 2-year period is defined as the date on which the prospectus is published. Most unsuccessful firms do not announce the cancellation of offerings or regulatory decisions. Hence, we estimate the date on which investors learn that a stock offering proposal will not be implemented. For successful firms, the average number of days between the shareholder approval date and the prospectus publication date is about 235 days. Because most firms publish their prospectus immediately after receiving regulatory approval, we treat the average time interval between the shareholder approval date and the regulatory decision date as about 235 calendar days. Accordingly, we set the start date of the 2-year period for unsuccessful firms which do not announce the cancellation of their offering plans as the 235th day after the shareholder approval date. For unsuccessful firms that actually announce the cancellation of their offering plans, the start date is set as the date of the cancellation announcement. The year in which a regulatory decision is first known to investors is defined as Year 0.

Following Loughran and Ritter (1995), we match each sample firm with a control firm of similar size to calculate its long-run abnormal stock return. This approach is less vulnerable to the skewness problem and hence yields better-specified statistics for detecting long-run abnormal stock returns in comparison with a reference portfolio approach (Barber and Lyon, 1997). For our main analysis, we use the market value of equity as a proxy for firm size. To find a matching firm, on December 31 of Year 0 for a sample firm, we obtain all other firms that do not issue new shares within the 2-year period surrounding the start date of the 2-year event window and rank them by market value of equity. The firm with a market value closest to that of the sample firm is chosen as its matched firm. We calculate both buy-and-hold abnormal stock returns ($BHAR$) and cumulative abnormal returns (CAR) since financial economists argue that both measures have their merits and drawbacks (Fama, 1998; Barber and Lyon, 1997). Specifically, $BHAR$ and CAR for sample Firm i from the first month until Month T are calculated in the following way:

$$BHAR_{i,T} = \prod_{t=1}^{T}(1 + r_{i,s,t}) - \prod_{t=1}^{T}(1 + r_{i,c,t}), \tag{5}$$

$$CAR_{i,T} = \sum_{i=1}^{T}(r_{i,s,t} - r_{i,c,t}), \tag{6}$$

where $r_{i,s,t}$ is the raw return for sample Firm i during Month t and $r_{i,c,t}$ is the raw return for the corresponding control firm during Month t.

Fig. 2 plots the *BHAR*s and *CAR*s for sample firms. Panels A and B show that successful non-state firms perform significantly better than unsuccessful non-state firms. Panels C and D, however, indicate that successful and unsuccessful state firms do not differ in stock performance after regulatory decisions.

Table 5 reports results of our formal tests. Univariate test results, reported in Panel A, show that neither successful nor unsuccessful state firms have pronounced abnormal stock returns and that the differences in

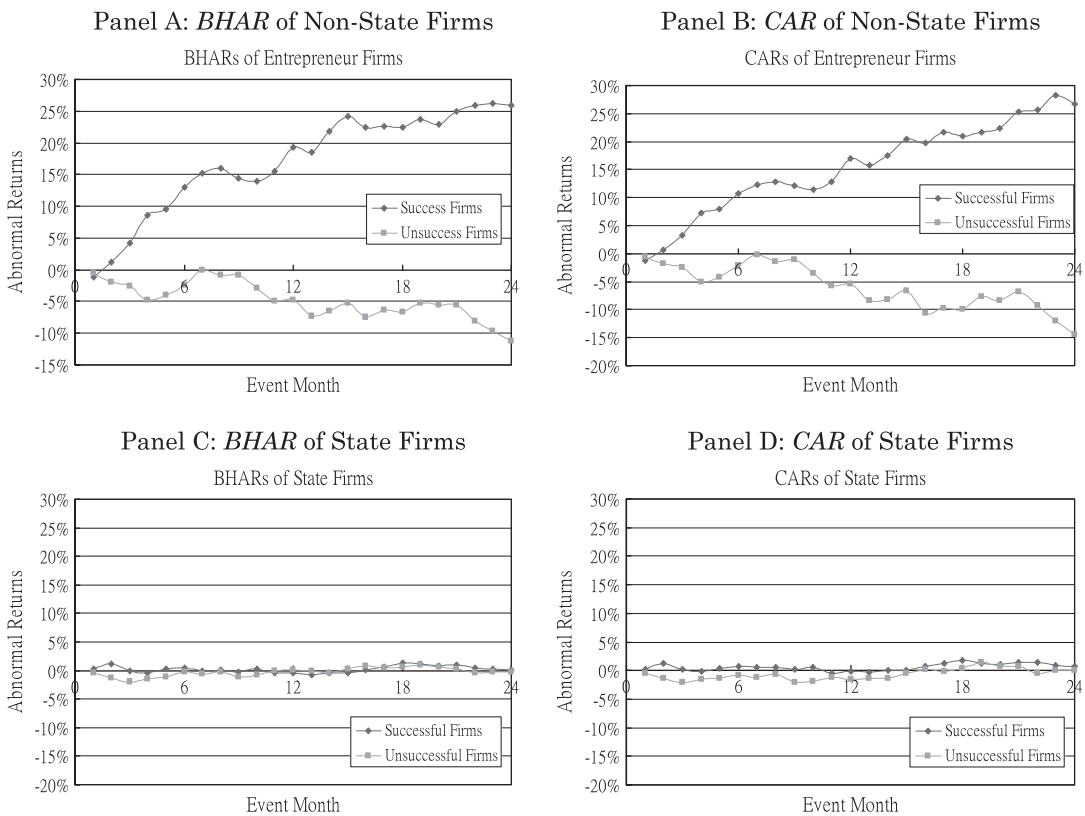


Fig. 2. Stock performance after regulatory decisions. A firm is defined as a successful firm if it successfully offers stock within 1 year of receiving shareholder approval for the proposal and is defined as an unsuccessful firm otherwise. A firm is defined as a state firm if its ultimate controlling shareholder is the government or as a non-state firm if its ultimate controlling shareholders are individuals. *BHAR* and *CAR* for sample firm i from the first month until Month T are calculated in the following ways:

$$BHAR_{i,T} = \prod_{t=1}^{T}(1 + r_{i,s,t}) - \prod_{t=1}^{T}(1 + r_{i,c,t})$$

$$CAR_{i,T} = \sum_{i=1}^{T}(r_{i,s,t} - r_{i,c,t})$$

where $r_{i,s,t}$ is the tth monthly raw return for sample firm i and $r_{i,c,t}$ is the tth monthly raw return for the corresponding control firm. Panel A (B) plots the average *BHAR* (*CAR*) over a 24-month period after regulatory decisions for non-state firms and Panel C (D) plots the average *BHAR* (*CAR*) over a 24-month period for state firms.

abnormal returns between them are not significant. Meanwhile, successful non-state firms perform significantly better than unsuccessful non-state firms. The mean (median) *BHAR* for successful non-state firms over the 2-year period is 26% (9%), whereas the mean (median) *BHAR* for unsuccessful non-state firms over the same period is −11% (−3%), and the difference is highly significant at the 0.00 level. The mean (median)

Table 5
Stock performance after regulatory decisions. A firm is defined as a successful firm if it successfully offers stock within 1 year of receiving shareholder approval for the proposal and is defined as an unsuccessful firm otherwise. A firm is defined as a state firm if its ultimate controlling shareholder is the government or as a non-state firm if its ultimate controlling shareholders are individuals. *BHAR* and *CAR* for sample firm *i* from the first month until Month *T* are calculated in the following ways:

$$BHAR_{i,T} = \prod_{t=1}^{T}(1 + r_{i,s,t}) - \prod_{t=1}^{T}(1 + r_{i,c,t})$$

$$CAR_{i,T} = \sum_{i=1}^{T}(r_{i,s,t} - r_{i,c,t})$$

where $r_{i,s,t}$ is the tth monthly raw return for sample firm i and $r_{i,c,t}$ is the tth monthly raw return for the corresponding control firm. *P*-values that are 0.10 or smaller are highlighted in bold (two-sided tests). In Panel B, *p*-values are after correction for heteroskedasticity.

	All	Non-state firms			State firms		
		Successful	Unsuccessful	Difference	Successful	Unsuccessful	Difference
N	736	40	48		383	265	
Panel A: Univariate analysis							
Mean buy-and-hold abnormal returns							
12-Month	1%	19%	−5%	**0.01**	0%	0%	0.87
24-Month	1%	26%	−11%	**0.00**	0%	0%	0.95
Median buy-and-hold abnormal returns							
12-Month	−1%	6%	−4%	**0.01**	−2%	0%	0.84
24-Month	1%	9%	−3%	**0.00**	1%	1%	0.88
Mean cumulative abnormal returns							
12-Month	0%	17%	−5%	**0.01**	0%	−2%	0.61
24-Month	1%	27%	−14%	**0.00**	1%	0%	0.85
Median cumulative abnormal returns							
12-Month	−2%	9%	−5%	**0.02**	−3%	−1%	0.99
24-Month	0%	10%	−8%	**0.00**	−1%	1%	0.98

Variable	12-Month				24-Month			
	BHAR		*CAR*		*BHAR*		*CAR*	
	Estimate	*p*-Value	Estimate	*p*-Value	Estimate	*p*-Value	Estimate	*p*-Value
Panel B: Multivariate regressions for the whole sample								
Intercept	−0.04	0.67	−0.04	0.66	−0.11	0.38	−0.08	0.57
State	0.06	0.24	0.04	0.45	0.12	**0.05**	0.15	**0.05**
Success	0.24	**0.00**	0.22	**0.01**	0.38	**0.00**	0.42	**0.00**
State ∗ Success	−0.25	**0.01**	−0.21	**0.02**	−0.38	**0.00**	−0.40	**0.00**
Growth in Sales	0.01	0.79	−0.01	0.87	0.09	0.14	0.08	0.20
Return on Assets	0.52	0.41	0.39	0.55	0.07	0.93	−0.30	0.72
Market Run-up	−0.01	0.93	−0.02	0.73	0.02	0.78	−0.06	0.46
Cash Ratio	−0.15	0.36	−0.10	0.53	−0.14	0.47	−0.05	0.82
Leverage	−0.02	0.88	0.01	0.97	−0.05	0.77	−0.09	0.61
Log of Capitalization	0.00	0.12	0.00	0.23	0.00	0.48	0.00	0.49
Period	0.02	0.69	0.00	0.98	0.02	0.83	−0.02	0.82
N	736		736		736		736	
Adj. R-square	0.57%		0.32%		0.83%		1.03%	

CAR for successful non-state firms over the 2-year period is 27% (10%), whereas the mean (median) *CAR* for unsuccessful non-state firms over the same period is −14% (−8%), and the difference is highly significant at the 0.00 level.

Panel B, Table 5 reports multivariate regression results. The explanatory and control variables are the same as those reported in Table 4. The stock performance of unsuccessful state firms, *State*, is better than that of unsuccessful non-state firms, and the difference is significant at the 5% level for the 24-month period. The coefficients on *Success* are positive and significant (0.24, $p = 0.00$ for 12-month and 0.38, $p = 0.00$ for 24-month using *BHAR*; 0.22, $p = 0.01$ for 12-month and 0.42, $p = 0.00$ for 24-month using *CAR*), suggesting that successful non-state firms perform much better than unsuccessful non-state firms. The coefficients on the interaction between *Success* and *State* are significantly negative (−0.25, $p = 0.01$ for 12-month and −0.38; $p = 0.00$ for 24-month using *BHAR*; −0.21, $p = 0.02$ for 12-month and −0.40, $p = 0.00$ for 24-month using *CAR*). This result is similar to that based on subsequent investment, suggesting that successful state firms significantly underperform successful non-state firms, again supporting Hypothesis 2. Therefore, the stock performance of non-state firms is sensitive to regulatory decisions, whereas that of state firms is not, even though they are favored in the regulatory screening process.

4.4. Alternative explanation?

Morck et al. (2000), among others, suggest that in certain countries such as China, stock prices do not accurately reflect firm-specific information. It is possible that investors may not be able to differentiate between firms with and without investment opportunities before the release of regulatory decisions and thus price these firms similarly. If the Chinese government successfully distinguishes firms with investment opportunities from those without investment opportunities and approves the former to conduct SEOs, then we observe approved firms investing more than denied firms because the former have more investment opportunities. The regulatory decision also conveys useful information about SEO firms' investment opportunities to the market. Accordingly, investors bid up stock prices of firms approved for SEOs and drive down stock prices of firms denied approval. This argument can explain why successful non-state firms have better long-term stock performance than unsuccessful non-state firms. This argument, however, cannot explain why successful and unsuccessful state firms do not differ significantly in long-term investment and stock performance. In fact, Gul et al. (2010) find that the stock prices of state firms in China are less informative than those of non-state firms. If the above reasoning is true, the difference in the long-run stock performance between successful and unsuccessful state firms should be greater than that between successful and unsuccessful non-state firms, which is contrary to our findings.

5. Extensions and robustness tests

5.1. Debt financing after regulatory decisions

We have argued that state firms have better access to bank credit or/and are more likely to receive government financial support, and thus their performance and investment are less likely to be affected by regulatory decisions regarding equity issuance. In contrast, non-state firms have difficulties getting bank credit, and therefore have to abandon investment opportunities if their SEO applications are rejected. To confirm this conjecture, we examine debt financing after regulatory decisions. The literature on financial development typically examines both total debt financing and long-term debt financing (Demirguc-Kunt and Maksimovic, 1998). We thus calculate both the growth in long-term debt and total debt using the following formulas:

$$Growth\ in\ Long\text{-}term\ Debt_{i,t} = \frac{Long\text{-}term\ Debt_{i,t} - Long\text{-}term\ Debt_{i,t-1}}{Long\text{-}term\ Debt_{i,t-1}}, \tag{7}$$

$$Growth\ in\ Debt_{i,t} = \frac{Total\ Debt_{i,t} - Total\ Debt_{i,t-1}}{Total\ Debt_{i,t-1}}. \tag{8}$$

Table 6
Debt financing after regulatory decisions. A firm is defined as a successful firm if it successfully offers stock within 1 year of receiving shareholder approval for the proposal and is defined as an unsuccessful firm otherwise. A firm is defined as a state firm if its ultimate controlling shareholder is the government or as a private firm if its ultimate controlling shareholders are individuals. Year 0 is the year in which the regulatory decision on a firm's stock offering proposal is made. *Growth in Long-term Debt* and *Growth in Total Debt* are calculated in the following ways:

$$Growth\ in\ Long\text{-}term\ Debt = \frac{Long\text{-}term\ Debt_t - Long\text{-}term\ Debt_{t-1}}{Long\text{-}term\ Debt_{t-1}}$$

$$Growth\ in\ Debt_{i,t} = \frac{Total\ Debt_{i,t} - Total\ Debt_{i,t-1}}{Total\ Debt_{i,t-1}}$$

P-values that are 0.10 or smaller are highlighted in bold (two-sided tests). In Panel B, *p*-values are after correction for heteroskedasticity.

Variable	Year 1				Year 2			
	Growth in Long-term Debt		*Growth in Debt*		*Growth in Long-term Debt*		*Growth in Debt*	
	Estimate	*p*-Value	Estimate	*p*-Value	Estimate	*p*-Value	Estimate	*p*-Value
Intercept	0.79	0.01	0.77	0.00	0.04	0.87	0.28	**0.05**
State	0.31	**0.04**	−0.02	0.80	0.22	**0.09**	0.13	**0.04**
Success	0.37	**0.10**	0.38	**0.00**	0.36	**0.09**	0.31	**0.00**
State ∗ Success	−0.40	**0.10**	−0.24	**0.06**	−0.34	0.14	−0.31	**0.01**
Growth in Sales	0.17	0.19	0.12	**0.06**	0.08	0.43	0.02	0.73
Return on Assets	−1.91	0.18	−0.05	0.95	−0.92	0.54	1.77	**0.06**
Market Run-up	−0.89	**0.06**	−0.54	**0.02**	−0.65	0.13	−0.52	**0.01**
Cash Ratio	−0.22	0.21	−0.13	0.18	0.25	0.11	0.03	0.71
Leverage	−1.00	**0.01**	−0.92	**0.00**	−0.02	0.96	−0.48	**0.00**
Log of Capitalization	0.00	0.78	0.00	**0.01**	0.00	0.81	0.00	0.38
Period	−0.28	**0.04**	−0.15	**0.03**	0.23	**0.08**	−0.08	0.26
N	736		736		736		736	
Adj. R-square	1.50%		10.95%		0.00%		6.55%	

Because debt financing is also determined by firms' investment opportunities and debt capacities, we control for those variables in Eq. (4). Results are reported in Table 6. We find that that state firms obtain more bank credit after regulatory decisions than non-state firms if both are denied approval to issue equity (coefficient on *State* is 0.31, $p = 0.04$ for Year 1 and 0.22, $p = 0.09$ for Year 2 using *Growth in Long-term Debt*; 0.13, $p = 0.04$ for Year 2 using *Growth in Debt*). This potentially explains an earlier finding that the investment and stock performance of state firms are not sensitive to regulatory decisions, while those of non-state firms are. The coefficients on *State ∗ Success* are mostly negative and significant (−0.41, $p = 0.10$ for Year 1 using *Growth in Long-term Debt*; −0.24, $p = 0.06$ for Year 1 and −0.31, $p = 0.01$ for Year 2 using *Growth in Debt*), suggesting that successful state firms borrow less after obtaining equity capital.

Successful non-state firms appear to borrow significantly more than unsuccessful non-state firms (coefficient on *Success* is 0.37 and $p = 0.10$ in Year 1 and 0.36 and $p = 0.09$ in Year 2 using *Growth in Long Term Debt*; 0.38 and $p = 0.00$ in Year 1 and 0.31 and $p = 0.00$ in Year 2 using *Growth in Debt*). This result suggests that regulatory approval enables non-state firms to raise equity capital as well as gain better access to bank credit. As a consequence, their financial constraints are eased, enabling them to grow rapidly. Our result is consistent with Cull and Xu (2005) and Ayyagari et al. (2010) who find that non-state firms with bank financing grow faster than those without.

5.2. Politically connected non-state firms and central versus local state firms

Our results so far demonstrate that non-state firms are discriminated against in the regulatory screening process. Previous studies suggest that political connections bring benefits to connected firms around the world (Fisman, 2001; Faccio, 2006; Fan et al., 2008; Berkman et al., 2011) and that political connections are associated with inefficiency (Fan et al., 2007; Hung et al., 2011). Is it possible that non-state firms can overcome regulatory discrimination by building political connections? Are state firms controlled by the central

government more likely to pass the regulatory screening process than state firms controlled by local governments? We conduct additional tests to examine these issues.

A non-state firm is identified as having a political connection if one or more of its executives or directors are (were) members of the National People's Congress (NPC) or the Chinese People's Political Consultative Conference (CPPCC), hold (held) positions in central ministries or are (were) leaders of national industry organizations.[10] Industry organizations in China are government-controlled and many of them are actually transformed from former industry administrative ministries.

In our main analysis, state firms are treated as a homogenous group in terms of their strategic importance and their connections with regulators, which may not be the case in reality. The ultimate controlling shareholders of state firms include the central government (including the State Asset Management Bureau or central ministries) and local governments. Firms that are directly controlled by the central government could be more strategically important and thus be treated more favorably in the screening process than those controlled by local governments. Furthermore, firms that are controlled by the central government may have more direct, stronger connections with central regulators than those controlled by local governments.

We run the following logistic regression to assess the impact of political connections on the screening outcome among non-state firms and the impact of central versus local state firms:

$$\begin{aligned} Prob(Success_{it}) = {} & \alpha_0 + \alpha_1 Central\ State_{it} + \alpha_2 Local\ State_{it} + \alpha_3 Politically\ Connected_{it} \\ & + \alpha_4 Growth\ in\ Sales_{it} + \alpha_5 Returns\ on\ Assets_{it} + \alpha_6 Market\ Run\text{-}up_{it} \\ & + \alpha_7 Cash\ Ratio_{it} + \alpha_8 Leverage_{it} + \alpha_9 Log\ of\ Capitalization_{it} + \alpha_{10} Period_{it} + e_{it}, \end{aligned} \tag{9}$$

where *Politically Connected* takes a value of one if a non-state firm has a political connection and zero otherwise; *Central State* takes a value of one if a firm is ultimately controlled by the central government and zero otherwise; *Local State* takes a value of one if a firm is controlled by a local government and zero otherwise.

Results are reported in Panel A, Table 7. The coefficient on *Politically Connected* is positive and significant (0.88, $p = 0.08$) and is insignificantly different (Chi-square = 0.001, $p = 0.97$) from that on *Local State* (0.87, $p = 0.01$). Hence, non-state firms with political connections have a significantly greater chance of surviving the screening process than those without political connections. Further, the chance of surviving the screening process for a politically connected non-state firm is comparable to that of a local state owned firm, suggesting that non-state firms can largely overcome regulatory discrimination by building connections to regulators. This result speaks to the value of political connections (Fisman, 2001; Faccio, 2006; Fan et al., 2008). However, building political connections does not necessarily result in a desirable outcome for non-state firms as a whole because politically connected firms crowd out unconnected firms in the capital allocation process. Panel A, Table 7 also shows that central state firms are marginally significantly more likely (Chi-square = 2.56, $p = 0.11$) than local state firms to pass the screening process (1.25, $p = 0.00$ for central state firms versus 0.87, $p = 0.01$ for local state firms).

Based on the above results, when all other variables are held at their sample means, the probability of a central state firm surviving the regulatory screening process is 65%. The probabilities are 56%, 56% and 35% for a local state firm, a politically connected non-state firm and a non-politically connected non-state firm, respectively. Therefore, a central state firm has 16% ((65% − 56%)/56%) more chance to pass the screening process than a local state firm or a politically connected non-state firm, and a politically connected non-state firm has 60% ((56% − 35%)/35%) more chance to pass the screening process than a non-politically connected non-state firm.

Panel B, Table 7 presents results on the sensitivity of investment growth to regulatory decisions. There is some evidence (based on growth in PPE in Year 1) that politically connected non-state firms behave in a manner somewhat similar to state firms in that they invest more than their non-connected counterparts if both are denied approval to issue equity (coefficient on *Political Connected* is 0.15, $p = 0.03$) and that they invest less if they receive approval to raise capital than their non-connected counterparts who also receive approval to raise

[10] Boukari et al. (2008) find that in many countries, newly privatized firms have political connections. Therefore, it is possible that some connected non-state firms are former state firms and retain bureaucrats as their executives after the privatization.

Table 7
Political connections for non-state firms and state versus local state firms. *Politically Connected* takes a value of 1 if a non-state firm has political connection at the national level and 0 otherwise; a non-state firm is defined to have national-level political connection if one or more of its managers or directors are (were) members of the NPC or the CPPCC, hold (held) positions in central ministries or are (were) leaders of national professional societies or industry organizations. *Central State* takes a value of 1 if a firm is ultimately controlled by the central government and 0 otherwise. *Local State* takes a value of 1 if a firm is controlled by a local government and 0 otherwise. *P*-values that are 0.10 or smaller are highlighted in bold (two-sided tests). In Panels B and C, *p*-values are after correction for heteroskedasticity.

	All	
	Estimate	*p*-Value
Panel A: Determinants of successful offerings		
Intercept	9.27	**0.00**
Central State	1.25	**0.00**
Local State	0.87	**0.01**
Politically Connected	0.88	**0.08**
Growth in Sales	−0.39	0.14
Return on Assets	18.45	**0.00**
Market Run-up	1.46	**0.00**
Cash ratio	−2.56	**0.01**
Leverage	1.69	**0.02**
Log of Capitalization	−0.53	**0.00**
Period	−0.69	**0.02**
N	736	
Pseudo R-square	19.16%	

	Year 1				Year 2			
	Growth in PPE		*Growth in Assets*		*Growth in PPE*		*Growth in Assets*	
	Estimate	*p*-Value	Estimate	*p*-Value	Estimate	*p*-Value	Estimate	*p*-Value
Panel B: Investment subsequent to regulatory decisions								
Intercept	0.05	0.53	0.25	**0.00**	−0.05	0.54	0.11	**0.07**
Central State	0.07	0.27	0.03	0.54	0.10	**0.10**	0.10	**0.04**
Local State	0.13	**0.02**	0.00	0.94	0.08	0.12	0.05	0.14
Politically Connected	0.15	**0.03**	−0.01	0.80	−0.03	0.65	0.00	0.94
Success	0.32	**0.00**	0.30	**0.00**	0.21	**0.01**	0.16	**0.00**
*Central State * Success*	−0.24	**0.02**	−0.22	**0.00**	−0.21	**0.03**	−0.20	**0.00**
*Local State * Success*	−0.32	**0.00**	−0.24	**0.00**	−0.21	**0.01**	−0.16	**0.00**
*Politically Connected * Success*	−0.23	**0.05**	−0.12	0.15	−0.01	0.94	−0.01	0.87
Growth in Sales	0.13	**0.00**	0.06	**0.01**	0.11	**0.00**	0.04	**0.07**
Return on Assets	−0.02	0.97	−0.05	0.88	0.82	**0.07**	0.19	0.58
Market Run-up	0.07	0.15	−0.01	0.72	0.00	0.79	0.00	0.93
Cash ratio	−0.08	0.53	−0.09	0.29	0.10	0.41	−0.01	0.89
Leverage	−0.09	0.31	−0.27	**0.00**	−0.06	0.42	−0.18	**0.00**
Log of Capitalization	0.00	0.67	0.00	**0.09**	0.09	**0.06**	0.10	**0.00**
Period	−0.02	0.53	−0.01	0.74	0.03	0.36	0.00	0.98
N	736		736		736		736	
Adj. R-square	4.94%		12.12%		4.80%		6.50%	

	12-Month				24-Month			
	BHAR		*CAR*		*BHAR*		*CAR*	
	Estimate	*p*-Value	Estimate	*p*-Value	Estimate	*p*-Value	Estimate	*p*-Value
Panel C: Stock performance subsequent to regulatory decisions								
Intercept	−0.03	0.78	−0.03	0.79	−0.17	0.18	−0.12	0.39
Central State	0.13	**0.10**	0.14	0.12	0.31	**0.01**	0.36	**0.00**
Local State	0.01	0.84	0.00	0.95	0.13	**0.09**	0.14	0.14
Politically Connected	−0.07	0.39	−0.07	0.46	0.15	0.11	0.11	0.36
Success	0.29	**0.03**	0.26	**0.05**	0.53	**0.00**	0.54	**0.00**
*Central State * Success*	−0.39	**0.01**	−0.35	**0.02**	−0.73	**0.00**	−0.72	**0.00**
*Local State * Success*	−0.27	**0.04**	−0.22	**0.10**	−0.48	**0.01**	−0.47	**0.01**
*Politically Connected * Success*	−0.09	0.56	−0.07	0.66	−0.40	**0.04**	−0.32	0.13
Growth in Sales	0.00	0.98	−0.02	0.66	0.07	0.22	0.06	0.32

Table 7 (*continued*)

	12-Month				24-Month			
	BHAR		*CAR*		*BHAR*		*CAR*	
	Estimate	*p*-Value	Estimate	*p*-Value	Estimate	*p*-Value	Estimate	*p*-Value
Return on Assets	0.62	0.31	0.48	0.45	0.23	0.73	−0.15	0.86
Market Run-up	0.00	**0.06**	0.00	0.13	0.00	0.33	0.00	0.32
Cash ratio	−0.18	0.28	−0.14	0.38	−0.17	0.43	−0.10	0.65
Leverage	−0.01	0.96	0.02	0.87	−0.03	0.84	−0.07	0.69
Log of Capitalization	0.00	0.97	−0.01	0.83	0.04	0.62	−0.04	0.59
Period	0.04	0.47	0.02	0.73	0.04	0.54	0.01	0.89
N	736		736		736		736	
Adj. R-square	0.76%		0.75%		1.57%		1.81%	

capital (coefficient on *Political Connected* ∗ *Success* is −0.23, $p = 0.05$). Panel B, Table 7 also shows that local state firms' post-approval investment is similar to that of central state firms.

Panel C, Table 7 presents results on the sensitivity of stock performance to regulatory decisions. There is some limited evidence that politically connected non-state firms perform worse after receiving approval to issue equity than non-politically connected non-state firms that also receive approval (coefficient on *Political Connected* ∗ *Success* is −0.40, $p = 0.04$ for 24-month *BHAR*). Also, after receiving approval to issue equity, both central and local state firms perform worse than non-state firms and central state firms perform worse than local state firms. These results are consistent with non-politically connected non-state firms being the most financially constrained, followed by politically connected non-state firms and then state firms.

5.3. Market reactions to SEO cancellation announcements

Market reactions to SEO cancellation announcements should differ between non-state and state firms if they have differing degrees of financial constraints. Specifically, market reactions to cancellation announcements made by non-state firms should be worse than those made by state firms because investors likely further discount the possibility that non-state firms will be able to implement their investment projects. Unfortunately, not all firms announce the cancellation of offering proposals. Within our sample, only 9 non-state firms and 42 state firms announced the cancellation of stock offerings after shareholder approval of those proposals.

We define the announcement date as the event day. To control for the impact of information leakage and delayed reactions, we use a 5-day event window from 3 trading days before until 1 day after the announcement date. The size-matched firms defined in the previous section are used as benchmarks to calculate 5-day cumulative abnormal returns (*CAR*s). Untabulated results show that the mean (median) abnormal stock return during the 5-day period surrounding the cancellation announcement for a non-state firm is −1.42% (−1.77%), whereas the stock price of a state-controlled firm climbs by a mean (median) of 1.04% (0.34%) during the same window. The difference between the two groups, 2.46% (2.11%), is significant at the 5% (8%) level. Table 8 reports multivariate regression results. The explanatory and control variables are the same as those reported in Tables 4 and 5. Results suggest that market reactions surrounding the cancellation announcements are significantly worse for non-state firms than for state firms (the coefficient on *State* is 0.03, $p = 0.06$). Market reactions are more negative for firms with good investment opportunities (coefficient on *Growth in Sales* is −0.05, $p = 0.08$) and for firms with less cash on hand (coefficient on *Cash Ratio* is 0.16; $p = 0.00$). The results suggest that firms with more financial constraints and more investment opportunities are more adversely affected by unsuccessful stock offerings.

5.4. Further attempt to mitigate the endogeneity concern

To further mitigate the endogeneity concern, we follow Faulkender and Petersen (2009) and decompose *Success* into two components, the predicted probability of passing the screening obtained in Model (1) (*Prob*(*Success*)) and the residual defined as the difference between *Success* and *Prob*(*Success*) (*Residual*(*Success*)). *Residual*(*Success*) represents the unpredicted portion of a shock to capital availability and thus the

Table 8
Market reaction to stock offering cancellation announcements. A firm is defined as a state firm if its ultimate controlling shareholder is the government or as a non-state firm if its ultimate controlling shareholders are individuals. Cumulative abnormal return (*CAR*) is the sum of the difference between a sample firm and its size-matched firm in terms of the daily stock return from 3 trading days before to 1 trading day after the event day, where the event day is the day on which the offering proposal cancellation announcement is made. *P*-values after correction for heteroskedasticity that are 0.10 or smaller are highlighted in bold (two-sided tests).

	Estimate	*p*-Value
Intercept	0.19	0.54
State	0.03	**0.06**
Growth in Sales	−0.05	**0.08**
Return on Assets	−0.16	0.35
Market Run-up	0.07	0.24
Cash ratio	0.16	**0.00**
Leverage	0.08	0.13
Log of Capitalization	−0.01	0.44
Period Dummy	0.01	0.70
N	51	
Adj. R-square	13.03%	

Table 9
Alternative approach to address the endogeneity issue. A firm is defined as a state firm if its ultimate controlling shareholder is the government or as a non-state firm if its ultimate controlling shareholders are individuals. *Prob*(*Success*) is the predicted probability of passing the screening based on Model (1), and *Residual*(*Success*) is the difference between *Success* and *Prob*(*Success*). *P*-values after correction for heteroskedasticity that are 0.10 or smaller are highlighted in bold (two-sided tests).

	Year 1				Year 2			
	Growth in PPE		*Growth in Assets*		*Growth in PPE*		*Growth in Assets*	
	Estimate	*p*-Value	Estimate	*p*-Value	Estimate	*p*-Value	Estimate	*p*-Value
Panel A: Investment subsequent to regulatory decisions								
Constant	0.05	**0.08**	0.09	**0.00**	0.01	0.75	0.02	0.41
Prob(*Success*)	0.24	**0.01**	0.16	**0.01**	0.05	0.52	0.13	**0.03**
Prob(*Success*) ∗ *State*	−0.11	0.16	−0.13	**0.01**	−0.02	0.72	−0.03	0.50
Residual(*Success*)	0.16	**0.05**	0.18	**0.00**	0.24	**0.00**	0.16	**0.00**
Residual(*Success*) ∗ *State*	−0.13	0.13	−0.11	**0.04**	−0.23	**0.00**	−0.17	**0.00**
Growth in Sales	0.12	**0.00**	0.04	**0.08**	0.11	**0.00**	0.04	0.12
Return on Assets	0.06	0.87	0.86	**0.00**	1.02	**0.01**	0.54	**0.08**
Log of Capitalization	0.00	0.51	0.00	**0.01**	0.00	0.65	0.00	0.89
N	736		736		736		736	
Adj. R-square	3.36%		8.06%		5.03%		4.19%	
	12-Month				24-Month			
	BHAR		*CAR*		*BHAR*		*CAR*	
	Estimate	*p*-Value	Estimate	*p*-Value	Estimate	*p*-Value	Estimate	*p*-Value
Panel B: Stock performance subsequent to regulatory decisions								
Constant	0.01	0.74	0.01	0.90	−0.01	0.94	0.04	0.53
Prob(*Success*)	0.08	0.43	0.09	0.37	0.07	0.65	−0.04	0.80
Prob(*Success*) ∗ *State*	−0.14	**0.07**	−0.12	**0.09**	−0.11	0.32	−0.06	0.61
Residual(*Success*)	0.17	**0.05**	0.16	**0.06**	0.17	0.12	0.22	**0.08**
Residual(*Success*) ∗ *State*	−0.20	**0.03**	−0.18	**0.05**	−0.21	**0.07**	−0.25	**0.06**
Growth in Sales	0.01	0.91	−0.01	0.76	0.07	0.19	0.05	0.35
Return on Assets	0.65	0.26	0.47	0.40	0.39	0.59	0.38	0.59
Log of Capitalization	0.00	**0.06**	0.00	0.18	0.00	0.32	0.00	0.29
N	736		736		736		736	
Adj. R-square	0.63%		0.36%		0.00%		0.03%	

coefficient on it can better capture the impact of financial constraints on firm investment and stock performance. Similar to Faulkender and Petersen (2009), we include proxies for investment opportunities (*Growth in Sales*), operating cash flow (*Return on Assets*) and firm size (*Log of Capitalization*).

We report results in Table 9. The predicted component of *Success*, *Prob*(*Success*), is in general positively associated with investment growth (Panel A) but is not associated with stock returns (Panel B). There is also some limited evidence that the effect of *Prob*(*Success*) on investment growth and stock returns is smaller for state firms than for non-state firms (coefficients on *Prob*(*Success*) $*$ *State* are -0.13, $p = 0.01$ for *Growth in Assets* in Year 1; -0.14, $p = 0.07$ for 12-month *BHAR*; -0.12, $p = 0.09$ for 12-month *CAR*). These results suggest that regulatory decisions regarding SEO applications are somewhat related to the investment opportunities individual firms have and thus highlights the importance of including the determinants of the screening outcome in the investment and stock performance models, as is done in the main analysis section.

The more interesting results are on the unpredicted component of *Success*, *Residual*(*Success*). The coefficients on *Residual*(*Success*) are positive and significant except for the 24-month *BHAR* and the coefficients on *Residual*(*Success*) $*$ *State* are negative and negative except for *Growth in PPE* in Year 1. These results suggest that an unpredicted approval boosts investment significantly for non-state firms but not for state firms, supporting Hypothesis 2. To the extent that *Residual*(*Success*) largely captures an exogenous shock to capital availability and that the two types of firms have different levels of financial constraints, findings here are robust evidence that financial constraints affect firm investment and stock performance.

5.5. Robustness analyses

5.5.1. Alternative benchmarks for calculating abnormal stock returns

We use equal- or value-weighted market portfolios as benchmarks. We also use total sales or total assets as a proxy for size to determine the size-matched non-SEO firms. Untabulated results obtained using these benchmarks are qualitatively similar to those in our main analysis.

5.5.2. Including firms that cancel offering proposals before shareholder approval

In arriving at the final sample, we exclude firms that announced stock offering plans and then withdrew such plans before the relevant shareholder meetings. To the extent that these firms might have withdrawn their offering plans under pressure from regulators, the results we describe above may underestimate the percentage of firms that are screened out by regulators. If firms withdrawing their applications have characteristics different from those that do not withdraw but fail to pass regulatory screening, then results in Table 3 could be biased. Untabulated results show that after the inclusion of the 44 firms that withdrew their offering plans before forwarding them to shareholder meetings, our inferences remain largely unchanged.

5.5.3. Including industry dummies as determinants of regulatory decisions

Non-state and state firms may have different industry distributions. It is possible that governments may support some industries more than others. To determine the robustness of our results, we add industry dummies and re-run Model (1). We follow industry classifications issued by the CSRC and divide sample firms into 22 industries. Untabulated results show that the coefficient on *State* remains significantly positive (0.73, $p = 0.01$) after the inclusion of 21 industry dummies.

5.5.4. Using Tobin's Q as a proxy for investment opportunities

We next replace *Growth in Sales* with Tobin's *Q* in the investment regressions. Main results are qualitatively similar (untabulated). Take *Growth in PPE* in the first year as an example. The coefficient on *State* is 0.08 ($p = 0.08$). The coefficient on *Success* is 0.27 ($p = 0.00$), while the coefficient on *State* $*$ *Success* is -0.26 ($p = 0.00$).

6. Conclusion

In this study we examine the effect of state control on firms' access to capital in China, where the government controls the equity capital allocation process. We also examine the consequences of this

governmental control. We find that state firms are more likely to receive regulatory approval to issue new equity than non-state firms. Non-state firms exhibit greater sensitivities to regulatory decisions as reflected in their post-decision investment growth and stock performance than state firms. This result implies that non-state firms, being more financially constrained than state firms, should benefit more from being able to raise equity capital. Collectively, findings in this study suggest that the screening process leads to capital misallocation and impedes the growth of non-state firms. We provide robust evidence that political intervention results in capital allocation inefficiency and that financing frictions cause underinvestment.

We also show that non-state firms with political connections are more likely to receive approval to issue new equity than unconnected non-state firms. The likelihood of a politically connected non-state firm passing the regulatory screening process is comparable to that of a state firm. We thus provide direct evidence that politically connected firms in the private sector benefit from favorable regulatory treatment, which gives non-state firms strong incentives to build such connections.

Our paper is relevant to the current debate about the role of the government in the economy amid a global financial and economic crisis. Our results suggest inefficiency and misallocation of resources due to government ownership or government intervention. While the economic and institutional setting in China is different to that of developed countries and we are hesitant to extrapolate excessively, results from our analysis should be of reference and use to these economies. An important lesson from the current financial crisis is that financing frictions are real and of first-order importance (Kashyap and Zingales, 2010). Our work helps researchers and regulators better understand this issue.

The Chinese government established the Medium and Small Enterprise Listing Board in late 2004 and the Growth Enterprise Board in 2009. As a result, many non-state firms are now allowed to access the stock market to raise capital. Our work suggests that this development could ease financial constraints for non-state firms and result in faster growth. Future research can further explore this issue based on this new development.

Despite the fact that the Chinese government has significantly improved equality in capital allocation in recent years, it is still widely believed that private entrepreneurs face serious obstacles in obtaining capital (China Financial and Economic News, March 6, 2009). Our study generates useful implications to policymakers and supports financial reforms that further promote equal access to capital for firms with different ownership status.

Acknowledgements

We thank Sudipta Basu, Jeffrey Callen, Guohua Jiang, Bin Ke, Sidney Leung, Randall Morck, Saif Ullah, Joseph Weintrop and seminar participants at the City University of Hong Kong, the Shanghai University of Finance and Economics and the 2009 International Conference on Corporate Finance and Governance in Emerging Markets for their helpful comments and suggestions. Zhifeng Yang acknowledges a Strategic Research Grant received from the City University of Hong Kong (Grant No. 7200080).

Appendix A. CSRC guidelines on SEOs

Requirements for rights issues listed in CSRC [1999] 12, for example, include:

1. The listed company should be independent from its controlling shareholder in terms of its staff, property, and finance.
2. The applicant's corporate charter should be in compliance with the Company Law.
3. The use of capital raised should be consistent with the state's industrial policies.
4. There should be at least one complete fiscal year between a new application and the previous successful equity offering.

5. The average ROE in the 3 years before the year of application should be no lower than 10% and the ROE should be no lower than 6% in any of the three previous years. The minimum average ROE can be lowered to 9% for applicants in the agriculture, energy, raw materials, infrastructure, and high-tech industries.
6. The applicant should not have any record of material accounting fraud or negligence in the past 3 years.
7. The forecast ROE after an offering should be no lower than the interest rate for bank deposits over the same period.
8. Only common stock can be issued and new shares should be issued to existing shareholders only.
9. The number of new shares issued cannot usually be more than 30% of the number of outstanding shares before an offering.

These guidelines also list some negative conditions that may lead to the denial of SEO applications. The negative criteria specified in CSRC [1999] 12 are as follows:

1. Failure to fulfill information disclosure obligations as required by laws and regulations.
2. Having a record of any material legal or regulatory violation in the past 3 years.
3. Using capital raised in the last offering in a manner inconsistent with the purpose stated in the prospectus.
4. Failure to conduct the shareholders meeting in the manner required by the Company Law.
5. Including misleading statements in the application.
6. Setting the offer price lower than the net asset value per share.
7. Providing collateral for bank loans to its shareholders or other individuals.
8. Any significant related-party transaction between the applicant and its controlling shareholder that clearly hurts the interests of minority shareholders or occupation of the applicant's property or funds by the controlling shareholder.

Other than for the profitability requirements, the positive and negative criteria specified in the various guidelines are mostly the same.

Appendix B. Variable definitions

Variable name	Definition or calculation
Assets	Total assets at the end of the year before the offering announcement
BHAR	Buy-and-hold abnormal return
Capitalization	The market value of equity at the end of the year before the offering announcement
CAR	Cumulative abnormal return
Cash Ratio	The ratio of cash and cash equivalents over total assets at the end of the year before the offering announcement
Central State	=1 if the ultimate controlling shareholder of a sample firm is the central government and 0 otherwise
Non-state Firm	A firm is defined as a non-state firm if its ultimate controlling shareholder(s) is (are) (an) individual(s)
Growth in Assets	The growth rate of total assets adjusted by cash and cash equivalents
Growth in PPE	The growth rate of net property, plant and equipment
Growth in Sales	The growth rate of sales in the year before the offering announcement
Leverage	The ratio of total liabilities over total assets at the end of the year before the offering announcement
Market Run-up	Equally weighted market returns over the 12-month period before the board announcement date

(*continued on next page*)

Appendix B (*continued*)

Variable name	Definition or calculation
Period	=1 if a sample firm announces its offering proposal after 2001 and 0 otherwise
Politically Connected	=1 if a non-state firm has a political connection at the national level and 0 otherwise; a non-state firm is considered to have a national-level political connection if one or more of its managers or directors are (were) members of NPC or CPPCC, hold (held) positions in central ministries or are (were) leaders of national professional societies or industry organizations
Return on Assets	The average ratio of net income over total assets over the 3 years before the offering announcement
Sales	Total sales earned in the year before the offering announcement
State Firm	A firm is defined as a state firm if its ultimate controlling shareholder is the government
Success	=1 if a firm successfully offers new shares within a year of its shareholders approving the offering proposal and 0 otherwise

References

Aghion, P., Bolton, P., 1997. A theory of trickle-down growth and development. Review of Economic Studies 64, 151–172.

Allen, F., Qian, J., Qian, M., 2005. Law, finance, and economic growth in China. Journal of Financial Economics 77, 57–116.

Almeida, H., Campello, M., 2010. Financing frictions and the substitution between internal and external funds. Journal of Financial and Quantitative Analysis 45 (3), 589–622.

Ayyagari, M., Demirguc-Kunt, A., Maksimovic, V., 2010. Formal versus informal finance: evidence from China. Review of Financial Studies 27, 3048–3097.

Barber, B.M., Lyon, J.D., 1997. Detecting long-run abnormal stock returns: the empirical power and specification of test statistics. Journal of Financial Economics 43, 341–372.

Berkman, H., Cole, R.A., Fu, J.L., 2011. Political connection and minority-shareholder protection: evidence from securities-market regulation in China. Journal of Financial and Quantitative Analysis 45 (6), 1391–1417.

Booth, L., Aivazian, V., Demirguc-Kunt, A., Maksimovic, V., 2001. Capital structures in developing countries. Journal of Finance 56 (1), 87–130.

Bortolotti, B., Faccio, M., 2009. Government control of privatized firms. Review of Financial Studies 22 (8), 2907–2939.

Boukari, N., Cosset, J., Saffar, W., 2008. Political connections of newly privatized firms. Journal of Corporate Finance 14 (5), 654–673.

Brandt, L., Li, H., 2003. Bank discrimination in transition economies: ideology, information or incentives? Journal of Comparative Economics 37, 387–413.

Campello, M., Graham, J.R., Harvey, C.R., 2010. The real effects of financial constraints: evidence from a financial crisis. Journal of Financial Economics 97 (3), 470–487.

Chen, K.C.W., Yuan, H., 2004. Earnings management and capital resource allocation: evidence from China's accounting-based regulation of rights issues. Accounting Review 79, 645–665.

Chen, Z., Ke, B., Yang, Z., 2011. Does granting minority shareholders direct control Over corporate decisions help reduce value decreasing corporate decisions? A natural experiment from China (working paper). SSRN: <http://ssrn.com/abstract=1602868>.

China Securities Regulatory Commission (CSRC), 1999. Notice about some issues regarding rights offerings by listed firms (in Chinese).

China Securities Regulatory Commission (CSRC), 2000. Interim measures for general offerings by listed firms (in Chinese).

China Securities Regulatory Commission (CSRC), 2001. Notice about measures for seasoned equity offerings by listed firms (in Chinese).

Claessens, S., Perotti, E., 2007. Finance and inequality: channels and evidence. Journal of Comparative Economics 35, 748–773.

Claessens, S., Feijen, E., Laeven, L., 2008. Political connections and preferential access to finance: the role of campaign contributions. Journal of Financial Economics 88, 554–580.

Clarke, J., Dunbar, C., Kahle, K.M., 2001. Long-run performance and insider trading in completed and canceled seasoned equity offerings. Journal of Financial and Quantitative Analysis 36, 415–430.

Cull, R., Xu, L.C., 2005. Institutions, ownership, and finance: the determinants of profit reinvestment among Chinese firms. Journal of Financial Economics 77, 117–146.

Demirguc-Kunt, A., Maksimovic, V., 1998. Law, finance, and firm growth. Journal of Finance 53, 2107–2137.

Desai, M.A., Foley, C.F., Forbes, K.J., 2008. Financial constraints and growth: multinational and local firm responses to currency depreciations. Review of Financial Studies 21, 2857–2888.

Dinc, I.S., 2005. Politicians and banks: political influences on government-owned banks in emerging markets. Journal of Financial Economics 77, 453–479.

Duchin, R., Ozbas, O., Sensoy, B., 2010. Costly external finance, corporate investment, and the subprime mortgage credit crisis. Journal of Financial Economics 97 (3), 418–435.

Durnev, A., Kim, E.H., 2005. To steal or not to steal: firm attributes, legal environment, and valuation. Journal of Finance 60, 1461–1493.
Faccio, M., 2006. Politically connected firms. American Economic Review (March), 369–386.
Faccio, M., Parsley, D.C., 2009. Sudden deaths: Taking stock of geographic ties. Journal of Financial and Quantitative Analysis 44 (3), 683–718.
Faccio, M., Masulis, R.W., McConnell, John J., 2006. Political connections and corporate bailouts. Journal of Finance 61, 2597–2635.
Fama, E.F., 1998. Market efficiency, long-term returns, and behavioral finance. Journal of Financial Economics 49, 283–306.
Fan, J., Wong, T.J., Zhang, T., 2007. Politically connected CEOs, corporate governance, and post-IPO performance of China's newly partially privatized firms. Journal of Financial Economics 84, 330–357.
Fan, J.P.H., Rui, O., Zhao, M., 2008. Public governance and corporate finance: evidence from corruption cases. Journal of Comparative Economics 36, 343–364.
Faulkender, M., Petersen, M., 2009. Investment and Capital Constraints: Repatriations Under the American Jobs Creation Act. University of Maryland and Northwestern University (Working paper).
Fazzari, S.M., Hubbard, R.G., Petersen, B.C., 1988. Financing constraints and corporate investment. Brookings Papers on Economic Activity No. 1, 141–206.
Fisman, R., 2001. Estimating the value of political connections. American Economic Review 91 (4), 1095–1102.
Galor, O., Moav, O., 2004. From physical to human capital accumulation: inequality and the process of development. Review of Economic Studies 71, 1001–1026.
Galor, O., Zeira, J., 1993. Income distribution and macroeconomics. Review of Economic Studies 60, 35–52.
Gul, F., Kim, J., Qiu, A., 2010. Ownership concentration, foreign shareholding, audit quality, and stock price synchronicity: evidence from China. Journal of Financial Economics 95, 425–442.
Hung, M., Wong, T.J., Zhang, T., 2011. Political considerations in the decision of Chinese SOEs to list in Hong Kong. Journal of Accounting and Economics 53, 435–449.
Johnson, S., Mitton, T., 2003. Cronyism and capital controls: evidence from Malaysia. Journal of Financial Economics 67 (2), 351–382.
Kaplan, S.N., Zingales, L., 2000. Investment-cash flow sensitivities are not valid measures of financing constraints. Quarterly Journal of Economics (May), 707–712.
Kashyap, A., Zingales, L., 2010. The 2007–8 financial crisis: lessons from corporate finance. Journal of Financial Economics 97 (3), 303–305.
Khwaja, A.I., Mian, A., 2005. Do lenders favor politically connected firms? Rent provision in an emerging financial market. Quarterly Journal of Economics 120 (4), 1371–1411.
La Porta, R., Lopez-de-Silanes, F., Shleifer, A., 2002. Government ownership of banks. Journal of Finance 57 (1), 265–301.
Lang, L., Ofek, E., Stulz, R.M., 1996. Leverage, investment, and firm growth. Journal of Financial Economics 40, 3–30.
Leuz, C., Oberholzer-Gee, F., 2006. Political relationships, global financing, and corporate transparency: evidence from Indonesia. Journal of Financial Economics 81, 411–439.
Li, H., Meng, L., Wang, Q., Zhou, L., 2007. Political connections, financing and firm performance: evidence from Chinese private firms. Journal of Public Economics 87, 283–299.
Loughran, T., Ritter, J., 1995. The new issues puzzle. Journal of Finance 49 (March), 23–51.
Morck, R., Shleifer, A., Vishny, R., 1988. Management ownership and market valuation: an empirical analysis. Journal of Financial Economics 20, 293–315.
Morck, R., Yeung, B., Yu, W., 2000. The information content of stock markets: why do emerging markets have synchronous stock price movement? Journal of Financial Economic 58, 215–260.
Myers, S.C., 2003. Financing of corporations. In: Constantinides, G.M., Harris, M., Stulz, R. (Eds.), Handbook of the Economics of Finance.
Pastor, L., Veronesi, P., 2005. Rational IPO waves. Journal of Finance 60 (4), 1713–1757.
Sapienza, P., 2004. The effects of government ownership on bank lending. Journal of Financial Economics 72 (2), 357–384.
Stein, J.C., 2003. Agency, information and corporate investment. In: Constantinides, G.M., Harris, M., Stulz, R. (Eds.), Handbook of the Economics of Finance.
Wang, Q., Wong, T.J., Xia, L., 2008. State ownership, the institutional environment, and auditor choice: evidence from China. Journal of Accounting and Economics 46, 112–134.
Zia, B.H., 2008. Export incentives, financial constraints, and the (mis)allocation of credit: micro-level evidence from subsidized export loans. Journal of Financial Economics 87, 498–527.

China Journal of Accounting Research 5 (2012) 127–144

Contents lists available at SciVerse ScienceDirect

China Journal of Accounting Research

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

Relative performance evaluation and executive compensation: Evidence from Chinese listed companies

Donghua Chen, Shangkun Liang*, Pin Zhu

Institute of Accounting and Finance, School of Business, Nanjing University, China

ARTICLE INFO

Article history:
Received 25 June 2011
Accepted 7 February 2012
Available online 9 June 2012

JEL classification:
G30
J33
M52

Keywords:
Relative performance evaluation (RPE)
Top managers' compensation
Non-SOEs
SOEs

ABSTRACT

This paper focuses on the effect of relative performance evaluation (RPE) on top managers' compensation in Chinese public firms. Overall, we find no evidence of an RPE effect or any asymmetry in firms' use of RPE. The results obtained using Albuquerque's (2009) method are similar to those obtained using traditional methods. In addition, we find that RPE is used more in non-SOEs than in SOEs. This may be due to the regulation of compensation, various forms of incentives and the multiple tasks of managers in SOEs.

1. Introduction

The accurate evaluation of agents' work and the provision of appropriate compensation contracts is an important issue (Jensen and Meckling, 1976). The cost of directly supervising executives is quite high, thus valuing their work indirectly, for example through relative performance evaluation (RPE), is more feasible

* Corresponding author. Tel.: +852 54961492; fax: +852 34420349.
E-mail address: jevonacc@gmail.com (S. Liang).

Production and hosting by Elsevier

1755-3091/$ - see front matter © 2012 China Journal of Accounting Research. Founded by Sun Yat-sen University and City University of Hong Kong. Production and hosting by Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.cjar.2012.02.002

(Jensen and Murphy, 1990; Murphy, 1999). As performance information reflects a company's output level and return level, it is likely to be the most important economic characteristic. This information is considered to be reliable under modern accounting and auditing systems, and thus is widely applied. However, information on the company itself is not sufficiently accurate for evaluating managers' efforts because a company is in an open system, affected by many external factors that are not directly related to the effort of managers. Therefore, using only the performance of the company to value managers' efforts will create a bias. However, the method of evaluation would be improved if we could exclude systemic factors.

RPE theory is based on this logic. The theory assumes that companies inevitably face industry-level or macro-level external risk (common risk), and an optimal compensation contract that eliminates these common risks will be more efficient (Holmstrom, 1982; Antle and Smith, 1986; Gibbons and Murphy, 1990). Nevertheless, RPE theory does not produce consistent empirical results. For example, Antle and Smith (1986) and Aggarwal and Samwick (1999b) find no support for the theory, and Gibbons and Murphy(1990), Janakiraman et al. (1992) and Crawford (1999) find only weak support.

Recent years have seen new developments in the research on RPE. One area of research involves identifying more appropriate peer groups from theoretical inference (Albuquerque, 2009). Another area extracts information on peer groups directly from companies' annual reports (Carter et al., 2009; Faulkender and Yang,2010; Gong et al., 2011). Although empirical research has provided strong support for these two methods, there is little empirical evidence from China. Nevertheless, this issue is of concern in the context of China. For example, the foreign literature cannot provide any conclusions on whether there are differences in the use of RPE between SOEs (State Owned Enterprises) and non-SOEs (non-State Owned Enterprises). The executive compensation models of SOEs and non-SOEs are quite different. For example, SOEs have cash compensation regulations (Chen et al., 2005a). In addition, non-SOEs are more market-oriented and face more intense competition. Thus, on the one hand, we need to consider the difference in the nature of SOEs and non-SOEs when selecting peer groups, but on the other hand, non-SOEs may be more likely to use RPE.

Using data from 1999 to 2009, we conduct an empirical test of RPE theory in China. Overall, we find no significant RPE in China and also no asymmetry in the use of RPE. Considering the nature of companies, we find that non-SOEs are more likely to use RPE. We select peer groups using both the traditional method of Janakiraman et al. (1992), and the method described by Albuquerque (2009). We also conduct a strong-form RPE check, following Antle and Smith (1986). The results are consistent under all methods.

The paper proceeds as follows. In Section 2, we present the literature review, theoretical analysis and hypothesis development. In Section 3, we describe the sample selection, variable definitions and descriptive statistics. We present the empirical tests in Section 4 and conclusions and limitations in Section 5.

2. Literature review, theoretical analysis and hypothesis development

RPE theory is logical and widely applicable. In the case of common risk, using the RPE method to choose a peer group can effectively extract the individual effort of managers and mitigate agency problems. The theory and models of RPE suggest that it is necessary to exclude the combined effect of peer groups (Baiman and Demski, 1980; Diamond and Verrecchia, 1982; Holmstrom, 1979, 1982). Antle and Smith (1986) and Gibbons and Murphy (1990) show that the benefit of adding relative performance considerations to executive compensation contracts is greater than the cost.

However, theoretical expectations have not received consistent support from empirical studies. Antle and Smith (1986) examine the relationship between CEO compensation and industry returns from 1947 to 1977. Using different definitions of compensation, they only find weak support for RPE. Gibbons and Murphy (1990) examine the relationship between change in compensation and firm stock returns for 1668 CEOs from 1974 to 1986. Their results show that changes in compensation are negatively related to industry and market performance. They also find evidence that RPE is related to CEO turnover. Jensen and Murphy (1990) find that changes in CEO compensation are positively related to changes in shareholder wealth. However, they find no significant relationships between change in compensation and change in net-of-industry wealth or net-of-market wealth. Janakiraman et al. (1992) examine 609 companies from 1970 to 1988. They find weak evidence in support of weak-form RPE, but no evidence in support of strong-form RPE. Aggarwal and Samwick (1999b) examine stock returns from 1993 to 1996 and use several methods, including median regressions

and OLS regressions, but find no systematic support for RPE. Aggarwal and Samwick (1999a) find some support for RPE using short-term compensation, but long-term compensation increases with industry performance. Garvey and Milbourn (2003) examine the relationship between CEO compensation and stock returns and find no support for RPE, except in companies where managers are younger and have less financial wealth.

To resolve such conflicts, researchers have offered possible explanations for the lack of RPE. On the one hand, constraint conditions will limit the use of RPE. For example, Aggarwal and Samwick (1999a) point out that the degree of competition might be an important factor in using RPE. On the other hand, the efficiency of compensation contracts is also in doubt. For example, Bebchuk and Fried (2003) find that in the case of poor corporate governance, CEOs can influence their own pay through their control over the design of CEO compensation. This will reduce the sensitivity of compensation and also lead to a lack of RPE.

There have been few empirical studies of RPE in China. Xiao (2005) tests the strong- and weak-form RPE in a sample of listed companies in 2002. Using the average ROE of peer groups in the same region and the average ROE by 2-digit industry code, they find evidence of weak-form, but not strong-form RPE. Gao (2006) uses a sample of all A-share listed companies from 2001 to 2004 to test the theory. He finds that RPE exists when the peer group is comprised of similar industry-size firms or the same industry-ownership firms. However, the article neither explains the theoretical base for the composition of peer groups, nor compares companies with different ownership types. Zhou and Zhang (2010) examine the effect of RPE in listed companies in China from 1999 to 2006 using their comprehensive index of performance. They find that RPE exists when peer groups are based on area, but find opposite effects when peer groups are based on industry or size. However, the comprehensive index of performance designed by the authors is a subjective measure.

In recent years, there has been substantial progress in the study of RPE. Albuquerque (2009) proposes a new theory and method for selecting peer groups. He regards size as the most important factor affecting outside risks at the company level. For example, large companies often face lower financing constraints because they are more likely to survive in the event of negative shocks. Additionally, size is often related to diversity and the degree of diversity can affect companies' risk tolerance. His empirical results support RPE theory. Carter et al. (2009) hand-collect information on peer groups in FTSE-listed companies in the UK. They find that the probability of using RPE does not increase when systemic risk increases, whereas external monitoring is an important factor for using RPE. Faulkender and Yang (2010) hand-collect information on peer groups in compensation plans in the US. Their results support RPE theory and their direct method has advantages over traditional methods, such as the industry-size peer group method. In addition, they find that companies prefer to put companies with high pay into their peer groups. Gong et al. (2011) also use manually collected information on peer groups in compensation plans in the US to test RPE theory. They find that 25% of listed companies explicitly use peer groups and the choice of peer groups supports a mixture of effective contract theory and rent-seeking theory.

In our opinion, it is essential to study RPE theory in China. First, studies on RPE in China are still rare and those that exist are mainly normative studies. Second, the existing empirical studies have produced mixed results (Xiao, 2005; Gao, 2006; Zhou and Zhang, 2010), thus improving RPE methodology is important. Third, we believe that the nature of ownership is an important factor to be considered in studying RPE, which is not generally considered either in China or elsewhere[1].

There are various differences in the way executive compensation is designed and evaluated for SOEs and non-SOEs. First, there are regulations on cash compensation in Chinese SOEs. In 2002 and 2009, for example, the SAC set multiple limits for executive cash compensation in SOEs.[2] However, there is no limit in non-SOEs, so executive compensation in non-SOEs is more market-oriented. Chen et al. (2005a) provide evidence that executives' relative pay in SOEs is far less than in non-SOEs.[3] Second, there are various forms of incentives

[1] The influence of the nature of ownership in studying RPE is important. We need to compare the difference between the incentives of SOEs and non-SOEs to use RPE in a theoretical analysis, and we should also consider it in the methodology for constructing peer groups.

[2] *The Guidelines about Further Standardizing the Executive Compensation in SOEs*, issued in 2009, rules that the basic salary of executives in SOEs must not exceed five times the average salary of the workers and the upper limit for performance-related salary is three times their basic salary.

[3] Relative pay means the ratio of executives' average salary to non-executives' average salary.

in SOEs. For example, Chen et al. (2005a) find that perks were widely used as an incentive. Cao et al. (2010), Chen et al. (2011a) and Wang and Xiao (2011) argue that the opportunity for promotion of executives in SOEs is also an important incentive. However, such incentives are rare in non-SOEs and cash compensation is dominant.[4] Third, SOEs are affected by multiple tasks. Bai and Xu (2005) and Bai et al. (2006) find that executives in SOEs undertake diverse tasks. Executives in SOEs not only need to improve performance, but also need to consider other issues, such as the employment of workers. However, non-SOEs are often subject to less government intervention (Chen et al., 2011b), so performance is likely to be more closely related to executive evaluation.

The above differences may cause RPE to be applied differently in SOEs and non-SOEs. First, the regulation of executive cash compensation is expected to reduce the effect of RPE. For example, when cash compensation is close to the limit, even if relative performance is high, executives may not work harder, thus RPE is not effective. Second, the various forms of incentives in SOEs will reduce the benefit of RPE, because cash compensation is just one type of incentive in SOEs. Third, multiple tasks will obscure the relationship between firm performance and executive effort, which will increase the implementation cost of RPE. For example, the performance in company A's financial statements is lower than in company B's, but company A undertakes a lot of redundancies. Is the performance of company A better or worse than that of company B? However, in non-SOEs, there is no regulation of executive cash compensation, there is only one form of incentive and there is less intervention from multiple governmental goals, thus implementation of RPE will be easier and the net effects of RPE will be more obvious.

In summary, we believe that RPE is more likely to be applied in non-SOEs than in SOEs.

3. Sample selection, definition of variables and descriptive statistics

3.1. Sample selection

The initial sample used in this study comprises 15,238 observations for A-share firms listed on the Shanghai and Shenzhen stock markets. We screened the sample as follows: (1) we remove 2541 observations for firms that had been listed for less than 2 years; (2) we remove 119 financial companies; and (3) we remove 1881 observations with missing values. A total of 10,724 observations remain. To reduce the influence of extreme values, we exclude the top and bottom 1% of *Roe* and *Ret* values, which leaves 10,321 observations. The data used is from the CSMAR and CCER databases. We use SAS and STATA software to process the data. The procedure for sample selection is listed in Table 1.

3.2. Construction of peer groups

We use two methods to construct peer groups. The first group, denoted as M1, includes companies in the same year, with the same ownership type and the same industry (excluding the company itself). The second group, denoted as M2, includes companies in the same year, with the same ownership type, the same industry and of a similar size (excluding the company itself). The construction of M2 follows Albuquerque (2009). Similar size was defined as companies in the same quartile. Albuquerque (2009) believes that systematic discrepancies exist between different sized companies. For M2, each peer group was required to have at least three observations. Therefore, 722 observations were removed. The remaining 9590 observations were included in the final analysis.

3.3. Definition of variables

Table 2 shows the definitions of variables.

We select *Ret* and *Roe* as measurements of company performance. *Ret* is the cumulative stock returns from May to April in the following year (using the BHR method). Peer group performance is recorded as *Peer_ret*

[4] Stock options have only recently become popular, and were not dominant in these sample years.

Table 1
Sample selection.

Year	Initial observations	Observations for companies listed less than 2 years	Observations for listed financial companies	Observations with missing data	Remaining observations
1999	1105	384	5	431	285
2000	1147	320	5	564	258
2001	1224	299	6	137	782
2002	1284	223	7	100	954
2003	1393	253	7	108	1025
2004	1396	186	8	92	1110
2005	1361	116	10	81	1154
2006	1442	110	10	97	1225
2007	1552	215	14	85	1238
2008	1606	204	17	83	1302
2009	1728	204	30	103	1391
Total	15,238	2514	119	1881	10,724

Table 2
Variable definitions.

Name	Symbol	Explanation
Stock return	*Ret*	Cumulative stock returns from May to April of the following year
Accounting performance	*Roe*	Net profit/equity
Accounting performance of peer group	*Peer_roe*	Average *Roe* of peer group
Stock return of peer group	*Peer_ret*	Average *Ret* of peer group
Age of listed company	*Age*	Age of listed company
Leverage of company	*Lev*	Debt/assets
Scale of company	*Size*	Natural logarithm of assets
Growth of company	*Growth*	Growth in operating income
Proportion of largest stockholder	*Sh*	Proportion shares held by the largest stockholder
Proportion of management	*Mshare*	Proportion of shares held by management
Proportion of independent directors	*Rinde*	Proportion of independent directors
Dual CEO and Chairman of the Board	*Dual*	Dummy variable that equals 1 if the CEO and Chairman are the same, otherwise 0
Nature of ownership	*Pri*	Dummy variable that equals 1 for non-SOEs, otherwise 0
Year	*Year*	Dummy variable, every year
Industry	*Industry*	Dummy variable, every industry

and *Peer_roe*, which are the average values of the peer groups (M1 refers to *Peer_ret*1 and *Peer_roe*1; M2 refers to *Reer_ret*2 and *Peer_roe*2). *Lncp* is the natural logarithm of the total cash compensation of the top three managers. *Age* is the number of years the company has been listed. *Lev* is the company's leverage. *Size* is the size of the company, the natural logarithm of total assets at the end of the year. *Growth* is the income growth rate. *Sh* is the shareholding ratio of the largest shareholder. *Mshare* is the shareholding ratio of managers. *Rinde* is the ratio of independent directors to the total number of directors. *Dual* is a dummy variable that equals 1 if the same person holds the positions of CEO and Chairman of the Board, and 0 otherwise. *Pri* is a dummy variable for the proprietary nature of the enterprise; it equals 1 if the company is a non-SOE, and 0 otherwise. *Year* are dummy variables for every year. *Industry* are industry dummy variables set by the CSRC.

3.4. Descriptive statistics and correlations

Table 3 reports the descriptive statistics for the main variables. The mean and median of *Ret* are 0.29 and 0.02 respectively, indicating a skewed distribution. The mean and median of accounting performance are 0.04 and 0.06 respectively. The average years listed (*Age*) is 7 years. Leverage (*Lev*) is around 50%. In about 10% of companies, the CEO and Chairman of the Board is the same person (*Dual*).

Table 3
Descriptive statistics.

Variables	Mean	Lower quartile	Median	Upper quartile	Standard deviation
Lncp	13.0771	12.4549	13.1520	13.7369	0.9702
Ret	0.2889	−0.2511	−0.0232	0.4375	0.8906
*Peer_ret*1	0.2887	−0.1742	−0.0161	0.4402	0.7671
*Peer_ret*2	0.2889	−0.1817	−0.0002	0.4218	0.7850
Roe	0.0399	0.0204	0.0604	0.1069	0.1743
*Peer_*roe1	0.0397	0.0163	0.0456	0.0711	0.0463
*Peer_*roe2	0.0399	0.0122	0.0510	0.0871	0.0808
Age	7.6273	5	7	10	3.6808
Lev	0.4931	0.3675	0.5047	0.6270	0.1799
Size	21.4114	20.7101	21.3062	21.9950	1.0638
Growth	0.5181	−0.0249	0.1310	0.3148	16.0782
Sh	0.3983	0.2649	0.3813	0.5255	0.1660
Mshare	0.0033	0	0.0000	0.0001	0.0267
Rinde	0.3106	0.3000	0.3333	0.3636	0.1196
Dual	0.0975	0	0	0	0.2966

Table 4 shows the correlation analysis for the main variables; the Pearson correlation matrix is in the lower triangle and the Spearman correlation matrix is in the upper triangle. We find that managers' compensation (*Lncp*) is significantly and positively related to company performance (*Ret*, *Roe*), which shows the effectiveness of executive pay. Table 4 also shows that the main explanatory variables do not have any severe collinearity problems.

4. Empirical tests

4.1. Do Chinese companies use RPE?

Following Albuquerque (2009), we establish model (1) to test whether listed companies in China adopt the RPE method to determine executive pay.

$$Lncp = a_0 + a_1 Ret(Roe) + a_2 Peer\_ret(Peer\_roe) + a_3 Age + a_4 Lev + a_5 Size + a_6 Growth + a_7 Sh + a_8 Mshare + a_9 Rinde + a_{10} Dual + \Sigma Year + \Sigma Industry + \varepsilon \quad (1)$$

Table 5 displays the regression results using the method of clustering by companies and we report robust *t*-values. The explanatory variables in columns (1) and (3) of Table 5 are *Peer_ret* and *Peer_roe*, composed according to M1 (the same year, the same ownership and the same industry). The explanatory variables in columns (2) and (4) of Table 5 are *Peer_ret* and *Peer_roe*, composed according to M2 (the same year, the same ownership, the same industry and similar size). We find that company performance (*Ret*, *Roe*) is positive and significant, but peer group performance is not significant. This suggests that companies in China do not generally use RPE.

Albuquerque (2009) argues that there is asymmetry in the use of RPE: companies with poor performance are more likely to use RPE to avoid litigation risks. We follow Albuquerque (2009) and use model (2) to test this deduction.

$$Lncp = a_0 + a_1 Ret(Roe) + a_2 Peer\_ret(Peer\_roe) + a_3 Peer\_ret(Peer\_roe) * D + a_4 D + a_5 Age + a_6 Lev + a_7 Size + a_8 Growth + a_9 Sh + a_{10} Mshare + a_{11} Rinde + a_{12} Dual + \Sigma Year + \Sigma Industry + \varepsilon \quad (2)$$

In this model, *D* is a dummy variable, equal to 1 if the company's performance is below the lower quartile and 0 otherwise. *D*1 and *D*2 refer to *Ret* and *Roe* respectively.

The regression results are shown in Table 6. We find a significant negative interaction only in column (3). The remaining interaction terms are insignificant. These results suggest that there is no asymmetry in the use of

Table 4
Correlations.

	Lncp	*Ret*	*Peer_ret*1	*Peer_ret*2	*Roe*	*Peer_roe*1	*Peer_roe*2	*Age*	*Lev*	*Size*	*Growth*	*Sh*	*Mshare*	*Rinde*	*Dual*
Lncp	1.0000	0.1323	0.1384	0.1409	0.3262	0.1590	0.2247	0.2850	0.0560	0.4167	0.0724	−0.1127	0.0678	0.3573	0.0008
		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.9360
Ret	0.0689	1.0000	0.7725	0.7670	0.1829	0.0891	0.0840	0.0737	0.0084	0.0558	0.0355	−0.0399	−0.0116	0.1587	0.0121
	<.0001		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.4125	<.0001	0.0005	<.0001	0.2576	<.0001	0.2371
*Peer_ret*1	0.0744	0.8531	1.0000	0.9423	0.0536	0.1640	0.1105	0.1355	0.0310	0.0490	−0.0733	−0.0811	−0.0307	0.2298	0.0026
	<.0001	<.0001		<.0001	<.0001	<.0001	<.0001	<.0001	0.0024	<.0001	<.0001	<.0001	0.0026	<.0001	0.8020
*Peer_ret*2	0.0720	0.8435	0.9776	1.0000	0.0611	0.1383	0.1521	0.1278	0.0288	0.0735	−0.0616	−0.0777	−0.0250	0.2189	0.0061
	<.0001	<.0001	<.0001		<.0001	<.0001	<.0001	<.0001	0.0048	<.0001	<.0001	<.0001	0.0142	<.0001	0.5497
Roe	0.2167	0.0543	0.0125	0.0136	1.0000	0.1833	0.2484	−0.0410	−0.0613	0.2524	0.3639	0.1085	0.0491	0.0436	−0.0016
	<.0001	<.0001	0.2203	0.1830		<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	<.0001	0.8774
*Peer_roe*1	0.1179	0.0411	0.0536	0.0514	0.1428	1.0000	0.5502	0.1095	−0.0115	0.1337	0.0634	−0.0148	−0.0381	0.1176	−0.0076
	<.0001	<.0001	<.0001	<.0001	<.0001		<.0001	<.0001	0.2619	<.0001	<.0001	0.1477	0.0002	<.0001	0.4575
*Peer_roe*2	0.1568	0.0259	0.0298	0.0416	0.1451	0.5620	1.0000	0.0784	0.0763	0.4308	0.1009	0.0390	0.0126	0.0806	−0.0065
	<.0001	0.0114	0.0035	<.0001	<.0001	<.0001		<.0001	<.0001	<.0001	<.0001	0.0001	0.2185	<.0001	0.5234
Age	0.2995	0.0672	0.0760	0.0779	−0.0339	0.0798	0.0488	1.0000	0.1675	0.1485	−0.1032	−0.2395	−0.0101	0.2754	−0.0444
	<.0001	<.0001	<.0001	<.0001	0.0009	<.0001	<.0001		<.0001	<.0001	<.0001	<.0001	0.3214	<.0001	<.0001
Lev	0.0586	0.0435	0.0349	0.0300	−0.2001	−0.0212	0.0552	0.1540	1.0000	0.2293	0.0809	−0.0828	−0.0567	0.0922	−0.0225
	<.0001	<.0001	0.0006	0.0034	<.0001	0.0379	<.0001	<.0001		<.0001	<.0001	<.0001	<.0001	<.0001	0.0277
Size	0.4212	0.0075	0.0158	0.0084	0.1904	0.1451	0.3467	0.1228	0.2195	1.0000	0.1276	0.1787	0.0455	0.1381	−0.0550
	<.0001	0.4652	0.1229	0.4093	<.0001	<.0001	<.0001	<.0001	<.0001		<.0001	<.0001	<.0001	<.0001	<.0001
Growth	0.0054	−0.0065	−0.0119	−0.0132	0.0197	−0.0037	−0.0071	0.0143	0.0073	−0.0066	1.0000	0.0831	−0.0189	0.0036	0.0046
	0.5983	0.5276	0.2446	0.1966	0.0533	0.7203	0.4899	0.1630	0.4755	0.5154		<.0001	0.0644	0.7248	0.6521
Sh	−0.1334	−0.0728	−0.0871	−0.0876	0.0960	0.0253	0.0684	−0.2466	−0.0819	0.2000	0.0042	1.0000	−0.1086	−0.1261	−0.0515
	<.0001	<.0001	<.0001	<.0001	<.0001	0.0133	<.0001	<.0001	<.0001	<.0001	0.6848		<.0001	<.0001	<.0001
Mshare	0.0899	0.0266	0.0425	0.0358	0.0389	−0.0033	0.0039	−0.1331	−0.0508	−0.0537	−0.0024	−0.1033	1.0000	−0.0875	0.0891
	<.0001	0.0092	<.0001	0.0005	0.0001	0.7449	0.7043	<.0001	<.0001	<.0001	0.8168	<.0001		<.0001	<.0001
Rinde	0.4377	0.1305	0.1525	0.1500	0.0271	0.0653	0.0401	0.3177	0.0966	0.1542	0.0062	−0.1311	0.0656	1.0000	0.0013
	<.0001	<.0001	<.0001	<.0001	0.0081	<.0001	<.0001	<.0001	<.0001	<.0001	0.5442	<.0001	<.0001		0.8967
Dual	−0.0011	−0.0008	−0.0048	−0.0048	−0.0042	−0.0107	−0.0025	−0.0412	−0.0177	−0.0644	−0.0013	−0.0518	0.1092	−0.0280	1.0000
	0.9117	0.9396	0.6392	0.6374	0.6818	0.2957	0.8036	<.0001	0.0823	<.0001	0.8986	<.0001	<.0001	0.0062	

Table 5
Relative performance evaluation and executive compensation.

Variables	(1) M1	(2) M2	(3) M1	(4) M2
Ret	0.0349**	0.0320**		
	(2.56)	(2.37)		
Peer_ret	−0.0503	0.0028		
	(−1.08)	(0.09)		
Roe			0.7531***	0.7534***
			(10.95)	(10.98)
Peer_roe			−0.1650	−0.0935
			(−0.74)	(−0.81)
Age	0.0055	0.0056	0.0074	0.0074
	(1.16)	(1.17)	(1.59)	(1.59)
Lev	−0.4441***	−0.4427***	−0.2496***	−0.2487***
	(−5.11)	(−5.09)	(−2.86)	(−2.85)
Size	0.3458***	0.3461***	0.3167***	0.3189***
	(20.42)	(20.41)	(19.09)	(18.99)
Growth	0.0004**	0.0004**	0.0002	0.0002
	(2.53)	(2.57)	(1.15)	(1.16)
Sh	−0.5046***	−0.5044***	−0.5358***	−0.5360***
	(−4.82)	(−4.82)	(−5.24)	(−5.24)
Mshare	1.6866***	1.6794***	1.4961***	1.5015***
	(5.30)	(5.27)	(4.89)	(4.90)
Rinde	0.4604***	0.4602***	0.4314***	0.4315***
	(2.93)	(2.93)	(2.83)	(2.83)
Dual	0.0741*	0.0741*	0.0724*	0.0726*
	(1.68)	(1.68)	(1.68)	(1.69)
Constant	6.4755***	6.4448***	6.9516***	6.9008***
	(17.77)	(17.62)	(19.67)	(19.31)
Industry dummy	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes
Observations	9590	9590	9590	9590
R-squared	0.4697	0.4696	0.4854	0.4854
F	134.0	134.1	137.1	137.0

Note: The regression results follow the cluster method (by company) and we report robust *t* values. ***, **, * represent significance at the 1%, 5%, and 10% levels (two-tailed) in all tables. M1 refers to peer groups constructed according to the same year, the same type of ownership and the same industry. M2 refers to peer groups constructed according to the same year, the same type of ownership, the same industry and the same scale.

RPE. The results also show that there is little difference between Albuquerque's (2009) method and the traditional method of constructing peer groups.

4.2. The difference between SOEs and non-SOEs

Earlier, we discussed a series of differences in executive compensation between SOEs and non-SOEs. These differences will also affect the use of RPE, especially in non-SOEs. To test this inference, we regress model (1) on different subsamples according to the type of ownership.

Table 7 Panel A presents the regression results. Peer group performance for SOEs is positive or insignificant. Peer group performance for non-SOEs is negative, but only significant in column (8). To compare the two groups, we construct model (3). *Pri* is a dummy variable that equals 1 for non-SOEs, and 0 otherwise. If non-SOEs use RPE more than SEOs, then the interaction should be significantly negative.

$$Lncp = a_0 + a_1 Ret(Roe) + a_2 Peer\_ret(Peer\_roe) + a_3 Peer\_ret(Peer\_roe) * Pri + a_4 Pri + a_5 Age + a_6 Lev + a_7 Size + a_8 Growth + a_9 Sh + a_{10} Mshare + a_{11} Rinde + a_{12} Dual + \Sigma Year + \Sigma Industry + \varepsilon \quad (3)$$

Table 6
Asymmetry of relative performance evaluation.

Variables	(1) M1	(2) M2	(3) M1	(4) M2
Ret	0.0147	0.0112		
	(1.04)	(0.80)		
Peer_ret	−0.0610	−0.0013		
	(−1.27)	(−0.04)		
Peer_ret ∗ D1	0.0480	−0.0235		
	(0.38)	(−0.25)		
*D*1	−0.0836***	−0.0931***		
	(−3.16)	(−3.69)		
Roe			0.4364***	0.4332***
			(6.31)	(6.29)
Peer_roe			0.0738	−0.0124
			(0.29)	(−0.09)
Peer_roe ∗ *D*2			−0.9007**	−0.3332
			(−2.07)	(−1.38)
*D*2			−0.2111***	−0.2325***
			(−7.04)	(−8.74)
Age	0.0055	0.0055	0.0089*	0.0089*
	(1.15)	(1.16)	(1.93)	(1.93)
Lev	−0.4332***	−0.4316***	−0.2594***	−0.2584***
	(−4.99)	(−4.97)	(−3.02)	(−3.01)
Size	0.3442***	0.3445***	0.3090***	0.3117***
	(20.40)	(20.38)	(18.69)	(18.65)
Growth	0.0004**	0.0004**	0.0002	0.0002
	(2.51)	(2.53)	(0.90)	(0.90)
Sh	−0.5108***	−0.5108***	−0.5424***	−0.5414***
	(−4.89)	(−4.89)	(−5.37)	(−5.36)
Mshare	1.6683***	1.6626***	1.4791***	1.5018***
	(5.25)	(5.22)	(4.92)	(4.97)
Rinde	0.4577***	0.4582***	0.4235***	0.4241***
	(2.92)	(2.92)	(2.79)	(2.79)
Dual	0.0720	0.0720	0.0718*	0.0726*
	(1.64)	(1.64)	(1.67)	(1.69)
Constant	6.5254***	6.4908***	7.1743***	7.1175***
	(17.98)	(17.81)	(20.45)	(20.09)
Industry dummy	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes
Observations	9590	9590	9590	9590
R-squared	0.4707	0.4707	0.4935	0.4933
F	127.7	127.7	132.0	132.0

Table 7 Panel B presents the regression results. The interactions are negative and significant at the 1% level in columns (1) and (2), and significant at the 5% level in column (3). These results support our inference that non-SOEs use RPE more than SOEs.

4.3. Tests of strong-form RPE

According to Holmstrom and Milgrom (1987), executive compensation should be adjusted for systematic risks associated with performance, and should only relate to the company's own performance. Antle and Smith(1986), Janakiraman et al. (1992) and Albuquerque (2009) perform an empirical test of this strong-form RPE. Following the above literature, we divide company performance (*Perf*) into performance with systemic risk (*Sys_perf*) and with its own risk (*Unsys_perf*).

$$Perf = a_0 + a_1 Peer\_perf + \varepsilon \tag{4}$$

Table 7
Relative performance evaluation, ownership and executive compensation.

	SOEs				Non-SOEs			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	M1	M2	M1	M2	M1	M2	M1	M2
Panel A: Subsample tests								
Ret	0.0377**	0.0363**			0.0258	0.0253		
	(2.31)	(2.26)			(1.02)	(0.98)		
Peer_ret	0.0261	0.0395			−0.1175	−0.0358		
	(0.50)	(1.03)			(−1.53)	(−0.67)		
Roe			0.9057***	0.9030***			0.4622***	0.4586***
			(10.43)	(10.40)			(4.80)	(4.75)
Peer_roe			−0.2651	−0.0150			−0.1656	−0.2717*
			(−1.04)	(−0.10)			(−0.49)	(−1.66)
Age	0.0101*	0.0101*	0.0124**	0.0123**	−0.0013	−0.0012	−0.0009	−0.0012
	(1.78)	(1.78)	(2.25)	(2.24)	(−0.16)	(−0.15)	(−0.11)	(−0.15)
Lev	−0.4761***	−0.4755***	−0.2508**	−0.2504**	−0.3332**	−0.3330**	−0.1974	−0.1979
	(−4.82)	(−4.81)	(−2.52)	(−2.52)	(−2.15)	(−2.15)	(−1.27)	(−1.27)
Size	0.3247***	0.3251***	0.2910***	0.2914***	0.4005***	0.4010***	0.3789***	0.3870***
	(16.88)	(16.86)	(15.55)	(15.39)	(12.87)	(12.89)	(12.04)	(12.10)
Growth	0.0029	0.0029	0.0000	−0.0000	0.0003***	0.0003***	0.0002**	0.0002**
	(0.60)	(0.60)	(0.00)	(−0.01)	(2.66)	(2.76)	(2.03)	(2.02)
Sh	−0.4906***	−0.4908***	−0.5264***	−0.5260***	−0.4269**	−0.4276**	−0.4751**	−0.4759**
	(−4.21)	(−4.22)	(−4.66)	(−4.65)	(−2.27)	(−2.27)	(−2.55)	(−2.56)
Mshare	7.4135***	7.3924***	7.1416***	7.1564***	1.2406***	1.2348***	1.1195***	1.1237***
	(4.64)	(4.62)	(4.41)	(4.41)	(3.40)	(3.38)	(3.13)	(3.15)
Rinde	0.5832***	0.5830***	0.5373***	0.5372***	0.3472	0.3483	0.3503	0.3511
	(3.13)	(3.13)	(3.01)	(3.01)	(1.25)	(1.25)	(1.27)	(1.27)
Dual	0.0183	0.0185	0.0262	0.0262	0.1810**	0.1814**	0.1727**	0.1732**
	(0.34)	(0.34)	(0.49)	(0.49)	(2.53)	(2.54)	(2.47)	(2.49)
Constant	6.9696***	6.9561***	7.5658***	7.5456***	5.1900***	5.1284***	5.5175***	5.3557***
	(16.66)	(16.52)	(18.72)	(18.41)	(7.53)	(7.45)	(8.01)	(7.69)
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7157	7157	7157	7157	2433	2433	2433	2433
R-squared	0.5054	0.5054	0.5238	0.5237	0.3717	0.3715	0.3816	0.3824
F	119.9	119.8	122.6	122.4	26.90	26.87	27.31	27.41
		(1)		(2)		(3)		(4)
Variables		M1		M2		M1		M2
Panel B: Full sample tests using interaction terms								
Ret		0.0356***		0.0332**				
		(2.63)		(2.47)				
Peer_ret		−0.0137		0.0307				
		(−0.29)		(0.96)				
*Peer_ret*Pri*		−0.0460***		−0.0482***				
		(−2.71)		(−2.83)				
Roe						0.7535***		0.7546***
						(10.86)		(10.90)
Peer_roe						0.1456		0.0241
						(0.52)		(0.16)
*Peer_roe*Pri*						−0.7969**		−0.2255
						(−1.97)		(−1.02)
Pri		−0.0217		−0.0217		−0.0189		−0.0389
		(−0.60)		(−0.60)		(−0.50)		(−1.09)
Age		0.0050		0.0050		0.0068		0.0067
		(1.05)		(1.05)		(1.46)		(1.43)
Lev		−0.4445***		−0.4433***		−0.2507***		−0.2493***
		(−5.12)		(−5.10)		(−2.88)		(−2.86)
Size		0.3435***		0.3439***		0.3137***		0.3148***
		(20.03)		(20.03)		(18.64)		(18.42)

Table 7 (*continued*)

Variables	(1) M1	(2) M2	(3) M1	(4) M2
Growth	0.0004**	0.0004**	0.0002	0.0002
	(2.55)	(2.57)	(1.19)	(1.28)
Sh	−0.5201***	−0.5206***	−0.5562***	−0.5588***
	(−5.01)	(−5.02)	(−5.49)	(−5.51)
Mshare	1.7773***	1.7700***	1.5836***	1.5804***
	(5.43)	(5.41)	(5.09)	(5.05)
Rinde	0.4708***	0.4710***	0.4468***	0.4487***
	(3.00)	(3.00)	(2.93)	(2.94)
Dual	0.0753*	0.0754*	0.0754*	0.0747*
	(1.71)	(1.72)	(1.76)	(1.74)
Constant	6.5395***	6.5108***	7.0449***	7.0214***
	(17.47)	(17.31)	(19.32)	(18.97)
Industry dummy	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes
Observations	9590	9590	9590	9590
R-squared	0.4702	0.4702	0.4860	0.4858
F	129.4	129.4	132.0	131.9

Table 8
Full sample tests of strong-form RPE.

Variables	(1) M1	(2) M2	(3) M1	(4) M2
Unsys_ret	0.0349**	0.0318**		
	(2.57)	(2.36)		
Sys_ret	−0.0161	0.0371		
	(−0.35)	(1.15)		
Unsys_roe			0.7516***	0.7525***
			(10.94)	(10.96)
Sys_roe			0.8094**	0.6811**
			(1.98)	(1.98)
Age	0.0055	0.0056	0.0074	0.0074
	(1.16)	(1.17)	(1.59)	(1.59)
Lev	−0.4441***	−0.4426***	−0.2487***	−0.2486***
	(−5.11)	(−5.09)	(−2.85)	(−2.85)
Size	0.3458***	0.3461***	0.3167***	0.3173***
	(20.42)	(20.41)	(19.09)	(18.92)
Growth	0.0004**	0.0004**	0.0002	0.0002
	(2.53)	(2.58)	(1.17)	(1.17)
Sh	−0.5046***	−0.5043***	−0.5359***	−0.5359***
	(−4.82)	(−4.82)	(−5.25)	(−5.24)
Mshare	1.6868***	1.6795***	1.4946***	1.4963***
	(5.30)	(5.27)	(4.86)	(4.87)
Rinde	0.4605***	0.4602***	0.4316***	0.4317***
	(2.93)	(2.93)	(2.83)	(2.83)
Dual	0.0741*	0.0740*	0.0721*	0.0722*
	(1.69)	(1.68)	(1.68)	(1.68)
Constant	6.4760***	6.4432***	6.9399***	6.9327***
	(17.77)	(17.61)	(19.64)	(19.47)
Industry dummy	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes
Observations	9590	9590	9590	9590
R-squared	0.4697	0.4696	0.4853	0.4853
F	134.0	134.1	136.9	136.8

Table 9
Ownership and strong-form RPE tests.

	SOEs				Non−SOEs			
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
Variables	M1	M2	M1	M2	M1	M2	M1	M2
Panel A: Subsample tests								
Unsys_ret	0.0377**	0.0363**			0.0258	0.0253		
	(2.31)	(2.26)			(1.02)	(0.98)		
Sys_ret	0.0641	0.0773**			−0.0931	−0.0128		
	(1.30)	(1.98)			(−1.19)	(−0.23)		
Unsys_roe			0.9057***	0.9030***			0.4622***	0.4586***
			(10.43)	(10.40)			(4.80)	(4.75)
Sys_roe			0.5064	0.8684**			−0.1772	−1.6021
			(1.31)	(2.57)			(−0.14)	(−1.28)
Age	0.0101*	0.0101*	0.0124**	0.0123**	−0.0013	−0.0012	−0.0009	−0.0012
	(1.78)	(1.78)	(2.25)	(2.24)	(−0.16)	(−0.15)	(−0.11)	(−0.15)
Lev	−0.4761***	−0.4755***	−0.2508**	−0.2504**	−0.3332**	−0.3330**	−0.1974	−0.1979
	(−4.82)	(−4.81)	(−2.52)	(−2.52)	(−2.15)	(−2.15)	(−1.27)	(−1.27)
Size	0.3247***	0.3251***	0.2910***	0.2914***	0.4005***	0.4010***	0.3789***	0.3870***
	(16.88)	(16.86)	(15.55)	(15.39)	(12.87)	(12.89)	(12.04)	(12.10)
Growth	0.0029	0.0029	0.0000	−0.0000	0.0003***	0.0003***	0.0002**	0.0002**
	(0.60)	(0.60)	(0.00)	(−0.01)	(2.66)	(2.76)	(2.03)	(2.02)
Sh	−0.4906***	−0.4908***	−0.5264***	−0.5260***	−0.4269**	−0.4276**	−0.4751**	−0.4759**
	(−4.21)	(−4.22)	(−4.66)	(−4.65)	(−2.27)	(−2.27)	(−2.55)	(−2.56)
Mshare	7.4135***	7.3924***	7.1416***	7.1564***	1.2406***	1.2348***	1.1195***	1.1237***
	(4.64)	(4.62)	(4.41)	(4.41)	(3.40)	(3.38)	(3.13)	(3.15)
Rinde	0.5832***	0.5830***	0.5373***	0.5372***	0.3472	0.3483	0.3503	0.3511
	(3.13)	(3.13)	(3.01)	(3.01)	(1.25)	(1.25)	(1.27)	(1.27)
Dual	0.0183	0.0185	0.0262	0.0262	0.1810**	0.1814**	0.1727**	0.1732**
	(0.34)	(0.34)	(0.49)	(0.49)	(2.53)	(2.54)	(2.47)	(2.49)
Constant	6.9695***	6.9557***	7.5712***	7.5464***	5.1907***	5.1292***	5.5355***	5.4235***
	(16.66)	(16.51)	(18.73)	(18.46)	(7.53)	(7.45)	(7.98)	(7.86)
Industry dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	7157	7157	7157	7157	2433	2433	2433	2433
R-squared	0.5054	0.5054	0.5238	0.5237	0.3717	0.3715	0.3816	0.3824
F	119.9	119.8	122.6	122.4	26.90	26.87	27.31	27.41
		(1)		(2)		(3)		(4)
Variables		M1		M2		M1		M2
Panel B: Full sample tests using interaction terms								
Unsys_ret		0.0356***		0.0332**				
		(2.63)		(2.47)				
Sys_ret		0.0218		0.0651**				
		(0.48)		(2.00)				
Sys_ret ∗ Pri		−0.0466***		−0.0504***				
		(−2.72)		(−2.81)				
Unsys_roe						0.7535***		0.7546***
						(10.86)		(10.90)
Sys_roe						0.9727**		0.8102**
						(2.32)		(2.28)
Sys_roe ∗ Pri						−2.7343**		−1.5829
						(−2.13)		(−1.22)
Pri		−0.0214		−0.0210		0.0551		0.0127
		(−0.59)		(−0.58)		(0.93)		(0.21)
Age		0.0050		0.0050		0.0068		0.0067
		(1.05)		(1.05)		(1.46)		(1.43)
Lev		−0.4445***		−0.4433***		−0.2507***		−0.2493***
		(−5.12)		(−5.10)		(−2.88)		(−2.86)
Size		0.3435***		0.3439***		0.3137***		0.3148***
		(20.03)		(20.03)		(18.64)		(18.42)

Table 9 (*continued*)

Variables	(1) M1	(2) M2	(3) M1	(4) M2
Growth	0.0004**	0.0004**	0.0002	0.0002
	(2.55)	(2.57)	(1.19)	(1.28)
Sh	−0.5201***	−0.5206***	−0.5562***	−0.5588***
	(−5.01)	(−5.02)	(−5.49)	(−5.51)
Mshare	1.7773***	1.7700***	1.5836***	1.5804***
	(5.43)	(5.41)	(5.09)	(5.05)
Rinde	0.4708***	0.4710***	0.4468***	0.4487***
	(3.00)	(3.00)	(2.93)	(2.94)
Dual	0.0753*	0.0754*	0.0754*	0.0747*
	(1.71)	(1.72)	(1.76)	(1.74)
Constant	6.5395***	6.5105***	7.0419***	7.0201***
	(17.47)	(17.31)	(19.30)	(19.03)
Industry dummy	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes
Observations	9590	9590	9590	9590
R-squared	0.4702	0.4702	0.4860	0.4858
F	129.4	129.4	132.0	131.9

The performance of the company includes stock returns (*Ret*) and accounting performance (*Roe*). The residuals of model (4) are *Unsys_perf*, and *Sys_perf* is the difference between *Perf* and *Unsys_perf*. Performance measured as stock returns refers to *Sys_ret* and *Unsys_ret* respectively. Performance measured as accounting performance refers to *Sys_roe* and *Unsys_roe* respectively. We use model (5) to test whether the full sample uses strong-form RPE. If strong-form RPE exists, then the coefficient, a_2, will be insignificant.

$$Lncp = a_0 + a_1 Unsys\_perf + a_2 Sys\_perf + a_3 Age + a_4 Lev + a_5 Size + a_6 Growth + a_7 Sh + a_8 Mshare + a_9 Rinde + a_{10} Dual + \Sigma Year + \Sigma Industry + \varepsilon \quad (5)$$

Table 8 shows the regression results for model (5). We find that *Unsys_ret* and *Unsys_roe* are significantly positive. *Sys_ret* is not significant, whereas *Sys_roe* is positive and significant at the 5% level. This indicates that accounting performance does not support strong-form RPE.

Next, we consider the type of ownership. Table 9 Panel A presents the regression results for the subsamples by type of ownership. Table 9 Panel A shows that *Sys_perf* for non-SOEs is insignificant, whereas *Sys_perf* for SOEs is positive and significant at the 5% level in columns (2) and (4). This indicates that the SOE subsample does not support strong-form RPE. Systematic performance will increase executive pay. The results of model (6), shown in Panel B of Table 9, further reveal the difference between SOEs and non-SOEs, and we find that the interactions are negative and significant.

$$Lncp = a_0 + a_1 Unsys\_perf + a_2 Sys\_perf + a_3 Sys\_perf * Pri + a_4 Pri + a_5 Age + a_6 Lev + a_7 Size + a_8 Growth + a_9 Sh + a_{10} Mshare + a_{11} Rinde + a_{12} Dual + \Sigma Year + \Sigma Industry + \varepsilon \quad (6)$$

The results in Tables 8 and 9 suggest that strong-form RPE is more widely applied in non-SOEs than in SOEs.

4.4. Robustness tests

We conduct the following several robustness tests: (1) we use the change in executive compensation – the difference between the natural logarithm of the top three executives' total cash compensation and the value for the previous year – as the explanatory variable; (2) we use the total cash compensation for the entire management (directors, supervisors and managers) as the explanatory variable; and (3) we construct peer groups using operating income as a proxy for size. Due to space limitations, we only present the results for model (2). The

Table 10
Robustness tests.

Variables	(1) M1	(2) M2	(3) M1	(4) M2
Panel A: Change in executive compensation as the explanatory variable				
Ret	0.0477***	0.0510***		
	(4.12)	(4.36)		
Peer_ret	0.0813*	0.0202		
	(1.74)	(0.75)		
*Peer_ret * Pri*	−0.0270**	−0.0301**		
	(−1.99)	(−2.26)		
Roe			0.2558***	0.2558***
			(7.55)	(7.55)
Peer_roe			0.2231	0.1176
			(1.31)	(1.43)
*Peer_roe * Pri*			−0.3606	−0.2643**
			(−1.55)	(−2.08)
Pri	0.0009	0.0033	0.0039	−0.0003
	(0.07)	(0.27)	(0.28)	(−0.02)
Age	0.0030***	0.0030***	0.0036***	0.0034***
	(2.67)	(2.68)	(3.22)	(3.10)
Lev	−0.0507*	−0.0523**	0.0171	0.0162
	(−1.94)	(−1.99)	(0.64)	(0.61)
Size	0.0096**	0.0094**	−0.0016	−0.0026
	(2.30)	(2.27)	(−0.36)	(−0.55)
Growth	0.0013***	0.0013***	0.0013***	0.0013***
	(8.47)	(8.43)	(9.29)	(9.15)
Sh	0.0340	0.0347	0.0243	0.0222
	(1.34)	(1.38)	(0.98)	(0.90)
Mshare	0.4015***	0.4078***	0.3239***	0.3215***
	(3.37)	(3.43)	(2.81)	(2.79)
Rinde	0.0459	0.0455	0.0382	0.0385
	(0.61)	(0.60)	(0.52)	(0.52)
Dual	0.0023	0.0022	0.0029	0.0028
	(0.15)	(0.14)	(0.20)	(0.19)
Constant	−0.2013**	−0.1708**	0.0352	0.0641
	(−2.26)	(−1.99)	(0.40)	(0.68)
Industry dummy	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes
Observations	8770	8770	8770	8770
R-squared	0.0337	0.0335	0.0379	0.0381
F	10.29	10.28	11.50	11.69
Variables	(1) M1	(2) M2	(3) M1	(4) M2
Panel B: Total cash compensation for entire management as the explanatory variable				
Ret	0.0259*	0.0232*		
	(1.91)	(1.72)		
Peer_ret	−0.0533	0.0076		
	(−1.18)	(0.23)		
*Peer_ret * Pri*	−0.0294*	−0.0344**		
	(−1.76)	(−2.07)		
Roe			0.6826***	0.6831***
			(10.22)	(10.26)
Peer_roe			0.4019	0.1929
			(1.56)	(1.28)
*Peer_roe * Pri*			−1.0828***	−0.3854*
			(−2.59)	(−1.73)
Pri	−0.0558	−0.0552	−0.0372	−0.0633*
	(−1.55)	(−1.53)	(−0.97)	(−1.78)

Table 10 (*continued*)

Variables	(1) M1	(2) M2	(3) M1	(4) M2
Age	−0.0071	−0.0071	−0.0055	−0.0057
	(−1.53)	(−1.52)	(−1.21)	(−1.25)
Lev	−0.4172***	−0.4159***	−0.2388***	−0.2382***
	(−4.84)	(−4.82)	(−2.74)	(−2.73)
Size	0.4099***	0.4102***	0.3828***	0.3809***
	(21.73)	(21.72)	(20.46)	(19.95)
Growth	0.0001	0.0001	−0.0001	−0.0001
	(0.24)	(0.26)	(−0.28)	(−0.26)
Sh	−0.6098***	−0.6103***	−0.6408***	−0.6450***
	(−5.93)	(−5.93)	(−6.36)	(−6.39)
Mshare	1.8208***	1.8122***	1.6517***	1.6426***
	(5.11)	(5.07)	(4.86)	(4.79)
Rinde	0.2802*	0.2802*	0.2563*	0.2594*
	(1.78)	(1.78)	(1.67)	(1.69)
Dual	0.0438	0.0438	0.0442	0.0431
	(0.95)	(0.95)	(0.98)	(0.95)
Constant	6.1808***	6.1472***	6.6083***	6.6535***
	(15.00)	(14.89)	(16.36)	(16.18)
Industry dummy	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes
Observations	9464	9464	9464	9464
R-squared	0.4575	0.4575	0.4718	0.4716
F	103.5	103.3	106.6	106.5

Variables	(1) M1	(2) M2	(3) M1	(4) M2
Panel C: Constructing peer groups using operating income as proxy for size				
Ret	0.0339**	0.0295**		
	(2.44)	(2.03)		
Peer_ret	0.0216	0.0320		
	(0.48)	(0.88)		
*Peer_ret*Pri*	−0.0502***	−0.0527***		
	(−2.82)	(−2.89)		
Roe			0.7484***	0.7333***
			(10.77)	(10.76)
Peer_roe			1.1974	1.1955***
			(1.62)	(3.24)
*Peer_roe*Pri*			−0.5568	−1.2413**
			(−0.53)	(−1.99)
Pri	−0.0247	−0.0201	−0.0188	0.0254
	(−0.68)	(−0.55)	(−0.25)	(0.48)
Age	0.0049	0.0053	0.0071	0.0067
	(1.01)	(1.10)	(1.51)	(1.43)
Lev	−0.4412***	−0.4475***	−0.2438***	−0.2418***
	(−5.07)	(−5.10)	(−2.80)	(−2.75)
Size	0.3435***	0.3461***	0.3147***	0.3029***
	(19.99)	(20.06)	(18.68)	(17.58)
Growth	0.0004**	0.0004***	0.0002	0.0002
	(2.54)	(2.67)	(1.31)	(1.36)
Sh	−0.5226***	−0.5185***	−0.5690***	−0.5610***
	(−5.04)	(−4.94)	(−5.63)	(−5.42)
Mshare	1.7214***	1.7204***	1.5532***	1.5376***
	(5.36)	(5.23)	(4.92)	(4.81)
Rinde	0.5070***	0.5129***	0.4425***	0.4225***
	(3.20)	(3.23)	(2.88)	(2.70)
Dual	0.0755*	0.0926**	0.0747*	0.0812*
	(1.72)	(2.08)	(1.72)	(1.84)

(*continued on next page*)

Table 10 (*continued*)

Variables	(1) M1	(2) M2	(3) M1	(4) M2
Constant	6.5079***	6.4473***	6.9508***	7.2232***
	(17.36)	(17.11)	(18.78)	(19.44)
Industry dummy	Yes	Yes	Yes	Yes
Year dummy	Yes	Yes	Yes	Yes
Observations	9448	9036	9448	9036
R-squared	0.4702	0.4685	0.4862	0.4893
F	128.1	123.7	129.5	125.9

results of the three robustness tests are shown in Panels A–C of Table 10. Results are consistent with our previous analysis.

In addition, we carry out other unreported tests: (1) we measure accounting performance by *Roa* instead of *Roe*; (2) we measure peer group performance as the median rather than the mean of performance; and (3) we denote *D* as 1 if a company's performance is below 10% or the median when testing the asymmetry of RPE. The results are consistent with our previous findings.

5. Conclusions and limitations

RPE is a long-discussed theoretical problem. Although a number of new research methods and research findings on RPE have recently emerged, there have been relatively few studies in China and their methods and conclusions differ. This paper follows the latest research, such as Albuquerque (2009), to examine the use of RPE in listed companies in China.

We use data on Shanghai and Shenzhen A-share listed companies from 1999 to 2009. The results show that overall, RPE does not exist in China's listed companies, nor is there asymmetry in the use of RPE. In contrast to the extant literature, we argue that the type of ownership cannot be ignored when researching RPE in China. When we consider the type of ownership, we find that RPE is more likely to be used in non-SOEs than in SOEs. This result is likely due to the regulation of cash compensation, various forms of incentives and the multiple tasks of managers in SOEs. These results are stable across a variety of relative performance measures and robustness tests. In addition, our results show that there is little difference between the traditional method and Albuquerque's (2009) method of constructing peer groups.

Of course, this paper still has some limitations. First, Faulkender and Yang (2010) find that using peer groups disclosed by the company is superior to constructing them using Albuquerque's (2009) method. This means that our method can be improved upon. For example, maybe all companies select the same several companies with a high reputation in the industry as their peer group. Our method may miss this result. Second, there are various incentives in SOEs and RPE may be used in decisions on perks or promotion rather than cash compensation. Chen et al. (2005b) and Zhou et al. (2005) find evidence to suggest that RPE is used in the promotion of local government officials. Third, the multiple tasks in SOEs make it difficult to evaluate the true effort of managers. Excluding these factors may make our results more precise. These points not only represent the limitations of this study, but also future research directions.

Acknowledgments

This paper is the result of research supported by the National Social Science Foundation (08CJY2009) and the National Nature Science Foundation of China (70602011). We are grateful for support from the International Accounting PHD (IAPHD) scheme of Nanjing University, the Accounting and Finance Research Institute of the Shanghai University of Finance, the Center for Economic Transformation and Development, the Study of Economic Growth and Structural Transformation and the 985 plan topics of Nanjing University, the New Century Excellent Talents Project and the First Scholarship Award for Excellent Doctor Student of the Education Ministry. We also appreciate the suggestions made by scholars attending the 2011 China Journal of

Accounting Research Workshop. We are thankful for the helpful advice of scholars such as Qi Xiangqin, Shen Yongjian, Jiang Dequan and Xin Fu. We acknowledge the executive editor of this paper and the anonymous reviewer for their useful comments and suggestions, but stress that we are completely responsible for the content of this paper.

References

Aggarwal, R.K., Samwick, A.A., 1999a. Executive compensation, strategic competition, and relative performance evaluation: theory and evidence. Journal of Political Economy 54 (6), 1999–2043.

Aggarwal, R.K., Samwick, A.A., 1999b. The other side of the trade-off: the impact of risk on executive compensation. Journal of Political Economy 107 (1), 65–105.

Albuquerque, A., 2009. Peer firms in relative performance evaluation. Journal of Accounting and Economics 48 (1), 69–89.

Antle, R., Smith, A., 1986. An empirical investigation of the relative performance evaluation of corporate executives. Journal of Accounting Research 24 (1), 1–39.

Bai, C.-E., Lu, J., Tao, Z., 2006. The multitask theory of state enterprise reform: empirical evidence from China. The American Economic Review 96 (2), 353–357.

Bai, C.-E., Xu, L.C., 2005. Incentives for CEOs with multitasks: evidence from Chinese state-owned enterprises. Journal of Comparative Economics 33 (3), 517–539.

Baiman, S., Demski, J.S., 1980. Economically optimal performance evaluation and control systems. Journal of Accounting Research 18 (Suppl.), 184–220.

Bebchuk, L., Fried, J.M., 2003. Executive compensation as an agency problem. Journal of Economic Perspectives 17 (3), 71–92.

Cao, J., Lemmon, M., Pan, X., Tian, G., 2010. Political promotion, CEO compensation, and their effect on firm performance. Working Paper.

Carter, M.E., Ittner, C.D., Zechman, S.L.C., 2009. Explicit relative performance evaluation in performance-vested equity grants. Review of Accounting Studies 14 (2–3), 269–306.

Chen, D., Chen, S., Li, Z., Liang, S., 2011a. Administrative rank and firm performance. Working Paper.

Chen, D., Chen, X., Wan, H., 2005a. Regulation and non-pecuniary compensation in Chinese SOEs. Economic Research 2, 92–101 (in Chinese).

Chen, S., Sun, Z., Tang, S., Wu, D., 2011b. Government intervention and investment efficiency: evidence from China. Journal of Corporate Finance 17 (2), 259–271.

Chen, Y., Li, H., Zhou, L., 2005b. Relative performance evaluation and the turnover of provincial leaders in China. Economics Letters 88 (3), 421–425.

Crawford, A.J., 1999. Relative performance evaluation in CEO pay contracts: evidence from the commercial banking industry. Managerial Finance 25 (9), 34–54.

Diamond, D.W., Verrecchia, R.E., 1982. Optimal managerial contracts and equilibrium security prices. Journal of Finance 37 (2), 275–287.

Faulkender, M., Yang, J., 2010. Inside the black box: the role and composition of compensation peer groups. Journal of Financial Economics 96 (2), 257–270.

Gao, Y., 2006. Relative performance evaluation with different peer groups: Evidence from China's listed enterprises. Journal of ShanXi Finance and Economics University 28 (2), 86–89 (in Chinese).

Garvey, G., Milbourn, T., 2003. Incentive compensation when executives can hedge the market: evidence of relative performance evaluation in the cross section. Journal of Finance 58 (4), 1557–1581.

Gibbons, R., Murphy, K., 1990. Relative performance evaluation for chief executive officers. Industrial & Labor Relations Review 43 (3), 30–51.

Gong, G., Li, L.Y., Shin, J.Y., 2011. Relative performance evaluation and related peer groups in executive compensation contracts. The Accounting Review 86 (3), 1007–1043.

Holmstrom, B., 1979. Moral hazard and observability. Bell Journal of Economics 10 (1), 74–91.

Holmstrom, B., 1982. Moral hazard in teams. Bell Journal of Economics 13 (2), 324–340.

Holmstrom, B., Milgrom, P., 1987. Aggregation and linearity in the provision of intertemporal incentives. Econometrica 55 (2), 303–328.

Janakiraman, S., Lambert, R., Larcker, D., 1992. An empirical investigation of the relative performance evaluation hypothesis. Journal of Accounting Research 30 (1), 53–69.

Jensen, M.C., Meckling, W.H., 1976. Theory of the firm: managerial behavior, agency costs and ownership structure. Journal of Financial Economics 3 (4), 305–360.

Jensen, M.C., Murphy, K.J., 1990. Performance pay and top-management incentives. Journal of Political Economy 98 (2), 225–264.

Murphy, K.J., 1999. Executive compensation. In: Ashenfelter, O., Card, D. (Eds.), Handbook of Labor Economics, vol. 3. Elsevier Science, Amsterdam, pp. 2485–2563 (Chapter 38).

Wang, K., Xiao, X., 2011. Controlling shareholders' tunneling and executive compensation: evidence from China. Journal of Accounting and Public Policy 30 (1), 89–100.

Xiao, J., 2005. A synthesis of relative performance evaluation theory and empirical research. Economic Management 14, 17–27 (in Chinese).

Zhou, H., Zhang, W., 2010. The comparative effects of managers' compensation in Chinese A-listed companies: an empirical study based on relative performance evaluation. Accounting Research 7, 50–56 (in Chinese).

Zhou, L., Li, H., Chen, Y., 2005. Relative performance evaluation: empirical research on the promotion mechanism of Chinese local officials. Economic Journal 1, 83–96 (in Chinese).

China Journal of Accounting Research 5 (2012) 145–161

Contents lists available at SciVerse ScienceDirect

China Journal of Accounting Research

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

Board independence, internal information environment and voluntary disclosure of auditors' reports on internal controls

Ye Sun [a,b,*], Yang Yi [a], Bin Lin [a,c]

[a] *School of Business, Sun Yat-sen University, China*
[b] *Department of Accountancy, City University of Hong Kong, China*
[c] *Center for Accounting, Finance and Institutions, Sun Yat-sen University, China*

ARTICLE INFO

Article history:
Received 8 December 2011
Revised 20 May 2012
Accepted 29 May 2012
Available online 30 June 2012

JEL classification:
G30
K22
M41
D23

Keywords:
Voluntary disclosure
Auditors' reports on internal controls
Board independence
Internal information environment

ABSTRACT

When there is high information asymmetry between directors and managers, independent directors do not have enough information to perform their functions. Only when faced with a good internal information environment can such directors acquire enough information to provide advice and monitor managers, and only under these conditions can increasing their proportion on the board effectively reduce agency problems, such as driving managers to disclose information to investors. Using a sample of Chinese listed firms that voluntarily disclose their auditors' reports on internal controls from 2007 to 2009, this study explores how the information acquisition costs of independent directors affect their monitoring effectiveness by investigating the disclosure decisions of their internal control audits. We find that when the information asymmetry between insiders and outside directors is low and the proportion of independent directors on a board is high, a firm is more likely to voluntarily disclose its internal control audit report.

* Corresponding author at: Department of Accountancy, City University of Hong Kong, China.
E-mail address: sunye_74@163.com (Y. Sun).

1755-3091/$ - see front matter © 2012 China Journal of Accounting Research. Founded by Sun Yat-sen University and City University of Hong Kong. Production and hosting by Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.cjar.2012.05.003

1. Introduction

Spurred by the seemingly ever-growing list of corporate scandals at the time, the United States passed the Sarbanes–Oxley Act (SOX) in 2002, which requires managers to evaluate the design and effectiveness of their internal control systems and report their overall conclusions, at which point they must employ an external auditor to audit their internal control systems and attest to the accuracy of the company management assertion that internal accounting controls are in place, operational and effective (SOX 302, 404). In China, investors and policymakers have also paid increasing attention to firms' internal controls. Since 2006, the China Securities Regulatory Commission (CSRC) and the Shanghai and Shenzhen Stock Exchanges have released a series of internal control-related regulations. In 2008, the Ministry of Finance released the Enterprise Internal Control Basic Standard, which is considered the Chinese SOX (C-SOX) and is aimed at standardizing the construction of internal controls in Chinese firms and strengthening the supervision and assessment of internal controls. Regarding internal control audits, unlike in the United States, there were no mandatory requirements for most Chinese listed firms before 2010. Since 2007, the Shanghai and Shenzhen Stock Exchanges have explicitly encouraged listed firms to report their internal control self-assessments and voluntarily hire CPA firms to conduct audits of internal controls. Hiring auditors to provide extra audit reports on internal controls produces additional costs. However, according to our statistics, from 2007 to 2009, there were 133, 161 and 210 listed firms that voluntarily disclosed their auditors' reports on internal controls (ARICs). What were the motives and incentives for those firms to voluntarily audit their internal control systems? What factors caused such differential disclosure decisions? These are still open questions. Lin and Rao (2009) show that firms with high internal control quality and those that want to refinance are more likely to audit their internal controls to send a positive signal to the market. This study investigates the motives behind the voluntary auditing of internal controls from a corporate governance perspective. In particular, we discuss the relationships among board independence, voluntary audit and disclosure decisions under different internal information environments.

As Jensen and Meckling (1976) note, the separation of property and management rights creates agency problems between principals and agents. The latter tend to hide information in the hope of maintaining their private control benefits (Chen and Jaggi, 2000; Eng and Mak, 2003; Gul and Leung, 2004). As a mechanism for solving agency problems, effective corporate governance is capable of increasing both the quantity and quality of disclosures in addition to enhancing voluntary disclosure. Fama (1980) believes that the board of directors is the core of an internal governance mechanism that monitors agents. Among all of the board characteristics, the proportion of independent directors is one of the most important factors because it reflects board independence and is considered an objective and professional monitoring mechanism. Cheng et al. (2009) show that the independent director system provides a more secure control mechanism for managing employment contracts, such that the independent directors' professional knowledge makes board decisions more scientific and capable of effectively preventing financial report distortion. We predict that a higher proportion of effective independent directors on a board will drive the firm to voluntarily audit its internal control system and disclose the related audit report.

Independent directors affect auditing and disclosure decisions regarding internal controls in the following ways. First, consistent with the literature, the monitoring role of independent directors will push the firm to disclose more information, including internal control information, to investors, which increases the likelihood that the internal control system will be audited to reduce information asymmetry and agency problems (direct effect). Second, under the requirements of C-SOX, the board of directors has the primary responsibility for establishing internal controls. The audit committee, under the control of the board, plays a core role in the detailed design and daily review of the internal control system. If the board is more independent, its monitoring function will be more pronounced, to the extent that the firm will pay more attention to the establishment of its internal control system. These firms are also more likely to send a signal of the effectiveness of their internal controls by disclosing their third-party verification reports (indirect effect).

We choose the voluntary disclosure of ARIC to test the monitoring effectiveness of independent directors for the following reasons. First, given the increased attention that internal control systems have been receiving in China and around the world, internal control information has become more important to investors' decision making. An internal control system plays an important role in ensuring the efficiency of daily operations

and the reliability and relevance of financial information. Its effectiveness not only reflects the quality of a firm's financial reports but also showcases the firm's ability to avoid risk and fraud. Investors can then use it to evaluate the firm's future value. Second, previous studies attempt to verify the monitoring role of independent directors by investigating whether it improves the firm's earnings quality and value, but the results have been mixed. For example, from an earnings quality perspective, Park and Shin (2004) and Peasnell et al. (2005) show that an independent board can improve a firm's earnings quality, whereas Klein (2002) does not find such a relationship. Results are also not consistent on the relationship between board independence and firm performance or value.[1] Some studies show that there is a positive relationship (Rhoades et al., 2000; Rosenstein and Wyatt, 1990) while others find that the composition of the board does not influence firm value (Yermack, 1996; Dalton et al., 1998; Hsu, 2010). We believe that internal control quality is different from earnings quality and firm performance, although the former can influence the latter. The latter also varies between firms as the result of fixed business models and economic environments, such that strengthening constraints and supervision mechanisms may not have a significant influence. However, the quality of a firm's internal controls is a direct consequence of its monitoring mechanisms, and our investigation of the relationship between board independence and voluntary ARIC disclosure provides more direct evidence of the monitoring role of independent directors. Third, this voluntarily disclosed information is evaluated by third-party auditors who face litigation risks when providing their audit reports. Thus, compared to other voluntarily disclosed information, such as earnings forecasts and CSR reports, this information is more reliable and objective.

We also highlight how the information asymmetry between insiders and independent directors affects the monitoring effectiveness of the latter. As per the definition of an independent director in the code of corporate governance, an independent director should not have any pecuniary relations or transactions with the company or its promoters; his decisions should be independent of those who have a controlling stake in the company and be in the overall interests of the company and its stakeholders. However, board independence is a double-edged sword in that it reduces the likelihood of collusion between the board and management, but also weakens the board's ability to obtain useful private information (Bushman et al., 2004). Given this, whether independent directors can adopt monitoring and advising roles depends on whether they can gather enough information. Jensen (1993) notes that management makes the decisions regarding when and how much information is disclosed to the board. If a significant amount of information is hidden, even talented directors are unable to review and evaluate management's decisions and the firm's strategies. When information asymmetry exists between management and the board and information acquisition costs are relatively high, corporate governance mechanisms such as independent directors and audit committees are hindered. The right to make decisions is also in the hands of management or controlling shareholders, such that the rights of minority shareholders are not protected. Only when internal information asymmetry is low and independent directors have enough information to help them make good decisions can they take appropriate actions to reduce agency problems and improve disclosure quality and the voluntary disclosure level.

However, internal information asymmetry levels are hard to measure. We use traditional measures that reflect the quality of the external information environment with expert information medium characteristics (including analysts and institutional investors) as proxy variables. If the external information environment is better, independent directors can obtain information through lower information acquisition costs, which helps them make better decisions based on the quality and quantity of the existing information disclosed by managers. Then, when making decisions or voting they can question managers. In addition, when the external information environment is better the firm will attract more attention from the public. In cases where a firm's risky behavior or fraud is confronted, independent directors take on increased reputation costs and are thus more likely to ask managers to provide more private information. Thus, the external information environment indirectly helps reduce information asymmetry between insiders and independent directors.

Our main finding supports our expectation that when information asymmetry between insiders and outside directors is low, there is a positive relationship between the proportion of independent directors on the board and the likelihood of a firm voluntarily disclosing its ARIC.

[1] These studies often use measures such as firm financial ratios (e.g. ROA, EPS), Tobin's Q and the market reaction to proxy for firm performance and value.

Our study makes two contributions to the literature. First, regarding information disclosure, many studies discuss how board independence influences voluntary disclosure around the world. For example, Shen et al. (2010) find that in China the proportion of independent directors has a positive effect on the voluntary disclosure of corporate social responsibility. Zhang and Huang (2010) note that board independence drives firms to voluntarily conduct interim audits. Fang et al. (2009) show that there is a positive relationship between the proportion of independent directors and voluntary internal control information disclosure. Our study differs from these by showing how internal information asymmetry influences the monitoring role of independent directors in driving managers to improve voluntary disclosure levels. Our results partially explain the mixed results in the literature on the function of independent directors. Second, regarding internal controls, unlike US firms subject to SOX 404, which mandatorily requires that they audit their internal control systems, Chinese firms were able to choose whether to audit their internal controls during our sample period. This provides us with a unique setting and our findings will enrich the internal control literature.

The remainder of this paper is organized as follows. Section 2 reviews the related literature and develops our hypothesis. Section 3 introduces the sample and specifies our research design. Section 4 provides descriptive statistics and presents the results of our univariate and multivariate tests. Section 5 discusses several robustness tests and provides additional analysis. Section 6 concludes the paper.

2. Literature review and research hypothesis

Previous studies test whether board independence, as one of the monitoring mechanisms of corporate governance, increases disclosure quality, but the results are mixed. Using a sample of Hong Kong listed firms, Chen and Jaggi (2000) find a positive relationship between the proportion of independent directors and comprehensive financial disclosures. This positive effect is more pronounced in non-family controlled firms than family controlled firms. Using a sample of 385 Hong Kong listed firms, Gul and Leung (2004) show that the duality of a board's CEO and Chairman negatively influences disclosure levels and that the proportion of experienced independent directors weakens this negative effect. Eng and Mak (2003) investigate Singapore listed firms to test the relationship between the proportion of independent directors and voluntary disclosure, specifically the comprehensive disclosure rating for non-mandatory strategies and non-financial and financial information. In contrast to Chen and Jaggi's (2000) findings, Eng and Mak (2003) show that a higher proportion of independent directors is associated with lower voluntary disclosure levels.

However, these studies pay little attention to how independent directors should effectively fulfill their duties. Private control benefits and the psychological value of being in control make agents less willing to disclose information to outsiders or even other board members, such as independent directors (Dyck and Zingales, 2004). A decision regarding whether a board is effective must consider more than whether it is independent because internal information asymmetry impedes outside directors from performing their monitoring and advising roles. Regarding the differentiation in the attainment of firm information, studies suggest that managers and inside directors grasp the most while independent directors attain less and outside investors are provided with the least (Armstrong et al., 2010). If the information asymmetry between independent directors and insiders is high, the former can hardly monitor and advise the agents. The literature (e.g., Raheja, 2005; Adams and Ferreira, 2007; Harris and Raviv, 2008; Duchin et al., 2010) suggests that it is important to consider the information environment that surrounds a board when evaluating the role of independent directors. Raheja (2005) claims that optimal board structure is determined by the trade-off between maximizing the incentives for insiders to reveal their private information, minimizing coordination costs among outsiders and maximizing outsiders' ability to reject inferior projects. Adams and Ferreira (2007) analyze the dual roles of boards as monitors and advisors. They find that directors' monitoring costs significantly increase if the CEO is reluctant to share internal information, which suggests that management-friendly boards can be optimal. Harris and Raviv (2008) also use an analytical model to conclude that given the information asymmetry between directors and managers, shareholders are sometimes better off with an insider-controlled board.

Independent directors can thus only play their role and help reduce agency problems when internal information asymmetry is low. Therefore, our analysis investigates how the proportion of independent directors influences a firm's voluntary disclosure decisions under varied internal information asymmetry. Specifically, we believe that when a firm's inside information asymmetry is high, independent directors do not have enough

Table 1
Distribution of voluntary disclosure sample

Panel A: Sample distribution by year			
Year	$DISC_{i,t}$		Proportion of disclosure sample %
	0	1	
2007	856	133	13.45
2008	833	161	16.20
2009	746	210	21.97
Total	2,435	504	17.15
Panel B: Sample distributed by industry			
Industry	$DISC_{i,t}$		Proportion of disclosure sample %
	0	1	
Comprehensive	132	18	12.00
Media	19	7	26.92
Social service	57	15	20.83
Real estate	192	43	18.30
Wholesale and retail	181	41	18.47
IT	151	25	14.20
Transportation and warehousing	88	35	28.46
Construction	49	10	16.95
Production and supply of electricity, gas and water	132	27	16.98
Manufacturing	1,329	253	15.99
Mining	51	12	19.05
Agriculture forestry, stockraising and fishing	54	18	25.00
Total	2,435	504	17.15

Panel C: Sample distribution by disclosure frequency from 2007 to 2009			
Disclosure frequency (2007-2009)	No. of observations	Percentage (%)	Cumulative Percentage (%)
0	2,195	74.69	74.69
1	330	11.23	85.91
2	249	8.47	94.39
3	165	5.61	100.00
Total	2,939	100.00	—

information to perform their monitoring and advisory roles, such that increasing the proportion of independent directors merely increases "free-riding" behavior rather than effectively inhibiting agency problems. Only when information asymmetry is low do independent directors have the necessary information to make judgments, and in such conditions, increasing their proportion effectively enhances their right to speak, which strengthens their monitoring and advising roles.

We predict that under lower internal information asymmetry, effective independent directors will influence firms' internal control audit decisions based on the following reasons. First, following the literature on the relationship between agency problems and voluntary disclosure, the conflicting interests of management and shareholders (or controlling and minority shareholders) will prompt management or controlling shareholders to hide relevant information in an attempt to maximize their personal interests (Luo and Zhu, 2010). In such a case, firms with serious agency problems will reduce their information disclosure, including the disclosure of internal control information, and will be less likely to hire third-party auditors. In contrast, a high-quality board with a high proportion of effective independent directors will help reduce agency problems and increase the likelihood that an external auditor will be hired to audit a firm's internal control system and disclose the resultant report to the public. This is the direct effect of the independent directors' monitoring mechanism on internal control audit decisions.

Second, independent directors influence firms' disclosure decisions regarding internal control audits indirectly by improving the quality of their internal control systems. Under C-SOX, it is the board's responsibility to establish a sound internal control system and ensure its effectiveness.[2] In particular, an audit committee

[2] See C-SOX 12 and 13.

under the board, which is generally comprised of independent directors with financial backgrounds, is responsible for internal control review, monitoring and self-assessment. Independent directors can choose to be directly involved in the control system inspection process and review the detailed control procedures with financial and accounting staff. Furthermore, in the annual audit of financial statements, external auditors first conduct regular and/or special tests on the internal control system and if they are worried about its quality, an effective board would follow up on the auditors' concerns to ensure that management makes the required improvements. Thus, we expect that internal control quality will be positively related to board independence. Lin and Rao (2009) note that firms with high-quality internal control systems are more likely to have voluntarily audits because doing so sends a strong signal to the market, which increases the firm's value as perceived by investors. Thus, firms with a high proportion of effective independent directors are more likely to disclose ARIC.

Based on the abovementioned discussion, we propose the following hypothesis:

Hypothesis 1. When a firm's inside information asymmetry is low, there is a positive relationship between the proportion of independent directors on the board and the likelihood that a firm will voluntarily disclose its auditor's report on internal controls.

3. Research design

3.1. Sample selection

Our sample selection criteria are as follows. The initial sample comprises all non-financial firms listed on the main boards of the Shanghai and Shenzhen Stock Exchanges. We exclude firms listed on the SME boards (small and medium firms) and those listed on the growth enterprise market (GEM) boards because the Shenzhen Stock Exchange has required firms listed on the SME and GEM boards to obtain a CPA firm's audit report on the effectiveness of their internal controls over financial reporting at least once every 2 years since 2010. Although our sample period does not include 2010, it still reveals that the supervisory intensity of these two boards regarding internal controls differ from that of the main board. We exclude financial industry firms because they have stricter disclosure and audit requirements regarding internal controls. In addition, the CSRC has special regulations on the internal control audits of IPO and SEO firms, so we exclude these firms. We also exclude firms that have issued both A shares and H or B shares because they are under more stringent supervision. Finally, we exclude firms with missing financial data. As Table 1 outlines, we obtain a total of 2939 firm-year observations over the period from 2007 to 2009 after applying the abovementioned selection criteria.

Our sample period starts in 2007 because that is the year the Shanghai and Shenzhen Stock Exchanges released explicit provisions for disclosure requirements regarding the self-assessment of internal controls and encouraged firms to hire third-party auditors. In addition, Chinese firms began to follow the new corporate accounting standards in 2007, so financial data is more consistent after this year. We manually collect data from annual reports or special announcements about ARIC and ultimately indentify 504 firm-year observations (17.15% of the sample size) that disclose ARIC along with 2435 that did not. Additional financial and corporate governance data are from the CSMAR database.

Table 1 presents the distribution of voluntary disclosure observations by year and industry along with statistics on the number of times firms disclosed ARIC during the 2007–2009 period. Panel A reveals an annual increase in voluntary disclosures, from 13.45% of the sample in 2007 to 21.97% in 2009. Panel B shows that the proportion of firms making ARIC disclosures across various industries ranges from 12.00% to 27.46%, which is relatively uniform. Panel C indicates that 14.08% of the firms disclosed ARIC more than twice, which reflects a gradual acceptance of the effectiveness of ARIC.

3.2. Empirical model and variable definitions

To examine the effect of board independence on firms' voluntary disclosure of ARIC decisions under varied inside information asymmetry, we estimate the following regression model:

Table 2
Variable definitions.

Variable name	Definition
$DISC_{i,t}$	Dummy variable equal to 1 if the firm voluntarily discloses auditor's report on internal controls in the current year, and 0 otherwise
$INDEP_{i,t}$	Proportion of independent directors on the board
$INFORI_{i,t}$	Any one of the following information environment proxy variables, including ANADUM, ANA, ANA_AD, FORSD, FORERR, INSHD, and ACINSHD
$ANADUM_{i,t}$	Dummy variable equal to 1 if the firm has at least one analyst who issues forecasts, and 0 otherwise
$ANA_{i,t}$	Natural logarithm of the number of analysts
$ANA\_AD_{i,t}$	Size-adjusted number of analysts, measured as the residual from a regression of the number of analysts on firm size
$FORSD_{i,t}$	Standard deviation of analyst forecasts, measured as the inter-analyst standard deviation of forecasts deflated by stock price
$FORERR_{i,t}$	Analyst forecast error, measured as the absolute difference between the actual earnings per share and the median analyst forecast of earning per share, deflated by price per share
$INSHD_{i,t}$	Institutional ownership, measured as percentage ownership in year t by all institutional investors
$ACINSHD_{i,t}$	Active institutional ownership, measured as percentage ownership in year t by hedge funds and investment advisors
$SIZE_{i,t}$	Natural logarithm of total assets
$AGE_{i,t}$	Natural logarithm of the number of years since the IPO
$ROE_{i,t}$	Return on book equity, measured as net income divided by book equity
$GROWTH_{i,t}$	Sales growth, measured as the percentage change of sales over year $t-1$ to year t
$SOE_{i,t}$	Dummy variable equal to 1 if the firm is ultimately controlled by the central and local governments at the provincial, municipal and county level or other governmental institutions, and 0 otherwise
$BIG_{i,t}$	Dummy variable equal to 1 if firm i hires a Big 4 auditor in year t, and 0 otherwise
$MEETING_{i,t}$	Due diligence by the board of directors, measured as the number of board meetings
$BOARD_{i,t}$	Total number of directors on the board
$FB_{i,t}$	Directors with accounting or finance backgrounds, measured as the number of directors with accounting or finance backgrounds deflated by the total number of directors on the board
$MB_{i,t}$	Market-to-book ratio, measured as the market value of owners' equity and the book value of total liabilities all divided by the book value of total assets
$LagINDEP_{i,t}$	Proportion of independent members on the board in the three years before year t

$$Log\left[\frac{prob(DISC_{i,t})}{1-prob(DISC_{i,t})}\right] = \beta_0 + \beta_1 INDEP_{i,t} + \beta_2 INDEP_{i,t} * INFORI_{i,t} + \beta_3 SIZE_{i,t} + \beta_4 AGE_{i,t} + \beta_5 ROE_{i,t} + \beta_6 GROWTH_{i,t} + \beta_7 SOE_{i,t} + \beta_8 BIG_{i,t} + \beta_9 MEETING_{i,t} + \beta_{10} BOARD_{i,t} + \beta_{11} FB_{i,t} + \sum IND_{i,t} + \sum YEAR_{i,t} + \varepsilon_{i,t} \quad (1)$$

where $DISC_{i,t}$ is a dummy variable equal to 1 when firm i voluntarily discloses ARIC in year t. Our main test variable is the interaction between the proportion of independent directors $INDEP_{i,t}$ and the information asymmetry proxy $INFORI_{i,t}$.[3] Following previous studies (Lang and Lundholm, 1996; Krishnaswami and Subramaniam, 1999; Duchin et al., 2010), we choose an analyst following dummy variable, number of analysts, size-adjusted number of analysts, standard deviation of analyst forecasts, analyst forecast error, institutional ownership and active institutional ownership (including hedge funds and investment advisors) as the proxy variables. Detailed variable definitions are presented in Table 2. The rationale behind using external information environment variables to proxy for information asymmetry between insiders and outside directors is as follows. Independent directors can obtain information from two sources: outside public information and internal information privately disclosed by managers. For a given amount of inside information, when the external information environment is better, independent directors enjoy a wider range of information sources and can enjoy lower information acquisition costs, which verifies the reliability and relevance of the internal information and reduces the information asymmetry between independent directors and managers. In addition, by relaxing the assumption that the amount of inside information is constant and given the improvement

[3] Similar to Duchin et al. (2010), we do not put an information asymmetry proxy in the model. When we put an information environment index in the regression, the model has serious multicollinearity problems when submitted to VIF testing. For robustness, we also run subsample regressions based on information asymmetry high/low groups.

of the external information environment, independent directors can obtain more private information. This is because the improvement of the external information environment makes firms more vulnerable to public concerns, such that their violations and poor decisions are more likely to be discovered. Accordingly, independent directors must then shoulder more responsibility and endure higher reputation costs. Therefore, independent directors will either ask for more private information, as the private information obtained by independent directors net of information disclosed to public is reduced, or they will choose to leave the firm. Ultimately, the improvement of the external environment will reduce the internal information asymmetry between insiders and independent directors.

As control variables, we use other firm-level variables that are deemed to influence voluntary ARIC disclosure decisions. These include firm size (*SIZE*), the number of years since IPO (*AGE*), firm performance (*ROE*), sales growth (*GROWTH*), auditor size (*BIG*) and whether or not the firm is a SOE (*SOE*). We also control for other board characteristics, including board size (*Board*), board meetings (*MEETING*) and board financial background (*FB*). All variables are defined in Table 2.

4. Results

4.1. Descriptive statistics and univariate tests

Table 3 presents descriptive statistics for all of the variables. The small standard deviations of all of the variables relative to their means show that there is not wide variation among sample observations. The mean (median) of the proportion of independent directors in the sample is 36% (33%) and the minimum and maximum are 25% and 56%. Table 4 reports the results of both parametric and non-parametric tests for the mean and median differences among all of the main variables, respectively, between the two groups that do or do not disclose ARIC. The univariate tests show that the mean and median of the proportion of independent directors in the voluntary disclosure group are not significantly greater than those in the other group, which indicates that a failure to consider internal information asymmetry creates a situation in which the monitoring effectiveness of independent directors is unclear. Regarding the other control variables, larger firms with higher ROE are more likely to disclose ARIC, which is consistent with signaling incentives. That is, bigger and better firms grasp more benefits in avoiding adverse selection when they send good news to the market. Firms with shorter listing periods are also more likely to disclose ARIC because young firms have more infor-

Table 3
Descriptive statistics.

Variables	Obs.	Mean	SD	1% percentile	25% percentile	50% percentile	75% percentile	99% percentile
$INDEP_{i,t}$	2939	0.36	0.05	0.25	0.33	0.33	0.38	0.56
$SIZE_{i,t}$	2939	7.72	1.13	4.92	6.98	7.68	8.42	10.83
$AGE_{i,t}$	2939	2.22	0.43	1.10	1.95	2.30	2.48	2.83
$ROE_{i,t}$	2939	0.05	0.28	−1.55	0.02	0.06	0.12	1.05
$GROWTH_{i,t}$	2939	0.64	2.64	−0.94	−0.10	0.09	0.39	21.59
$SOE_{i,t}$	2939	0.65	0.48	0.00	0.00	1.00	1.00	1.00
$BIG_{i,t}$	2939	0.04	0.20	0.00	0.00	0.00	0.00	1.00
$MEETING_{i,t}$	2939	9.31	3.57	4.00	7.00	9.00	11.00	21.00
$BOARD_{i,t}$	2939	9.18	1.90	5.00	9.00	9.00	10.00	15.00
$FB_{i,t}$	2939	0.23	0.13	0.00	0.13	0.22	0.33	0.57
$ANADUM_{i,t}$	2939	0.72	0.45	0.00	0.00	1.00	1.00	1.00
$ANA_{i,t}$	2114	2.01	0.99	0.69	1.10	1.95	2.83	4.04
$ANA\_AD_{i,t}$	2114	−10.68	10.80	−31.13	−18.02	−11.78	−5.98	22.04
$FORSD_{i,t}$	1710	0.03	0.03	0.00	0.01	0.01	0.03	0.19
$FORERR_{i,t}$	2082	0.03	0.06	0.00	0.00	0.01	0.03	0.40
$INSHD_{i,t}$	2939	10.50	16.62	0.00	0.00	2.28	14.40	70.02
$ACINSHD_{i,t}$	2939	9.88	16.06	0.00	0.00	1.83	13.24	69.08
$LagINDEP_i$	2905	0.35	0.05	0.20	0.33	0.33	0.36	0.50

All continuous variables are winsorized at the 1st and 99th percentile.

Table 4
Univariate tests.

Variables	Mean values		*t*-Value	Median values		Wilcoxon *z*-value
	VA = 0 ($n = 2435$)	VA = 1 ($n = 504$)		VA = 0 ($n = 2435$)	VA = 1 ($n = 504$)	
$INDEP_{i,t}$	0.36	0.36	−0.82	0.33	0.33	−0.83
$SIZE_{i,t}$	7.62	8.20	−10.75***	7.58	8.06	−10.28***
$AGE_{i,t}$	2.24	2.11	6.56***	2.30	2.20	5.99***
$ROE_{i,t}$	0.04	0.09	−3.38***	0.06	0.09	−6.21***
$GROWTH_{i,t}$	0.69	0.40	2.26**	0.09	0.09	0.74
$SOE_{i,t}$	0.63	0.77	−6.28***	1.00	1.00	−6.24***
$BIG_{i,t}$	0.04	0.04	0.23	0.00	0.00	0.23
$MEETING_{i,t}$	9.22	9.73	−2.94***	9.00	9.00	−1.56
$BOARD_{i,t}$	9.14	9.42	−3.08***	9.00	9.00	−2.14**
$FB_{i,t}$	0.23	0.22	2.55**	0.22	0.22	2.45**
$ANADUM_{i,t}$	0.68	0.91	−10.48***	1.00	1.00	−10.29***
$ANA_{i,t}$	1.92	2.36	−8.59***	1.79	2.48	−8.20***
$ANA\_AD_{i,t}$	−11.26	−8.57	−4.75***	−12.07	−9.86	−4.02***
$FORSD_{i,t}$	0.02	0.03	−0.68	0.01	0.01	−1.01
$FORERR_{i,t}$	0.03	0.02	2.38**	0.01	0.01	1.29
$INSHD_{i,t}$	9.46	15.54	−7.55***	1.52	8.12	−10.58***
$ACINSHD_{i,t}$	8.87	14.77	−7.59***	1.17	7.52	−10.93***

** Significance at 5% level.
*** Significance at 1% level, respectively.

mation asymmetry with outsiders, which increases their motive to disclose more information to reduce financing costs. In contrast, older firms tend to have stable relationships with creditors and shareholders, which makes them less likely to voluntarily disclose information. Regarding the nature of property rights, SOEs are more likely to disclose ARIC compared to non-SOEs because regulators such as the CSRC encourage SOEs, particularly central SOEs, to take the lead in following internal control-related regulations. The above-mentioned results are consistent with the findings of previous studies, such as those of Lin and Rao (2009). Regarding board characteristics, our results show that when board size is larger, the corporate governance level is higher and the firm is more likely to disclose ARIC. However, the *t*-test shows that the companies with more directors that have financial backgrounds are less likely to disclose ARIC, which is not consistent with our expectation. We also find that most of the proxy variables for information environment show that when firms have better information environments, they are more likely to disclose ARIC.

4.2. Regression results

Table 5 presents the results of our main regression of Eq. (1). All of our reported *p*-values for the estimated coefficients are on an adjusted basis using standard errors correlated for clustering at the firm level to alleviate concerns about residual serial correlation and adjusted for heteroskedasticity. Column 1 of Table 5 presents the model that does not consider information asymmetry, which reveals that the coefficient of *INDEP* is not significant. Columns 2–8 present analyst following, number of analysts, size-adjusted number of analysts, standard deviation of analyst forecasts, analyst forecast error, institutional ownership and active institutional ownership, respectively, as proxy variables for inside information asymmetry to examine the relationship between the proportion of independent directors and voluntary disclosure decisions under varied information asymmetry between insiders and independent directors. Our results show that all of the signs of the interactions between the information asymmetry proxy variables and *INDEP* are consistent with our expectations and, except for $FORSD^{*}INDEP$, all of them are significant. Specifically, when a firm has at least one analyst who posts forecasts ($ANADUM = 1$), or when the number of analysts (or size-adjusted number of analysts) is larger, or when the standard deviation of analyst forecasts is smaller, or when analyst forecast error is smaller, or when institutional ownership (or active institutional ownership) is higher, then a higher proportion of independent directors creates a higher likelihood that the firm will disclose ARIC, such that the interactions of

Table 5
The relationship between board independence, internal information environment and the voluntary disclosure of auditor's reports on internal controls.

Independent variables	VA (Full sample)							
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
$INDEP_{i,t}$	1.254	−1.000	−0.531	2.577*	1.402	1.396	1.073	1.075
	(0.86)	(−0.67)	(−0.33)	(1.66)	(0.89)	(0.93)	(0.75)	(0.75)
$ANADUM_{i,t} \times INDEP_{i,t}$		2.448***						
		(4.19)						
$ANA_{i,t} \times INDEP_{i,t}$			0.988***					
			(3.77)					
$ANA\_AD_{i,t} \times INDEP_{i,t}$				0.081***				
				(4.24)				
$FORSD_{i,t} \times INDEP_{i,t}$					−7.749			
					(−1.36)			
$FORERR_{i,t} \times INDEP_{i,t}$						−6.336**		
						(−1.96)		
$INSHD_{i,t} \times INDEP_{i,t}$							0.027**	
							(2.42)	
$ACINSHD_{i,t} \times INDEP_{i,t}$								0.028**
								(2.49)
$SIZE_{i,t}$	0.424***	0.321***	0.136	0.300***	0.299***	0.323***	0.364***	0.363***
	(5.81)	(4.13)	(1.42)	(3.75)	(3.39)	(3.95)	(4.61)	(4.59)
$AGE_{i,t}$	−0.932***	−0.876***	−0.799***	−0.834***	−0.791***	−0.858***	−0.917***	−0.917***
	(−5.44)	(−5.13)	(−4.49)	(−4.67)	(−4.41)	(−4.89)	(−5.38)	(−5.38)
$ROE_{i,t}$	0.710***	0.581**	0.180	0.173	0.769	0.462	0.561**	0.555**
	(3.00)	(2.35)	(0.62)	(0.61)	(1.18)	(1.12)	(2.54)	(2.52)
$GROWTH_{i,t}$	−0.071**	−0.067**	−0.052	−0.053	−0.066	−0.082*	−0.076**	−0.076**
	(−2.19)	(−1.98)	(−1.31)	(−1.34)	(−1.41)	(−1.83)	(−2.28)	(−2.28)
$SOE_{i,t}$	0.535***	0.514***	0.533***	0.541***	0.591***	0.492***	0.532***	0.533***
	(3.17)	(3.03)	(2.95)	(2.99)	(3.01)	(2.74)	(3.14)	(3.15)
$BIG_{i,t}$	−0.810**	−0.762**	−0.926**	−1.017**	−0.891**	−0.908**	−0.813**	−0.809**
	(−2.05)	(−1.98)	(−2.31)	(−2.48)	(−2.17)	(−2.24)	(−2.05)	(−2.04)
$MEETING_{i,t}$	0.041**	0.039**	0.033*	0.036**	0.040**	0.035*	0.039**	0.039**
	(2.44)	(2.35)	(1.82)	(1.97)	(2.11)	(1.91)	(2.34)	(2.34)
$BOARD_{i,t}$	−0.031	−0.034	−0.033	−0.033	−0.005	−0.022	−0.031	−0.031
	(−0.79)	(−0.84)	(−0.78)	(−0.76)	(−0.12)	(−0.52)	(−0.77)	(−0.78)
$FB_{i,t}$	−0.662	−0.571	−0.177	−0.193	0.068	−0.137	−0.646	−0.643
	(−1.12)	(−0.95)	(−0.28)	(−0.31)	(0.10)	(−0.21)	(−1.10)	(−1.09)
Constant	−4.026***	−3.092***	−1.634	−3.196***	−3.717***	−3.301***	−3.575***	−3.568***
	(−3.97)	(−3.02)	(−1.38)	(−2.92)	(−3.26)	(−2.98)	(−3.46)	(−3.46)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2939	2939	2114	2114	1710	2082	2939	2939
Pseudo-R^2	0.092	0.103	0.072	0.075	0.058	0.063	0.096	0.096
Wald χ^2	164.07	161.85	114.09	117.76	84.73	97.40	174.76	175.26
p-Value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

* Significance at 10% level.
** Significance at 5% level.
*** Significance at 1% level, respectively.

Table 6
Sub-sample regressions based on high/low information asymmetry groups.

Independent variables	VA													
	(1) $ANADUM_{i,t}$		(2) $ANA_{i,t}$		(3) $ANA\_AD_{i,t}$		(4) $FORSD_{i,t}$		(5) $FORERR_{i,t}$		(6) $INSHD_{i,t}$		(7) $ACINSHD_{i,t}$	
Information asymmetry	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High	Low	High
$INDEP_{i,t}$	1.422	0.038	5.336***	1.200	5.637***	0.790	6.583***	−4.456	3.170*	−2.498	2.794*	−0.512	2.904*	0.258
	(1.30)	(0.01)	(2.62)	(0.57)	(2.71)	(0.39)	(3.16)	(−1.57)	(1.70)	(−1.00)	(1.73)	(−0.22)	(1.81)	(0.11)
$SIZE_{i,t}$	0.321***	0.349*	0.130	0.236	0.220**	0.311**	0.330**	0.558***	0.378***	0.229*	0.133	0.302*	0.116	0.411***
	(5.23)	(1.66)	(1.13)	(1.50)	(2.16)	(2.20)	(2.41)	(4.03)	(2.99)	(1.94)	(1.40)	(1.90)	(1.22)	(2.60)
$AGE_{i,t}$	−0.880***	−0.830*	−0.727***	−1.476***	−0.711***	−1.147***	−0.554**	−1.318***	−0.909***	−0.692**	−0.923***	−1.766***	−0.865***	−1.747***
	(−6.51)	(−1.87)	(−3.34)	(−4.36)	(−3.15)	(−3.44)	(−2.13)	(−4.13)	(−3.51)	(−2.42)	(−4.43)	(−5.66)	(−4.16)	(−5.71)
$ROE_{i,t}$	0.498	0.756	0.966	−0.074	0.536	0.396	1.254	1.330	2.227*	0.464	0.810	0.249	0.543	0.297
	(1.56)	(1.37)	(1.01)	(−0.18)	(0.84)	(0.67)	(1.12)	(1.40)	(1.65)	(1.17)	(1.07)	(0.69)	(0.71)	(0.83)
$GROWTH_{i,t}$	−0.061*	−0.080	−0.044	−0.085	−0.032	−0.075	−0.049	−0.066	−0.105	−0.169**	−0.053	−0.083	−0.054	−0.088
	(−1.68)	(−1.10)	(−0.37)	(−1.32)	(−0.22)	(−1.42)	(−0.48)	(−1.00)	(−1.34)	(−2.07)	(−1.08)	(−1.26)	(−1.11)	(−1.23)
$SOE_{i,t}$	0.492***	0.591	0.821***	0.605**	0.790***	1.021***	1.062***	0.177	0.589**	0.550**	0.514**	0.832***	0.529**	0.774***
	(3.60)	(1.63)	(3.11)	(2.28)	(3.16)	(3.39)	(3.34)	(0.60)	(2.16)	(2.14)	(2.46)	(3.04)	(2.53)	(2.84)
$BIG_{i,t}$	−0.902***	0.714	−0.959**	–	−0.633	−0.595	−2.131***	−0.769	−1.759***	−0.362	−0.799**	0.121	−0.679*	0.219
	(−3.07)	(0.86)	(−2.42)	(–)	(−1.43)	(−1.09)	(−2.61)	(−1.35)	(−2.74)	(−0.64)	(−2.20)	(0.15)	(−1.87)	(0.27)
$MEETING_{i,t}$	0.033**	0.078*	0.034	−0.003	0.051*	0.026	0.023	0.031	0.034	0.030	0.041*	0.046	0.039*	0.028
	(2.18)	(1.74)	(1.28)	(−0.09)	(1.94)	(0.87)	(0.65)	(1.05)	(1.13)	(0.96)	(1.91)	(1.24)	(1.79)	(0.76)
$BOARD_{i,t}$	−0.023	−0.071	−0.081	−0.040	−0.057	0.042	0.036	−0.065	0.008	−0.008	−0.033	−0.149**	−0.037	−0.180**
	(−0.74)	(−0.75)	(−1.57)	(−0.60)	(−1.05)	(0.70)	(0.58)	(−0.93)	(0.14)	(−0.12)	(−0.69)	(−2.06)	(−0.79)	(−2.51)
$FB_{i,t}$	−0.217	−2.694**	0.460	0.259	0.694	−0.320	0.062	−1.610	0.771	−0.722	0.549	−2.768***	0.542	−2.662***
	(−0.47)	(−2.20)	(0.57)	(0.29)	(0.86)	(−0.34)	(0.06)	(−1.51)	(0.92)	(−0.78)	(0.82)	(−2.99)	(0.81)	(−2.92)
Constant	−3.295***	−2.995	−3.187*	−0.797	−4.963***	−4.218**	−7.942***	−1.179	−5.310***	−1.579	−2.321*	−0.037	−2.473*	−0.680
	(−4.02)	(−1.16)	(−1.90)	(−0.46)	(−3.04)	(−2.33)	(−4.32)	(−0.60)	(−3.48)	(−0.98)	(−1.77)	(−0.02)	(−1.87)	(−0.38)
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	2114	772	592	702	600	655	517	497	608	643	834	1045	836	1084
Pseudo-R^2	0.061	0.102	0.078	0.087	0.093	0.105	0.102	0.154	0.101	0.088	0.056	0.154	0.053	0.150
Wald χ^2	133.81	36.25	68.37	66.13	68.37	66.13	56.61	82.30	65.81	54.83	55.00	99.42	51.71	99.60
p-Value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

* Significance at 10% level.
** Significance at 5% level.
*** Significance at 1% level, respectively.

columns 2, 3, 4, 7 and 8 are positive and the remaining two are negative. These results are consistent with Hypothesis 1.

Examining the control variables, firms with larger size, better performance and shorter listing periods are more likely to disclose ARIC. SOEs are more likely to disclose ARIC because of high regulation pressure. These results are consistent with the univariate tests. For auditor size, hiring a Big 4 audit firm can be considered as a signal to reduce agency problems. Therefore, as a substitution effect, the Big 4 dummy variable is negatively related to the voluntary disclosure of ARIC. For internal governance, when directors are more diligent, the company is more likely to disclose ARIC.

In summary, the regressions in Table 5 show that board independence influences voluntary ARIC disclosure behavior and this effect is conditional on lower inside information asymmetry. Only when independent directors' information acquisition costs are low can their governance roles successfully drive their firms to voluntarily disclose ARIC.

5. Robustness tests and additional analysis

5.1. Sub-sample regressions based on information environment

The proxy variables for information environment listed in Table 4 reveal significant differences between the disclosure and no disclosure groups. The information environment is better in the disclosure group, which is consistent with the literature on the information environment's effect on information disclosure (Lang and Lundholm, 1996; Healy and Palepu, 2001). This means that our results offer an alternative explanation, specifically that the external information environment has a direct effect on disclosure decisions, as opposed to an indirect effect through independent directors. In the main tests, we use interaction terms to prove our arguments. However, it is unclear whether firms with different external information environments exhibit systematic differences in firm characteristics. To rule out this possibility, we partition the sample according to the degree of information asymmetry. For the dummy variable of analyst following, we just partition the data into 1/0 groups. For other continuous information asymmetry proxies, we divide the sample into high/low groups, respectively based on the top 30% and bottom 30% of observations.[4] For each pair of high/low groups, we rerun the regression of Eq. (1) without the interaction term and test the effect of the proportion of independent directors on ARIC, respectively, and then compare the coefficients. The results are shown in Table 6.

As Table 6 illustrates, except for the analyst following proxy, the coefficients on *INDEP* are significantly positive for all of the other proxy variables of information asymmetry in the low groups, which indicates that the higher the proportion of independent directors, the higher the likelihood that a firm will voluntarily disclose ARIC. However, in the high groups, the results are not significant and the signs are not consistent with our predictions. In addition, we find that both the significance level and the absolute value of the coefficients are larger in the low groups compared to the high groups. The results in Table 6 further prove our hypothesis.

5.2. The endogeneity problem

Many studies find that the proportion of independent directors is determined by the corporate governance structure and the nature or characteristics of the firm (Hermalin and Weisbach, 1988; Ye et al., 2007; Duchin et al., 2010). Since these factors might also affect firms' voluntary disclosure behavior, our conclusion may have an endogeneity problem.

We run a two-stage regression to alleviate this concern. We choose the proportion of independent directors 3 years ago, *LagINDEP*, as the instrumental variable because independent directors are usually appointed for a term of 3 years and while the previous term's directors cannot impact recent firm decisions, the previous term's board structure can affect that of the present term, which makes *LagINDEP* an effective instrument variable. Specifically, in the first step we use *LagINDEP*, the interaction terms of *LagINDEP* and the

[4] Alternatively, we take the top (bottom) 40% or 20% of observations and the results are consistent.

information environment proxies as the instrumental variables for *INDEP*, the interaction terms of *INDEP* and the information environment proxies, respectively. The results are shown in Table 7.

For brevity, we choose *ANA*, *FORERR* and *INSHD* as the proxies of information asymmetry and only report the results of the main test variables. Table 7 reveals that in the first stage the coefficients of the instrumental variables are significant, which indicates their effectiveness. In the second regression, we find results that are consistent with Table 5. Thus, our results are robust after adjusting for the endogeneity problem.

5.3. Other robustness tests

For listed firms in China, since 2001 the proportion of independent directors on the board is expected to be at least 1/3. Unlike in countries such as the United States, the proportion of independent directors on the boards of Chinese listed firms is subject to a threshold. If we want to use an independent director proportion index to proxy for board independence, as US studies have done, we must consider an increment beyond 1/3. Thus, we replicate our regression using only those observations with more than 1/3 of independent directors on the board.[5] The results (untabulated) do not change significantly.

Our sample period includes important events such as the financial crisis and the Chinese government's four-trillion-dollar economic stimulus. Given the overall deterioration of the external economic situation and opportunities for national investment and credit support, listed firms might also have taken the initiative to increase the voluntary disclosure of ARIC. To rule out any influence that these events may have, we re-run the regression of Eq. (1) for the 2007–2008 period and obtain consistent results (untabulated).

5.4. Additional analysis

We further anticipate that the effect of board independence on voluntary disclosure behavior varies among firms with different features and we should find more pronounced interaction effects when the benefits of auditing internal control systems is larger or in firms that are more likely to have an inefficient internal control system. We partition the sample based on listing age and market-to-book ratios. On the one hand, young firms are more likely to face financing constraints and increasing information disclosure helps reduce financing costs. The market-to-book ratio measures growth rates, with a higher market-to-book ratio indicating a higher demand for financing. On the other hand, both young and high-growth firms are exposed to more potential internal control weaknesses (Doyle et al., 2007) and auditing internal controls not only sends a signal to the market that reduces information asymmetry, but also reflects the effectiveness of a firm's monitoring mechanisms. Thus, we predict that the monitoring role of independent directors will be more pronounced in such firms. The results of our sub-sample regressions are displayed in Table 8. For listing age and market-to-book ratios, we divide the sample observations into two groups, respectively based on the top 30% and bottom 30% of observations.[6] We re-run the regressions of Eq. (1) for each group. For brevity, we only use *ANA*, *FORERR* and *INSHD* as the information asymmetry proxy variables and only report the main test variables. Most of the results in Table 8 reveal that, relative to low growth or high listing age, in the high-growth or low listing age groups the coefficients of the interactions between the information asymmetry proxies and the proportion of independent directors are larger and more significant, which is consistent with our predictions. However, the regressions with the *FORERR* index do not produce significant results.

6. Conclusion

Using a sample of listed firms that voluntarily disclose ARIC from 2007 to 2009, this study investigates whether and how board independence as an important governance mechanism drives firms to voluntarily audit their internal control systems and disclose ARIC under the theoretical analysis structure of information

[5] We use the real "more than 1/3 proportion" sample, which refers to when the number of independent directors, minus 1, is still larger than 1/3 of the board members.

[6] We also try the top (bottom) 40% or 20% of observations and the results are similar.

Table 7
Endogeneity tests for the proportion of independent directors.

First stage	(1)		(2)		(3)	
	$INDEP_{i,t}$	$ANA_{i,t} \times INDEP_{i,t}$	$INDEP_{i,t}$	$FORERR_{i,t} \times INDEP_{i,t}$	$INDEP_{i,t}$	$INSHD_{i,t} \times INDEP_{i,t}$
$LagINDEP_{i,t}$	0.329***	−1.246***	0.325***	−0.018***	0.281***	−5.544***
	(12.74)	(−21.99)	(13.01)	(−11.28)	(15.25)	(−13.92)
$ANA_{i,t} \times LagINDEP_{i,t}$	−0.004	1.014***				
	(−1.09)	(118.46)				
$FORERR_{i,t} \times LagINDEP_{i,t}$			−0.015	1.046***		
			(−0.26)	(292.46)		
$INSHD_{i,t} \times LagINDEP_{i,t}$					−0.000*	1.014***
					(−1.82)	(273.14)
...	...	...	...	...	...	...
Observations	2086	2086	2054	2054	2905	2905
Adjusted-R^2	0.128	0.921	0.128	0.980	0.148	0.971
F-value	13.786	1018.518	13.554	4129.525	21.975	4110.974
p-Value	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)

Second stage	(1)	(2)	(3)
	VA	VA	VA
$INDEP_{i,t}$	−4.617*	−2.592	−4.815**
	(−1.89)	(−1.07)	(−2.04)
$ANA_{i,t} \times INDEP_{i,t}$	0.586***		
	(4.91)		
$FORERR_{i,t} \times INDEP_{i,t}$		−3.631*	
		(−1.83)	
$INSHD_{i,t} \times INDEP_{i,t}$			0.014***
			(2.62)
...	...	...	...
Observations	2086	2054	2905
Wald test of	4.28	3.66	5.74
Prob > χ^2	(0.118)	(0.161)	(0.057)

* Significance at 10% level.
** Significance at 5% level.
*** Significance at 1% level, respectively.

Table 8
Additional analysis.

Independent variables	VA											
	(1) $AGE_{i,t}$						(2) $MB_{i,t}$					
	High			*Low*			*Low*			*High*		
$INDEP_{i,t}$	4.094	3.853	3.454	2.772	4.967***	4.446**	−4.885**	−2.779	−3.725*	1.258	4.635**	4.529**
	(1.29)	(1.21)	(1.23)	(1.36)	(2.65)	(2.45)	(−2.14)	(−1.30)	(−1.78)	(0.51)	(2.19)	(2.25)
$ANA_{i,t} \times INDEP_{i,t}$	0.312			0.881***			1.089***			1.527***		
	(0.42)			(2.84)			(2.84)			(3.39)		
$FORERR_{i,t} \times INDEP_{i,t}$		−12.395			−8.928			−5.527			−8.377	
		(−0.99)			(−1.40)			(−1.07)			(−0.79)	
$INSHD_{i,t} \times INDEP_{i,t}$			0.005			0.036***			0.027			0.044***
			(0.16)			(2.70)			(1.06)			(2.76)
...	...	...	...	...	...	...	...	...	...	...	...	...
Year fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Industry fixed effects	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Observations	353	344	527	829	818	1019	644	635	893	561	553	857
Pseudo-R^2	0.117	0.111	0.111	0.079	0.075	0.095	0.121	0.110	0.150	0.099	0.080	0.123
LR χ^2	27.77	25.57	34.00	73.96	69.76	101.54	85.14	76.69	126.05	53.82	42.81	83.95
p-Value	(0.088)	(0.143)	(0.018)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.000)	(0.011)	(0.000)

* Significance at 10% level.
** Significance at 5% level.
*** Significance at 1% level, respectively.

asymmetry and agency problems. Unlike previous studies, we highlight that only when firms have better information environments and the information asymmetry between insiders and independent directors is relatively low can independent directors effectively fill their governance roles, which increases the likelihood that firms will voluntarily audit their internal control systems. Our results are consistent after adjusting for the influence of the endogeneity problem, Chinese independent directors' regulation factors and the financial crisis. Further, we also find some evidence in sub-samples with shorter listing periods and higher growth rates that the monitoring roles played by independent directors to encourage voluntary disclosure decisions are more pronounced.

Our results highlight how the information acquisition costs of independent directors affects their monitoring effectiveness by giving them the opportunity to investigate the disclosure decisions of internal control audits, which partially explains the prior mixed results on the monitoring role of independent directors. Furthermore, our results have policy implications that improve the effectiveness of independent directors. However, we focus exclusively on ARIC-related disclosure decisions to test the monitoring role of independent directors. Whether or not our results can be generalized to include all voluntary disclosure decisions will require further testing. Moreover, we use external information environment variables to proxy for the information asymmetry between insiders and outside directors. While we have provided explanations for the use of these variables, further studies are needed to find more appropriate proxies for testing and verifying our conclusions.

Acknowledgements

We appreciate useful comments from Professor Jinsong Tan, Shunlin Song from Sun Yat-sen University, Dr. Weiqiang Tan from Hong Kong Baptist University, Professor Wei Luo from Beijing University and participants of the Fourth China Youth accounting scholars Symposium. Special thanks go to the editor and anonymous referee for their useful comments and suggestions on an earlier version of the manuscript. Any errors are our own. We acknowledge financial support for this project from the China National Natural Science Foundation "Internal Control of Listed Companies and Investors Protection" (Project No. 70972076); Humanities Social Science Foundation of the Ministry of Education "Internal Control, Overinvestment

and Financial Crisis" (Project No. 09YJA790199); The Key Research Institutions of Humanities and Social Science Foundation of Guangdong Province "Internal Control and Value Creation – An Empirical Study Based on China's Capital Market"(Project No. 11JDXM79004); National Social Science Foundation Youth Project (Project No.10CGL041) and Academic New Distinguished Scholar Prize 2011 for PhD candidates offered by the Ministry of Education (14000-3191033).

References

Adams, R.B., Ferreira, D., 2007. A theory of friendly boards. The Journal of Finance 62 (1), 217–250.

Armstrong, C.S., Guay, W.R., Weber, J.P., 2010. The role of information and financial reporting in corporate governance and debt contracting. Journal of Accounting and Economics 50 (2–3), 179–234.

Bushman, R.M., Piotroski, J.D., Smith, A.J., 2004. What determines corporate transparency? Journal of Accounting Research 42 (2), 207–252.

Chen, C.J.P., Jaggi, B., 2000. Association between independent non-executive directors, family control and financial disclosures in Hong Kong. Journal of Accounting and Public Policy 19 (4–5), 285–310.

Cheng, X., Li, H., Luo, Y., Du, P., 2009. Can financial information distortion events prompt the companies revise the system of independent directors? China Accounting Review 7 (1), 87–96 (in Chinese).

Dalton, D.R., Daily, C.M., Ellstrand, A.E., Johnson, J.L., 1998. Meta-analytic reviews of board composition, leadership structure, and financial performance. Strategic Management Journal 19 (3), 269–290.

Doyle, J., Ge, W., McVay, S., 2007. Determinants of weaknesses in internal control over financial reporting. Journal of Accounting and Economics 44 (1–2), 193–223.

Duchin, R., Matsusaka, J.G., Ozbas, O., 2010. When are outside directors effective? Journal of Financial Economics 96 (2), 195–214.

Dyck, A., Zingales, L., 2004. Private benefits of control: an international comparison. The Journal of Finance 59 (2), 537–600.

Eng, L.L., Mak, Y.T., 2003. Corporate governance and voluntary disclosure. Journal of Accounting and Public Policy 22 (4), 325–345.

Fama, E.F., 1980. Agency problems and the theory of the firm. The Journal of Political Economy 88 (2), 288–307.

Fang, H., Sun, H., Jin, Y., 2009. Corporate characteristics, external audit, and voluntary disclosure of internal control information: an empirical study based on annual reports of listed companies of Shanghai stock exchanges from 2003 to 2005. Accounting Research 10, 44–95 (in Chinese).

Gul, F.A., Leung, S., 2004. Board leadership, outside directors' expertise and voluntary corporate disclosures. Journal of Accounting and Public Policy 23 (5), 351–379.

Harris, M., Raviv, A., 2008. A theory of board control and size. Review of Financial Studies 21 (4), 1797–1832.

Healy, P.M., Palepu, K.G., 2001. Information asymmetry, corporate disclosure, and the capital markets: a review of the empirical disclosure literature. Journal of Accounting and Economics 31 (1–3), 405–440.

Hermalin, B.E., Weisbach, M.S., 1988. The determinants of board composition. The RAND Journal of Economics 19 (4), 589–606.

Hsu, H., 2010. The relationship between board characteristics and financial performance. an empirical study of United States IPO. International Journal of Management 27 (2), 332–341.

Jensen, M.C., 1993. The modern industrial revolution, exit, and the failure of internal control systems. The Journal of Finance 48 (3), 831–880.

Jensen, M.C., Meckling, W.H., 1976. Theory of the firm: managerial behavior, agency costs and ownership structure. Journal of Financial Economics 3 (4), 305–360.

Klein, A., 2002. Audit committee, board of director characteristics, and earnings management. Journal of Accounting and Economics 33 (3), 375–400.

Krishnaswami, S., Subramaniam, V., 1999. Information asymmetry, valuation, and the corporate spin-off decision. Journal of Financial Economics 53 (1), 73–112.

Lang, M.H., Lundholm, R.J., 1996. Corporate disclosure policy and analyst behavior. The Accounting Review 71 (4), 467–492.

Lin, B., Rao, J., 2009. Why do listed companies disclose the auditor's internal control reports voluntarily? An empirical study based on signaling theory in China. Accounting Research 2, 45–52 (in Chinese).

Luo, W., Zhu, C., 2010. Agency costs and corporate voluntary disclosure. Economic Research Journal 10, 143–155 (in Chinese).

Park, Y.W., Shin, H., 2004. Board composition and earnings management in Canada. Journal of Corporate Finance 10 (3), 431–457.

Peasnell, K.V., Pope, P.F., Young, S., 2005. Board monitoring and earnings management: do outside directors influence abnormal accruals? Journal of Business Finance & Accounting 32 (7–8), 1311–1346.

Raheja, C.G., 2005. Determinants of board size and composition: a theory of corporate boards. Journal of Financial and Quantitative Analysis 40 (2), 283–306.

Rhoades, D.L., Rechner, P.L., Sundaramurthy, C., 2000. Board composition and financial performance. a meta-analysis of the influence of outside directors. Journal of Managerial Issues 12, 76–91.

Rosenstein, S., Wyatt, J.G., 1990. Outside directors, board independence, and shareholder wealth. Journal of Financial Economics 26 (2), 175–191.

Shen, H., Yi, Y., Wu, Y., 2010. Legitimacy, corporate governance and social disclosure. China Accounting Review 8 (3), 363–376 (in Chinese).

Ye, K., Lu, Z., Zhang, Z., 2007. Can independent directors deter the tunneling of large shareholders? Economic Research Journal 4, 103–111 (in Chinese).

Yermack, D., 1996. Higher market valuation of companies with a small board of directors. Journal of Financial Economics 40 (2), 185–211.

Zhang, T., Huang, J., 2010. An empirical investigation of voluntary auditing: cause and consequence. China Accounting Review 8 (2), 147–160 (in Chinese).

China Journal of Accounting Research 5 (2012) 163–186

Contents lists available at SciVerse ScienceDirect

China Journal of Accounting Research

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

Government auditing and corruption control: Evidence from China's provincial panel data

Jin Liu [a,*], Bin Lin [a,b]

[a] *School of Business, Sun Yat-Sen University, China*
[b] *Center for Accounting, Finance and Institutions, Sun Yat-Sen University, China*

ARTICLE INFO

Article history:
Received 1 October 2011
Accepted 5 March 2012
Available online 12 June 2012

JEL classification:
D73
G38
M42

Keywords:
Government auditing
Post-audit rectification
Corruption control

ABSTRACT

Since its foundation, China's government auditing system has played a very important role in maintaining financial and economic order and improving government accountability and transparency. Though a great deal of research has discussed the role of government auditing in discovering and deterring corruption, there is little empirical evidence on whether government auditing actually helps to reduce corruption. Using China's provincial panel data from 1999 to 2008, this paper empirically examines the role of government auditing in China's corruption control initiatives. Our findings indicate that the number of irregularities detected in government auditing is positively related to the corruption level in that province, which means the more severe the corruption is in a province, the more irregularities in government accounts are found by local audit institutions. Also, post-audit rectification effort is negatively related to the corruption level in that province, indicating that greater rectification effort is associated with less corruption. This paper provides empirical evidence on how government auditing can contribute to curbing corruption, which is also helpful for understanding the role of China's local audit institutions in government governance and can enrich the literature on both government auditing and corruption control.

* Corresponding author. Tel.: +86 13632439317.
E-mail addresses: fliujin@126.com (J. Liu), mnslb@126.com (B. Lin).

1755-3091/$ - see front matter © 2012 China Journal of Accounting Research. Founded by Sun Yat-sen University and City University of Hong Kong. Production and hosting by Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.cjar.2012.01.002

1. Introduction

China has achieved remarkable economic success since initiating the reform and opening-up policies in 1978. However, as the reform of economic institutions, power decentralization, privatization and opening-up policies progress, corrupt activities such as embezzlement, bribery, kickbacks, power-for-money deals and seeking private ends in public causes have also increased in most public sectors. It is estimated that about 4–8% of GNP is depleted by corruption (Hu and Guo, 2001; Gong, 2010). Corruption is a difficult problem that hampers economic development, political democracy and social harmony in China (Zhou and Tao, 2009; Gong, 2010). Many studies on the determinants of and factors affecting corruption find that corruption is always related to discretional power, incomplete or weak legal institutions and inadequate supervision (Zhou and Tao, 2009; Gong, 2010). Among others, the public finance sector is particularly open to corruption because it is granted many financial power advantages in terms of taxation, budgeting, government procurement and the management of state assets.

Government auditing, the fundamental purpose of which is to monitor, ensure and appraise the accountability of government, is an important institutional arrangement in modern government governance. By monitoring the operation of public power, especially how public resources are used, government auditing can strengthen accountability and reduce the abuse of power and resources. The governance practices of many countries also indicate that government auditing can play a unique role in curbing corruption. On the one hand, auditors are experts in detecting fraudulent financial reporting, which makes them effective in investigating the underlying corruption. On the other hand, the deterrent effect of government auditing can be intensified by making auditing results known to the public and holding the individual bureaucrats who are concerned responsible (Hu, 2005; Gong, 2010). If corruption is a "virus" that harms economic security and social harmony, then the government auditing system is supposed to be the "immune system" that detects, resists and weeds out the virus.

The governance role of auditing and the determinants and motivations of corruption are discussed separately in many studies. However, research on corruption mainly focuses on power-for-money deals and bribery in economic and banking areas, while little attention is given to corruption in public finance (Li and Zhuang, 2009). Meanwhile, studies on how to curtail corruption seldom pay specific attention to the role of auditing. Conversely, the literature on government auditing primarily focuses on the independence, professionalism and auditing input of government auditing agencies and how these factors affect the reputation and efficiency of government departments (Raman and Wilson, 1994; Saito and Mcintosh, 2010, etc.). Only a few studies touch upon the relationship between government auditing and corruption (Blume and Voigt, 2011; Olken, 2007). However, none of these studies answer the question of how government auditing may help to curb corruption.

Unlike that in developed countries in Europe and North America, government auditing in China is part of the governance institution and is characterized by strong administrative properties. Nevertheless, there is little evidence on whether China's audit system plays a different role from its counterparts in western countries. As a part of the overall government administration regime, China's government auditing system undoubtedly has some administrative power. To be specific, government audit institutions in China are not only supposed to detect and report[1] irregularities and violations that may exist in government accounts and statements, they are also authorized with the power to impose administrative sanctions and penalties on the responsible agencies and individuals who violate the laws and regulations. They must also ensure that all irregularities are corrected and all violations are punished accordingly. Even though China is a big country with multi-tier administrative units, local government plays a crucial role in the country's economic and social development and is undoubtedly controlling a certain portion of government resources. According to statistics, the US federal government owns the control rights on about two-thirds of the nation's government funds, whereas in China, public expenditure at the local level accounts for more than two-thirds of all public spending.[2] What's more, due to China's

[1] Here, "report" means to report the audit results to leading government officials, the higher audit institution and other related departments. Audit results at the local level, especially the municipal and county level, are not always disclosed publicly in the sample period.

[2] For example, local fiscal expenditure accounts for 68.5% of China's whole fiscal expenditure in 1999 and 78.7% in 2008. Data is from the *China Economic Information Network Database* (http://db.cei.gov.cn/).

relatively weak budget control mechanisms, China's local government actually has quite a lot of discretionary power over public revenue and expenditure. Therefore, supervising how local government officials are using their power and how public money is managed is vital and urgent, yet there are few studies and little evidence on the governance role of China's local audit institutions.

Building on the literature and taking China's special institutional setting into consideration, this paper tentatively explores the rectification and prevention role of China's local audit institutions in addition to its discovery role against irregular and corrupt behavior. We demonstrate empirically that China's government auditing has worked actively and effectively in discovering irregularities and preventing corruption, and therefore can help to improve government accountability and transparency. To be specific, this study employs a sample of local government audit institutions in China's 31 provincial administrations from 1999 to 2008. Taking corruption cases committed by public officials and filed by the judicial organs in each province as a measure of the severity of corruption, we empirically examine the role of government auditing in the fight against corruption from two perspectives: the fraud detection effort in government auditing and the rectification effort after audits. Our main findings indicate that: (1) local audit institutions can detect and report violations and misbehavior in the income and expenditure of government funds, and the number of violations and irregularities is positively related to the intensity of bureaucratic corruption in that province. However, the detection and reporting of violation and irregularities does not significantly decrease corruption; and (2) the implementation of sanctions, penalties and other audit decisions has a deterrent effect on the audited bodies, which indicates that increasing rectification effort in the present period will result in less corruption in the following period.

This paper makes several contributions to the literature. First, based on the supervision and appraisal role of government auditing, we carefully examine the relationship between the fraud detection effort of government auditing and the degree of corruption in each province, and provide empirical evidence on the revealing role of government auditing. Then, focusing on the specific properties of China's government auditing system, we tentatively examine whether the post-audit rectification effort can strengthen the deterrence power of government auditing and empirically demonstrate that rectification results are negatively related to the degree of corruption in the lagged period. Finally, unlike previous studies on corruption that pay little attention to audit institutions and previous discussions on the role of government auditing in curbing corruption that lack empirical support, our research provides direct evidence on the role of government auditing in the fight against corruption. Our research not only enriches the literature in these two areas, but also provides some far-reaching implications for China's government auditing practice and corruption control initiatives.

The remainder of the paper is organized as follows. Section 2 reviews the literature on government auditing and corruption. Section 3 discusses the institutional background, theoretical analysis and research hypotheses. Section 4 describes the sample, data and variables. Sections 5 and 6 present the empirical analysis on the relationship between government auditing and corruption. Section 7 concludes the paper.

2. Literature review

2.1. Government auditing

Classic audit theory states that audit quality is the probability that the auditor will both discover and report a breach in the client's accounting system (DeAngelo, 1981). When it comes to government audit, Zhao (2005) proposes a fairly complete characteristic framework that divides the factors related to the quality of government audit into three categories: technical factors (professional competence, auditor size and audit hours), independence factors (audit fee, auditor reputation and the organizational design of audit institutions) and administrative factors (determining the nature of irregularities, making the right decisions and checking on rectification results). Of these, administrative factors are unique under the special setting in China. In empirical studies, researchers often use one aspect of these characteristics as a proxy measurement of government audit quality. For example, Saito and Mcintosh (2010) employ time spent in auditing as a direct measure of auditing effort. Ma (2007) reports that educational background, experience and professional competence are significantly related to the financial efficiency of government auditing. Blume and Voigt (2011) document that the mandate, independence and institutional environment of the state supreme audit institutions can exert

strong influence on their effectiveness. Melo et al. (2009) demonstrate that both political competition and frequency of power alternation affect the independence of the audit bodies and thus are significantly related to the activism and autonomy of the latter. Considering China's special setting, Huang and Wang (2010) and Wei et al. (2010) argue that the "correction" or "rectification" effort made by the audit institutions and related parties after problems are recognized is the most important factor in determining the extent to which government auditing can perform its duties and promote government transparency and accountability.

Numerous studies have also been conducted on the economic consequences of government auditing. Many researchers discuss the important role that government auditing plays in the public sector. For example, Raman and Wilson (1994) find that government auditing procurement practices affect the price of seasoned municipal bonds. Saito and Mcintosh (2010) examine audit efficiency in public school operations and document that state auditors can enhance efficiency in the use of school resources. Both Schelker and Eichenberger (2010) and Blume and Voigt (2011) indicate that government auditing can improve the transparency of public policies and reduce wasteful spending. Olken (2007) conducted a field experiment on the monitoring effect of government auditing in Indonesia and documents that when the probability of village road projects being audited by government increased from 4% to 100%, corruption (over-spending) on these projects decreased by 8%. Similarly, Ferraz and Finan (2008, 2010) find that government auditing reports can reveal corrupt activities, which then affect political election results. Several studies have explored the effectiveness and efficiency of government auditing in China. For instance, Wei et al. (2010) discuss how sanctions and penalties, the transferring of cases and clues and the submission of audit reports and newsletters affect the operational security of public financial funds. Li et al. (2011) examine whether government auditing, especially economic accountability auditing, can prevent government officials and CPC party members from corruption.

Previous studies on government auditing conducted in both China and internationally are useful in understanding the role of government auditing in government governance, including the establishment of public accountability, control of corruption and promotion of government efficiency. Building on these studies, we argue that government auditing results should be read and explained dialectically. Although the irregular or illegal activities detected in government auditing to some extent reflect audit effort or quality, they are basically a reflection of the irregularities or corruption problems in the public financial sector. Therefore, we investigate both the relation between irregularities detected in government audits and provincial corruption, and the relation between rectification effort and provincial corruption. This paper not only answers whether government auditing can prevent or reduce corruption, but also provides empirical evidence that the rectification effort following an audit is critical to guaranteeing the power of government auditing. Government auditing can only act as a strong deterrent to corrupt activities if adequate effort is made to rectify malpractice in the collection and spending of government funds and by ensuring that all audit decisions and suggestions are carried out completely. Otherwise, government auditing will be worthless.

2.2. Corruption

Corruption is a significant problem that harms the economic development and social stability of many countries. Consequently, studies on the roots and consequences of corruption and its counter-strategies are hot economic, management and social topics. From an economic point of view, corruption is rooted in the existence of privileges and incomplete market mechanisms. Privileges are always accompanied by government regulation. The government's broad intervention in economic activities and multi-tier approval procedures provides enormous opportunities for rent-seeking (Shleifer and Vishny, 1993; Sun et al., 2005). Adit (2003) identifies three necessary conditions for corruption to arise and persist: discretionary power, economic rents, and weak institutions. While the arbitrary nature of power makes rent-seeking possible, the lack of a strong institution makes public officers with supreme authority fearless in extracting and creating rents. Although corruption may be efficient under some extreme conditions,[3] there is ample evidence to suggest that it is extremely harmful. The direct consequences of corruption are the wasting of resources, low efficiency in resource allocation, reduced investment and low economic growth (Shleifer and Vishny, 1993; Yang and Zhao, 2004).

[3] Adit (2003) quotes the example suggested by Leff (1964), that corrupt bureaucracies to some extent solved the inflation problems in Chile and Brazil in the early 1960s.

Corruption, then, leads to a distorted public spending structure. Corrupt officials tend to increase spending on construction projects and decrease spending on science, education, culture and health programs, because it is easier to extract from construction projects (Mauro, 1998; Wu and Yao, 2008). In addition, corruption represents a form of income redistribution without transparency, which increases the gap between the rich and poor, and is certainly against social fairness and justice (Chen and Li, 2010). In summary, corruption distorts the functions of government and market mechanisms. It makes it difficult to build economic order, slows down economic development and harms social stability.

As the increase in corruption has profound institutional roots, the proposed counter-strategies inevitably include institutional reform. Sun et al. (2005) point out that an effective way to fight corruption is market construction. Once a more perfect and complete market is built, there will be less space for rent-seeking. Cheng and Sun (2006) conclude that Pinochet's economic reforms in the 1970s successfully got Chile out of the quagmire of corruption. The reforms reduced government intervention and increased reliance on the market to allocate resources. Besides market construction, another important anti-corruption strategy is to increase supervision, which relies heavily on a country's special supervisory systems, particularly the judiciary system and audit system. However, special supervisory systems are also easy to corrupt, so the effectiveness of supervision depends largely on the independence of the professional supervisory agencies (Svensson, 2005). Paying higher wages to public officials is another widely used anti-corruption strategy. More competitive pay will encourage public officials to value their reputation and hesitate before becoming involved in illegal activities (Di Tella and Schargrodsky, 2003). Recently, there has been an increasing realization that improving information disclosure and giving citizens greater rights to decisions can be effective in reducing corruption. For example, Reinikka and Svensson (2005) report that since the Ugandan central government started publishing newspaper accounts of the education funds allocated to primary schools, the local capture of education funds has reduced significantly and student enrollment and learning have improved considerably. Yet public enforcement or monitoring may also cause free-riding problems and can be easily manipulated by the elites (Olken, 2007). Comprehensive strategies that combine market construction, stronger supervision by the judiciary and audit systems, and open budget reform and transparent decision-making are widely applied in the battle against corruption in many places across the world.

A government auditing system is an indispensible part of the whole political and economic institution, and its fundamental goal is to supervise and check the balance of public power. Government auditing is supposed to be an active force in the global anti-corruption campaign, yet previous studies provide little empirical evidence on the relationship between government auditing and corruption control. Unlike numerous studies that seek fundamental institutional reform and market improvement to curtail corruption, this paper tentatively examines one of the professional accountability mechanisms: the government auditing system for special concerns.

3. Institutional background and theoretical analysis

3.1. Institutional background

China's current government auditing system was developed in the early 1980s. Until then, the supervision of public power and bureaucracies mainly depended on the internal supervision of the Party and the personal loyalty of public officers, and the role of audit was politically and administratively marginalized (Gong, 2009). The China National Auditing Office (CNAO) was founded in 1983, followed by the establishment of its resident offices in state ministries and commissions and in certain regions, with corresponding audit institutions at provincial, municipal, and county levels. The CNAO, together with its resident offices and corresponding local institutions, formed a structured multi-tier government auditing system with wide coverage. In the 1990s, government auditing work was further legalized and standardized with the successive promulgation of the *Audit Law of the People's Republic of China,* the *Regulations for the Implementation of the Audit Law of the People's Republic of China* and a series of auditing standards and other regulations. However, it was the "audit storm" sparked by the announcement of audit results to the public in 2003 that made government auditing widely known to the public in China and around the world. The role of government auditing in "detecting

violations and combating corruption" was largely strengthened as a result of this storm. After more than 20 years of development, China's government audit institutions have become one of the most important institutional arrangements for supervising the use of government funds, maintaining national fiscal and economic order, and promoting government transparency and accountability.

Along with continuous improvements in government auditing, a theory of audit systems and core values of audit institutions have also developed. Before the introduction of the *Audit Law* and the *Regulations for the Implementation of Audit Law*, the legal framework of government auditing was neither complete nor perfect and the core missions of the audit were unclear. Thus, for a long time government audit institutions mainly acted as financial supervision agencies. The financial and economic supervision function of government auditing was only truly established after the promulgation of these two laws and regulations. Former General Auditor Li Jinhua pointed out that the essence of government auditing is "a tool that promotes democracy and the rule of law," and put forward the concept that an audit is the "watchdog" of state property. The present General Auditor Liu Jiayi inherited the idea that auditing should promote democracy and the rule of law, and further proposed that beyond acting like a "watchdog," audit institutions should be the "immune system" that safeguards the security of the entire social, economic and financial system. As an "immune system," government auditing should be sensitive to all risks and "viruses" that may hinder economic and social development. Both the "watchdog" theory and the "immune system" theory stress the detecting, revealing and resistance functions of the government auditing system, but the "immune system" theory places more emphasis on the prevention and restoration role than on the detection of irregularities.

Unlike developed Western countries, China adopts an executive mode of government auditing. According to China's *Constitution* and *Audit Law*, audit institutions exercise supervision through auditing of government departments, state-owned monetary institutions, enterprises and other institutions, but the audit system itself is a part of the executive branch of the state, which means the supervisor and the supervisee are not fully independent of each other. At the state level, the CNAO is directly under the leadership of the Premier, whereas the local audit institutions are under the dual leadership of the administrative heads of their corresponding-level governments and the audit institutions at the next-highest level. When their work is mainly directed by the next-highest audit institution, personnel affairs and audit funds are decided by the corresponding government, which makes local audit institutions even less independent (Zheng and Yin, 2010). However, China's government audit system also has some very special and important properties: besides carrying out investigations and making recommendations, the audit institutions are authorized to impose administrative sanctions and penalties[4] on the audited bodies, check on rectification results and force audited bodies to make sufficient rectifications. Thanks to these special properties, the functions of the government audit institutions in China are not limited to fraud detecting and reporting, but include rectification of any irregular or illegal acts in economic and fiscal operations (Feng, 2005; Zhao, 2005).

Corruption has become a huge problem that concerns many countries worldwide. The key to combating corruption is to eliminate privileges and strengthen government accountability. Therefore, many countries and organizations have put forward government audit institutions in the battle against corruption. For example, the USA introduced a Government Accountability Office (GAO) and Brazil established audit courts. China's government auditing system has a unique arrangement that differs from its counterparts in developed western countries. Furthermore, China's local audit institutions differ from the CNAO in many ways. Although a few empirical studies have examined the role of government auditing, few people are aware of the role of China's local audit institutions. As China's local governments are very important in China's political and economic system and corruption in local government is so severe, it is important to explore the role of local audit institutions in the war against corruption at the local level.

[4] According to article 41 of the *Audit Law of the People's Republic of China*, "Where violations of State regulations governing government and financial revenues and expenditures should be dealt with or punished in accordance with law, it shall, within the limits of its statutory functions and powers, make an audit decision or put forward to the department in charge its suggestions as to how to deal with or punish the violations." Article 45 further specifies the measures that should be taken, including ordering the audited units to turn over what should be turned over and returning their illegally possessed state-owned assets and unlawful gains, to deal with the matters concerned in accordance with the uniform regulations of the state governing the accounting system and to take other measures.

3.2. Theoretical analysis and hypothesis development

3.2.1. Detection of irregularities and exposure of corruption

The most important function of government auditing is to determine whether the process of collecting and spending public funds and other relevant transactions is in line with state laws and regulations, to determine whether there is any misbehavior in the management of public revenue and expenditure, and to disclose any irregularity that harms government accountability in the audit report. According to China's *Audit Law*, audit institutions should supervise by auditing the authenticity, lawfulness and efficiency of the government, or the financial revenues and expenditures of the audited bodies, among which the supervision of authenticity and lawfulness is the basis for the supervision of efficiency. Meanwhile, as the criteria for evaluating the efficiency of government or financial revenue and expenditure have not yet been developed, for the past twenty years or more, government auditing in China has been concerned mainly with the supervision of authenticity and lawfulness. As shown in the audit reports that have been publicized in recent years, local audit institutions can discover and expose misbehavior that violates laws and regulations, are against standards and guidelines, or waste resources.

Corruption is the misuse of public office for private gain. Misuse always involves comparison with a legal standard. Typical corruption includes the illegal sale of government property, kickbacks in government procurement and bribery and embezzlement of government funds (Shleifer and Vishny, 1993; Svensson, 2005). Due to the secretive nature of corruption and the various forms it takes, to control corruption professional agencies first need to identify and discover corrupt activities. Government auditors are proficient at detecting fraud in financial statements and the misuse of government properties and are therefore determined to work actively in detecting corruption (Gong, 2010). The number of irregularities found in government auditing to some extent reflects whether audit institutions are diligent in fraud detection, but more importantly, it reflects how public resources are misused by government sectors and related departments. Some researchers have used the misbehavior detected in government auditing to measure the diligence or effort of audit institutions (Ma, 2007; Li et al., 2011), but other researchers treat it as a direct measure of corruption (Melo et al., 2009; Pereira et al., 2009; Ferraz and Finan, 2008, 2011). When audit institutions are highly independent and the audit work is highly technical and impartial, irregularities or violation cases reported by audit institutions can be used as a good measure of government corruption (Melo et al., 2009; Ferraz and Finan, 2011). However, in this paper, we do not equate the irregularities found by audit institutions to corruption. Instead, following previous literature (Glaeser and Saks, 2006; Zhou and Tao, 2009; Wu and Rui, 2010), we apply corruption cases committed by public officials in each province to measure the severity of corruption. On the one hand, the audit institutions are not fully independent from the executive branch in China and corruption investigation is not the primary goal of government auditing. On the other hand, according to audit reports and other data, the problems found by government audit institutions are always conducted by a department, which differs from corruption cases committed by individual public officials. However, the close relationship between irregularities found by audit agencies and corruption cases filed by judicial organs in the same place is also undeniable. Generally, corruption cases and irregularities both reflect the quality of government governance. In a place with severe corruption, there is likely to be more irregular or illegal activities that are traceable in government financial accounts and statements, which should be noticed by professional, diligent and responsible government auditors. Otherwise, if an audit institution cannot discover or report clues and traces left by corrupt bureaucrats, it cannot be regarded as having fulfilled its supervising responsibilities. Therefore, we propose the following hypothesis:

H1. The number of irregularities detected by local audit institutions is positively related to the severity of corruption of public bureaucrats in a province.

3.2.2. Post-audit rectification and corruption

The number of irregularities detected in government auditing is a reflection of how many violations exist in government operations. However, an audit report disclosing these irregularities is far from sufficient to deter corrupt bureaucrats and their potential followers. The key to curbing corruption is accountability. That is, to curb accountability it is important to determine the rights and responsibilities of each government department,

related state-owned institutions and individual public officials, and to impose sanctions and penalties when the rights are not exercised in line with the relevant laws and regulations and when the responsibilities are not fulfilled accordingly. Therefore, the detection of irregularities in government auditing is only the first step and the second step of "asking for responsibility and making correction" is more important. It is only through the complete and timely enforcement of audit decisions—sanctions, penalties and suggestions for dealing with or punishing violations and improving management—that the deterrent effect of government auditing can be guaranteed. Otherwise, audit decisions will represent a worthless piece of paper and violations and wrongdoings will occur again and again.

To fulfill the mission of a government audit system, there must be an "asking for responsibility" step after violations and irregularities are identified by auditors. Klitgaard (1998) proposes a well-known model to explain the dynamics of corruption: corruption = monopoly power + discretion – accountability. Adit (2003) also points out that discretionary power, economic rents and weak institutions are the three necessary conditions for corruption to arise and persist. Both of these views indicate that corruption is rooted in the excessive power of government departments and public officials, together with a lack of supervision, whereas the strengthening of accountability regimes can reduce corruption. Compared with other accountability regimes, government auditing lays its expertise in the system of checks and balances and fraud detection. The check and balance of power must first determine where the problems are and who is responsible for those problems. All illicit or irregular acts are traceable in financial deals and accounting records. Auditors have long been familiar with the financial system and accounting books, and thus can play a unique role in fraud detection and corruption control (Gong, 2010). The World Bank considers the national audit office or the supreme audit institute as the linchpin of a country's integrity system, because an audit can help to: (1) curb corruption and act as a potent deterrent to waste and the abuse of public funds; (2) reinforce the legal, financial and institutional framework; (3) establish the predictability of government behavior and law, and reduce arbitrariness in the application of laws and rules; and (4) expose non-transparent policies against the public interest (Dye and Stapenhurst, 1998). However, all of the roles supposed to be played by the auditors depend on a powerful government system with effective accountability mechanisms (Gong, 2010).

China's government auditing system is essentially "a tool that promotes democracy and the rule of law," which aims to improve the transparency and accountability of government by exercising supervision of the revenues and expenditures of government sectors and other related institutions. Corruption is a chronic cancer that harms the transparency and accountability of government, and is inevitably the target for audit institutions to dig out, fight against and prevent from happening repeatedly. Compared with developed western countries, China has both a weak institution and a weak accountability system. However, China's audit institutions are authorized to impose administrative sanctions and penalties on audited bodies wherever illegal and irregular deeds are uncovered. In another words, in addition to detecting and reporting malpractice and misbehavior, China's audit institutions can punish and rectify them. Audit institutions are involved in the rectification process in several ways. They can: (1) impose sanctions and penalties directly; (2) transfer cases to the parties in charge and make suggestions on the sanctions and penalties that should be imposed; (3) make suggestions on how to repair deficiencies in government administration and how to perfect government institutions; and (4) check on the implementation of audit decisions and the rectification results. Rectification is more important than fraud detection and reporting, because it is only by punishing violations and correcting misbehavior in time that economic and fiscal order can be maintained and government transparency can be achieved. The results of rectification measures following an audit can reflect the supervisory effectiveness of government auditing and are essential in determining whether the audit system can reduce corruption. Therefore, we propose the following hypothesis:

H2. The more rectification effort made following government auditing, the more effective local audit institutions will be in reducing corruption.

3.2.3. Other factors

3.2.3.1. Factors affecting auditing and rectification results. Audit amount is the amount of funds audited by audit institutions. We use irregularities found in government auditing as a measure of auditors' detection effort. However, the number of irregularities is closely related to the total amount of funds audited. Other

things being equal, the more departments and projects involved in the auditing process, the more irregularities there are to be found. Though the specific amount audited by each local audit institution is unavailable, we can use the total amount of fiscal revenue and expenditure as a proxy, as the fiscal revenue and expenditure of local governments is the main compulsory object of supervision for audit institutions at the corresponding level.

Auditor is the most important resource in government auditing. Whether an audit institution can finish its tasks with high quality is largely dependent on the number, professional competence and independence of the auditors (Zhao, 2005; Ma, 2007; Li et al., 2011). Other things being equal, an audit institution with more independent and more experienced auditors tends to be more capable of detecting misbehavior, making correct decisions and providing rectification suggestions. However, due to data availability, we can only use the number of employees of the provincial audit office as a proxy.

Reports and newsletters delivered by local audit institutions contain summarized information on problems found in auditing, suggestions for management improvements and solutions for rectification, which are informative and important (Huang and Wang, 2010). When these reports and newsletters are instructed or adopted by leading government officials, higher audit institutions or related departments, the auditors who prepared this information will be encouraged and audited bodies will be under greater pressure to rectify misbehavior and improve management. Therefore, under the same conditions, a higher adoption rate of reports and newsletters delivered by local audit institutions may bring about more diligent audit teams and better rectification results.

Financial solvency of local government is another important factor. The post-audit rectification results, especially rectifications concerning money, are largely dependent on the local government's financial solvency. As some rectification reports state, a major reason that many audited bodies do not carry out rectification decisions or do not fulfill all rectification solutions is a lack of financial solvency. Following related literature, we use provincial revenue per capita and the expenditure–revenue ratio as a proxy for the financial solvency of local government.

3.2.3.2. Factors affecting corruption. Market development is perceived to be the key solution for chronic corruption problems. The root of corruption lies in the incompleteness and imperfection of markets and the law. Hence, market development that contains institutional reform and legalization and leads to less government intervention in the economy is fundamental to eradicating corruption (Sun et al., 2005; Cheng and Sun, 2006). Zhou and Tao (2009) take the development of a non-public ownership economy as an indicator of market development, which is also supported by Wu and Rui (2010). Following previous studies, we predict that provinces with higher market development will be less corrupt.

Education or human capital has been shown to be an important factor related to corruption. For instance, Glaeser and Saks (2006) find that places with higher education and income are less corrupt. Education and income status also differ across provinces in China. Following Wu (2010), we use the average number of years of education beyond the age of 6 to measure the education level in a province.

Wage of public officials is found to be an important factor affecting bureaucrats' motivation, therefore "high salary for transparency" is an important policy adopted by many countries in preventing corruption. Referring to Wu and Rui (2010), we use the relative wage of public officials to capture this factor.

Size of government is a controversial factor. Fisman and Gatti (2002) find that a larger government is related to less corruption, whereas Ali and Isse (2003) report the opposite. Using provincial data from China, Wu (2010) finds a negative relationship between government size and corruption cases, whereas Zhou and Tao (2009) report a positive relationship. Following this literature, we use the ratio of fiscal expenditure to GDP in each province to measure local government size.

Openness measures the presence of barriers to international trade and capital flows, which may be caused by collusive behavior between individuals and customs officials (Gatti, 2004). Some international studies suggest that countries that are more open tend to be less corrupt. Zhou and Tao (2009) also find that provinces with high imports and exports tend to be less corrupt in China. Therefore, we also control for the level of openness when examining the determinants of corruption.

4. Sample and data

4.1. Sample selection

This paper examines the relationships between irregularities detected in government auditing, post-audit rectification and the severity of public corruption at the provincial level. Our sample period is from 1999 to 2008. As a government audit may have a lagged effect on government corruption, data related to irregularities detected in and rectification taken after government auditing are collected from 1999 to 2008, whereas other data is from 2000 to 2008. Our sample period starts in 1999 because China's government auditing system experienced a long period of development and become relatively standardized and perfected by the late 1990s, and the *Yearbook of Auditing in China* began to disclose detailed information about the irregularities, sanctions and penalties, and rectification results of provincial government auditing in 1999. Data related to government auditing is primarily collected from the *Yearbook of Auditing in China* and is complemented by internet searches for missing observations. Other data is from the *China Statistical Yearbook* and *China Economic Information Network Database*.

Table 1 describes the sample selection process and its distribution across the sample period. The original sample includes 279 observations. However, there are 32 missing observations, thus the final sample contains 247 observations. Meanwhile, due to the unavailability of some dates, the sample distribution from 1999 to 2008 is not completely balanced.

4.2. Data description

Table 2 describes the irregularities detected in government auditing, the post-audit rectification results and other related information on government auditing. As shown in Panel A, on average about 4465 government departments, state-owned monetary institutions, enterprises and other institutions are audited (the auditees) by the local audit institutions per province-year. An average of about 6 billion RMB (hereafter all RMB) relating to irregular or illegal activities is detected, which means that on average there are 1.88 million in irregularities found per audited unit per province-year. We make an adjustment for the population size of each province and find that the average amount of irregularities is about 184.15 per capita. The amount of irregularities accounts for 6.34% of the financial revenue and expenditure per province-year, which means that 6.34% of government funds is not collected or expended in accordance with related laws and regulations.

Panel B of Table 2 describes how sanctions and penalties are implemented and how many cases and clues are transferred to the judicial organs (including the courts and procuratorates), supervisory departments and other related departments. The table shows that the average amount that should be turned into the treasury, returned to the original fund channel or deducted from grants or subsidies is about 1948.78 million, whereas an average of 1119.53 million was actually turned over, returned or deducted. The average rectification rate is about 57.35%. Besides administrative sanctions and penalties, the audit institutions transfer severe cases that may violate related laws and regulations to related departments. As indicated in the table, on average, 23, 40,

Table 1
Sample distribution.

Original data									31 provinces * 9 years = 279
Panel A – missing data									
Missing data:									32
i. Corruption cases: 9 province-year observations missing									
ii. Audit reports, newsletters and their acceptance: 22 province-year observations missing									
iii. Public officials' relative wage: 2 province-year observations missing									
Final sample:									247
Panel B – yearly sample distribution									
Year	2000	2001	2002	2003	2004	2005	2006	2007	2008
Obs.	24	18	29	31	31	27	30	29	28

Table 2
Irregularities detected in government auditing, rectification results and other related information.

Item	*N*	Mean	S.D.	Media	Min	Max
Pane A – irregularities						
Irregularities	310	655,965	660,927	458,490	3189	43,08,000
Auditees	310	4465	2664	4736	174	10,527
Irregularities per auditee	310	187.61	200.77	128.69	4.82	1720.32
Irregularities per capita	310	184.15	165.41	127.92	8.34	913.87
Irregularities/(rev. + exp.)	310	6.34%	4.40%	5.59%	1.12%	26.07%
Pane B – sanctions and penalties, rectification and clues						
Amounts to be turned over	310	194,878	218,759	108,779	3293	19,82,108
To be turned into the treasury	310	102,383	146,182	55,788	1207	14,53,368
Amounts turned over	310	111,953	144,137	61,151	503	985,322
Turned into the treasury	310	69,220	96,451	35,092	217	695,351
Rectification rate	310	57.35%	59.44%	53.11%	1.45%	296.92%[a]
Clues trans. to judicial organs	310	22.81	25.72	14	0	168
Clues trans. to supervisory dep.	217	39.87	62.26	25	0	707
Clues trans. to related dep.	217	30.55	33.93	25	0	200
Cases filed by jud. organs among clues trans. by audit ins.	185	8.86	8.89	7	0	61
Total cases filed by pro.	301	1212	813	1163	29	4068
Panel C – other related information						
Reports and news. delivered	254	3344.72	2619.27	2499	28	10,991
Reports and news. adopted	258	1664.22	1555.02	1110	7	7815
Adoption rate	257	46.47%	14.91%	46.09%	8.07%	92.46%
Number of employees	299	189.43	94.08	166	50	594
Audit employees/public officials	299	7.59	6.59	4.98	1.47	33.28

[a] There are 12 observations that are over 100%, which may be due to two reasons: first, the auditees may turn over or return more than asked for if they find more malpractices in the self-checking process after audit; second, they may turn over or return funds that should have been turned or returned in previous years but were delayed until the observed year.

and 9 cases are transferred to the judicial organs, the supervisory departments and other related departments, respectively, and less than nine clues transferred to the judicial organs are filed per province-year on average. The median rate of cases and clues filed is 48.45%, which is not far from the 42.5% reported by Huang and Wang (2010).[5] In addition, there are about 1212 cases relating to corrupt acts filed by the local procuratorial organs in each province every year. Of these, clues transferred by local audit institutions represent only a small proportion. In view of these descriptive statistics, it may be reasonable to infer that the power of the government audit institution and its deterrent effect lie mainly in the imposition of administrative sanctions and penalties, rather than the transfer of clues.

Panel C of Table 2 summarizes the auditing reports and newsletters delivered by local audit institutions and how these reports and newsletters are adopted by leading government officials and related departments. Unfortunately, there is some missing data, but the information in Panel C may still be informative. As the table shows, an average of 3245 auditing reports and newsletters are delivered by the audit institutions per province-year. Of these, 1644 are instructed or accepted by the higher audit institutions, leading government officials and other concerned departments, thus the average adoption rate is about 46.47%. The human resources and financial resources put into government auditing are also very important. However, because the detailed recruitment and budget information of audit institutions at municipal and county levels is unavailable, we use the number of employees in the provincial audit office as a proxy. The average number of auditors in a provincial audit office is 189. The number of employees varies widely between provinces. For instance, the minimum number of employees in the Xin Jiang audit office in 1999 is 50 and the maximum number in the Beijing audit office in 2007 is 594. When compared with the overall number of public officials, we find that, for each 10 thousand public officials, there are less than 8 government auditors, on average.

[5] The sample period of Huang and Wang (2010) is from 2002 to 2006.

Fig. 1 shows the time trend of corruption during the sample period in China. Two proxies measuring the degree of corruption are used. One is the corruption cases filed by the procuratorial organs (adjusted by population size, cases per 10,000 residents) and the other is the corruption perceptions index (CPI) scores evaluated by Transparency International (a higher score indicates more transparency and less corruption). Transparency International is a global civil society organization leading the fight against corruption and the CPI is one of the most authoritative corruption measurements in cross-country studies. Fig. 1 shows a slight decrease in corruption cases filed from 1999 to 2008. The CPI scores demonstrate a slight increase in the same period, which also indicates a small decrease in corruption. In other words, Fig. 1 suggests a significantly negative correlation between the amount of corruption cases filed and the CPI scores, and the trends in these two measures are consistent. Therefore, corruption cases filed may be a reasonable and feasible proxy for local government corruption (as local level CPI is unavailable).

Fig. 2 describes the time trend for irregularities found in government auditing, clues transferred to the judicial organs after audit and corruption cases filed by the local procuratorial organs. Fig. 2a shows the time trend for the number of irregularities per auditee, irregularities per capita and corruption cases filed per 10,000 residents. As the figure shows, the number of irregularities per auditee and per capita both present a significant increasing trend, whereas the number of corruption cases filed per 10,000 residents shows a slightly decreasing trend in the sample period. We provide two explanations. First, the increase in the number of irregularities is consistent with the growth in the whole economy and the government total revenue and expenditure, thus the total audited amount is increasing. Meanwhile, the scope of auditing has expanded and perhaps the detection effort has also increased as China's government auditing has drawn increasing attention in recent years. Second, the slight decrease in the number of corruption cases filed indicates a slight decrease in corruption in the sample period, which is consistent with the Transparency International's CPI scores for China (Fig. 1). This confirms, to some extent, that as the market development and legalization process continues and the government places more emphasis on government governance, China has achieved a certain level of success in the fight against corruption in recent years. Fig. 2b shows a decrease in corruption clues transferred by audit institutions to the judicial organs, which is consistent with the decrease in the overall number of corruption cases filed by the procuratorial organs. This also indicates a decrease in severe violations in the public finance sector, which may be attributable to the effective implementation of government audits in recent years. The audit storm and the subsequent institutional rectifications not only exposed the dark side of government operations to the public, but also pushed the government to make improvements and increase transparency.

Fig. 3 describes the cross-sectional differences in the number of irregularities detected and corruption cases filed across provinces during the sample period. Fig. 3a summarizes the raw data and Fig. 3b uses data

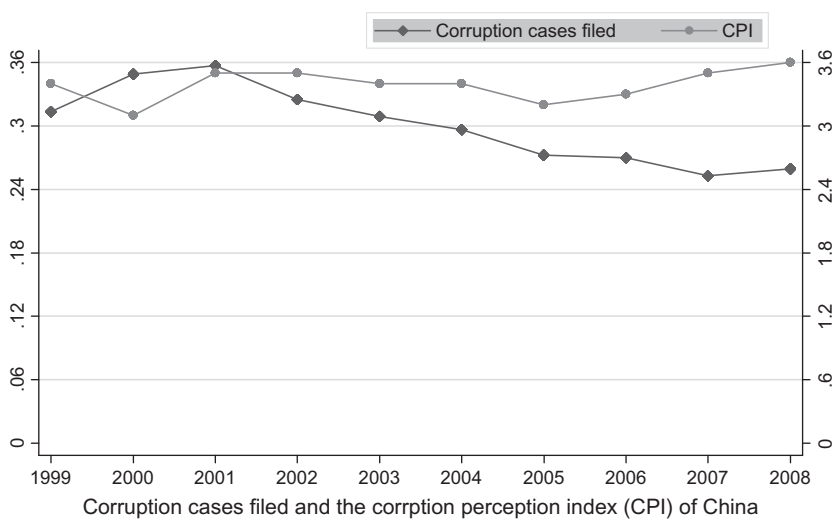


Fig. 1. Corruption trend (1999–2008).

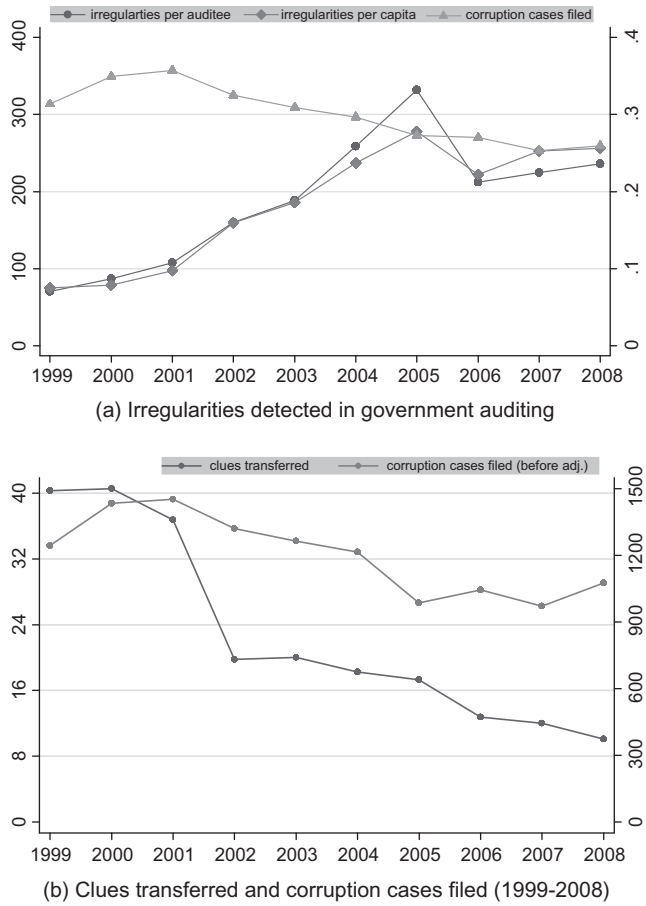
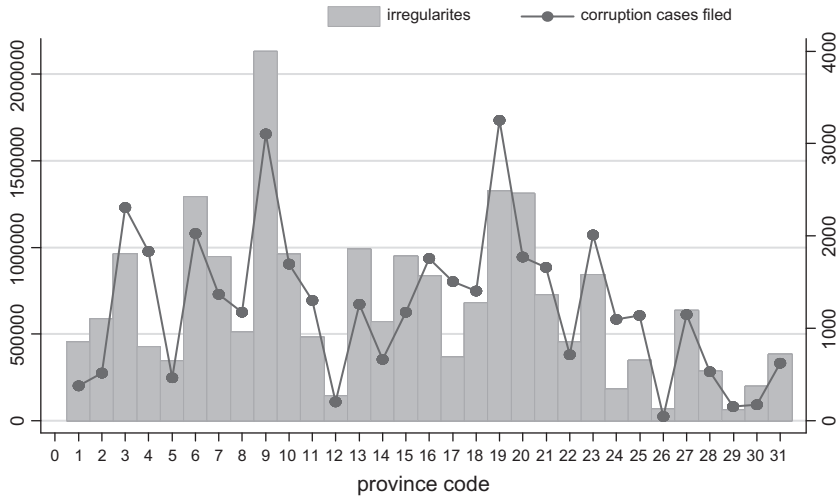


Fig. 2. Irregularities detected, clues transferred and corruption cases filed.

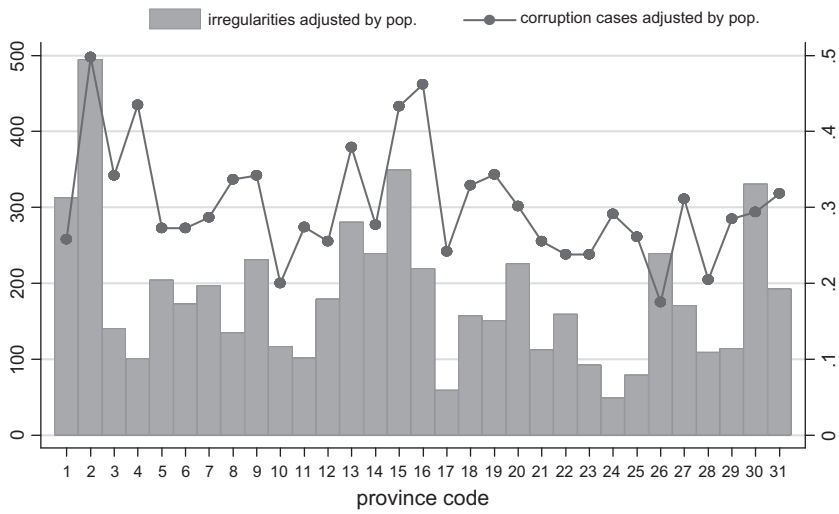
adjusted by the population size of each province. Codes 1–12 represent the twelve provinces in the east of China, codes 13–21 the nine provinces in the center and codes 22–31 the ten provinces in the west. As shown in Fig. 3, the number of irregularities in accounts and corruption cases filed varies significantly across provinces. Comparing the three regions, we find that there are significantly more irregularities and corruption cases in the east and central regions than in the western region (Fig. 3a). However, the regional differences diminish after adjusting for population size (Fig. 3b). We also note that more irregularities tend to be detected in provinces with more corruption cases, though the positive correlation is not particularly significant when the two amounts are adjusted by population size.

4.3. Variable definitions

This study examines the relationships between the severity of corruption and audit institutions' effort in detecting irregularities, and also between the post-audit rectification effort and the severity of corruption at the provincial level. Following Zhou and Tao (2009) and Wu and Rui (2010), we use cases committed by public officials and filed by the judicial organs to measure the severity of corruption in a province and construct a model of the determinants of corruption. Following Huang and Wang (2010) and Li et al. (2011), we apply irregularities found in auditing rectification results after an audit to measure the two aspects of government auditing and construct models of the factors that determine the detection and rectification of irregularities. Sections 5 and 6 provide details of the model design. Table 3 summarizes the definitions of the variables used in the regression models.



(a) Average irregularities and corruption cases of each province



(b) Irregularities and corruption cases of each province (adjusted by pop.)

Fig. 3. Irregularities and corruption cases in each province across the sample period.

5. Audit detection effort and corruption

5.1. Correlations

The previous analysis suggests that government auditing can detect and discover corrupt acts. In Section 4, we show that the number of corruption cases filed by the procuratorates is significantly related to the CPI scores provided by Transparency International. Some researchers have applied this number as a proxy for the degree of corruption in province-level studies (Zhou and Tao, 2009; Wu and Rui, 2010). It is noted that corruption cases always involve severe violations of public finance laws and regulations, and corrupt bureaucracies always have severe economic problems that should be noticed by government auditors. In a province with severe corruption, there must be more misbehavior in government operations. When auditors are diligent and responsible, more irregularities will be found and reported.

Fig. 4. describes the relationship between audit detection effort and the degree of local corruption by scattering all of the observations in the sample period. Fig. 4a uses the amount of irregularities per capita for audit

Table 3
Variable definitions.

Variable	Definition
Corrupt	Corruption, measured by cases of corruption filed by the procuratorial organs in each province, adjusted by population size (cases per 10,000 residents)
Au_irrp	Fraud detection effort, measured by the log of irregularities detected by government audit institutions in each province, adjusted by population size (yuan per capita, log transformed)
Au_irru	An alternative measure of fraud detection effort, measured by the log of irregularities detected by government audit institutions in each province, adjusted by the number of audited units (10,000 yuan per unit, log transformed)
Au_recp	Rectification effort, measured by whether the rectification result is in accordance with audit sanctions and penalties. Specifically, the amount of funds turned into the Treasury, returned to the original channel and the amount of relief and grants cut off after audit, adjusted by population size (yuan per capita, log transformed)
Au_recu	An alternative measure of rectification effort, the same as *Au_recp*, but adjusted by the number of audited units (10,000 yuan per unit, log transformed)
Rptcyl	The adoption rate of reports and newsletters delivered by local audit institutions, measured by reports and newsletters accepted or instructed by leading government officials, CNAO and related government departments, adjusted by the number of reports and newsletters delivered
Auditor	Auditor, measured by the number of employees in the provincial audit bureau, adjusted by the number of public officials in that province
Amount	The amount of money audited by local audit institutions, using the total public financial revenue and expenditure as a proxy, adjusted by population size (yuan per capita, log transformed)
Growth	Economic growth, measured by provincial GDP growth calculated by comparative price
Educ	Education, measured by the average years of education over the age of 6
Wage	Relative wage of public officials, measured by the average wage of employees in public administration and social organizations, adjusted by the nominal GDP per capita of each province
Govsize	Government size, measured by government final consumption, adjusted by the GDP of each province
Open	Openness, measured by the total amount of imports and exports, adjusted by the GDP of each province
Market	Market development, measured by the number of employees of private enterprises, adjusted by the total number of employees in each province
Revp	Financial revenue, adjusted by the population size of each province
Deficit	Deficit, measured by the expenditure revenue ratio of each province
Year	Year dummies

effort, while Fig. 4b uses the amount of irregularities per audited unit. The figure shows a primary positive correlation between the number of irregularities and the number of corruption cases filed.

5.2. Multivariate models

According to the theoretical analysis and prediction in Section 3, the number of irregularities in public financial revenue and expenditure detected by local audit institutions will be significantly related to the degree of corruption in that province. However, there may be reverse causality between audit fraud detection effort and the degree of bureaucrats' corruption. On the one hand, there are always more severe deficiencies in government operations and adminstration in a more corrupt place, thus the audit institutions will put more effort into detecting misbehavior. On the other hand, the exposure of misbehavior by audit institutions may also put pressure on present or potential corrupt bureaucrats and force the audited bodies to improve their management, thus reducing corruption in the lagged period (Li et al., 2011). In addition, several other factors may affect audit detection effort, such as the audited scope and amount (*Amount*), the number of auditors (*Auditor*), the adoption rate of audit reports and newsletters (*Rptcyl*), market development (*Market*) and openness (*Open*). Among these, *Market* and *Open* also affect the degree of local corruption. Education (*Educ*), economic growth (*Growth*), compensation of public officials (*Wage*) and government size (*Govsize*) are also controlled as determinants of corruption. Therefore, we use the following simultaneous equations to test the relationship between audit detection effort and bureacrats' corruption.

$$Au\_irr_{i,t} = \alpha_0 + \alpha_1 Corrupt_{i,t} + \alpha_2 Auditor_{i,t} + \alpha_3 Rptcyl_{i,t} + \alpha_4 Amount_{i,t} + \alpha_5 \mathrm{Open}_{i,t} + \alpha_6 \mathrm{Market}_{i,t} + \sum year + u_{it} \quad (1a)$$

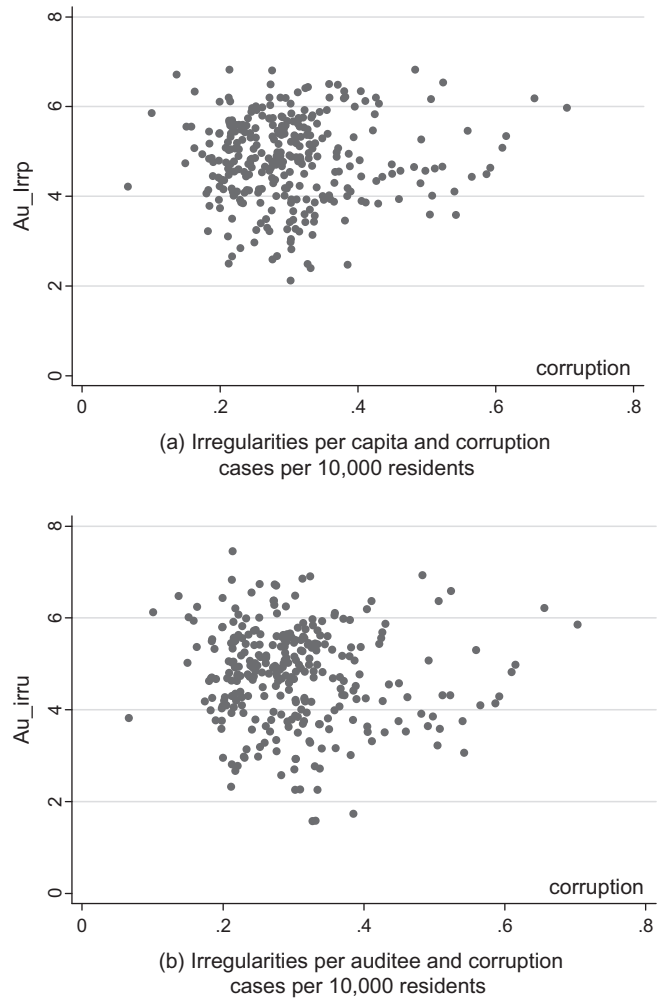


Fig. 4. Correlation between audit detection effort and the degree of local corruption (1999–2008).

$$Corrupt_{i,t} = \beta_0 + \beta_1 Au\_irr_{i,t-1} + \beta_2 \mathrm{Growth}_{i,t} + \beta_3 \mathrm{Educ}_{i,t} + \beta_4 \mathrm{Wage}_{i,t} + \beta_5 \mathrm{Govsize}_{i,t} + \beta_6 \mathrm{Open}_{i,t} + \beta_7 \mathrm{Market}_{i,t} + \sum year + \varepsilon_{it} \quad (1b)$$

The subscript i denotes the code for each province and t denotes the sample year. *Au_irr* is the log of irregularities detected by government audit institutions in each province, adjusted by population size (irregularities per capita, *Au_irrp*) or adjusted by the number of audited units (irregularities per unit, *Au_irru*). *Corrupt* is the degree of bureaucratic corruption in each province, measured by the number of corruption cases per 10,000 residents filed by local procuratorial organs in each province, following Wu and Rui (2010). The variable definitions are listed in Table 3 and descriptive statistics are presented in Table 4.

5.3. Empirical results

Table 4 presents the summary statistics for the main variables in the regression analysis (including the variables used in the next section). Table 5 reports the regression results for the simultaneous Eqs. (1a) and (1b); Part I uses *Au_irrp* as the independent variable in Model (1a), and Part II uses *Au_irru*. As the table shows, the detection effort (*Au_irrp* and *Au_irru*) of audit institutions is significantly positively related to the degree of bureaucratic corruption (*Corrupt*) at the provincial level, which is consistent with Hypothesis 1. Meanwhile, the adoption rate of audit reports and newsletters and the amount of funds audited both exert a significant

Table 4
Descriptive statistics.

Variables	*N*	Mean	S.D.	Median	Min	Max
$Au\_irrp_{i,t}$	247	4.99	0.85	4.98	2.12	6.81
$Au\_irru_{i,t}$	247	4.92	0.95	4.98	1.58	7.45
$Corrupt_{i,t}$	247	0.30	0.10	0.29	0.07	0.70
$Au\_irrp_{i,t-1}$	247	4.86	0.89	4.87	2.12	6.82
$Au\_irru_{i,t-1}$	247	4.78	1.03	4.87	1.57	7.45
Rptcyl	247	0.47	0.15	0.47	0.08	0.92
Auditor	247	7.65	6.51	5.00	1.48	33.28
Amount	247	7.97	0.72	7.89	6.62	10.17
Educ	247	7.92	1.09	7.98	3.74	11.09
Wage	247	1.57	0.65	1.45	0.34	4.43
Govsize	247	0.17	0.12	0.15	0.07	0.96
Open	247	0.34	0.43	0.12	0.04	1.72
Market	247	0.08	0.05	0.07	0.02	0.29
$Au\_corp_{i,t}$	247	3.00	0.90	2.99	0.51	5.45
$Au\_coru_{i,t}$	247	2.93	0.99	2.98	0.16	5.77
$Au\_corp_{i,t-1}$	247	2.83	0.90	2.87	0.51	5.21
$Au\_coru_{i,t-1}$	247	2.75	0.99	2.86	0.16	5.70
Revp	247	6.79	0.82	6.66	5.49	9.43
Deficit	247	2.52	2.15	2.20	1.05	17.90

positive influence on audit detection, which is consistent with our analysis in Section 3. Market development and openness are negatively related to irregularities found in government auditing. This is understandable because provinces that are more open and have good market development tend to have more transparent government and less misbehavior among bureaucrats. The regression results for the corruption equation indicate that the degree of corruption in year t is positively related to irregularities detected in year $t-1$. There are several explanations. First, the audit results of local audit institutions, especially at the municipal and county levels, are not always disclosed to the general public (Song et al., 2009). Meanwhile, audit decisions—including suggestions for sanctions, penalties and rectification—are always against the audited bodies rather than individuals and these decisions are seldom fulfilled, which considerably reduces the deterrent power of government auditing (Wei et al., 2010). Second, we use corruption cases filed by the procuratorial organs to measure the level of corruption, while audit institutions and procuratorial organs are cooperative in corruption investigations. More cases and clues may be transferred when auditors put more effort into detection, and these clues may be delayed to the lagged year and thus increase the number of corruption cases in the lagged year. Third, corruption is a chronic problem, thus if the audit institutions only report and disclose the misbehavior and relevant disposals within the government, it will not exert a strong deterrent effect, nor will it reduce corruption.

Table 5 also shows that the relative compensation of public officials and the level of openness are negatively related to corruption, which is also consistent with Wu and Rui (2010). However, the education variable is negatively related to corruption, which is against our expectation. As there may be strong correlations among the dependent variables, we regress *corrupt* on *education* separately, but still find that they are positively related. Two implications may be inferred from this finding. First, we need to improve the measurement of education, because although the flow of human resources across provinces in China is very common, the education measure is calculated from household registration data. Second, as shown in Table 4, the average education level in China is only 7.92 years and there is little variation in the sample, thus the incremental need for transparency caused by education may not prevail at present.

6. Post-audit rectification and corruption

6.1. Correlations

The exposure of misbehavior detected in government auditing is not enough for audit institutions to play a role in curbing corruption. The implementation of audit decisions and rectifications following audits are more

Table 5
Irregularities detected in government auditing and corruption.

Variables	Expected sign	I		II	
		Au_irrp	*Corrupt*	*Au_irru*	*Corrupt*
Cons.		−4.387***	0.066	−3.480***	0.193**
		(−3.23)	(0.68)	(−2.77)	(2.04)
Corrupt	+	5.540***		3.165***	
		(6.62)		(3.72)	
$Au\_irrp_{i,t-1}$	?		0.038***		
			(5.45)		
$Au\_irru_{i,t-1}$	?				0.019***
					(2.90)
Rptcyl	+	0.985***		1.871***	
		(3.63)		(6.03)	
Auditor	+	0.001		0.002	
		(0.13)		(0.22)	
Amount	+	0.946***		0.782***	
		(5.72)		(4.34)	
Growth	–		−0.000		−0.001
			(−0.07)		(−0.36)
Educ	?		0.014*		0.029***
			(1.71)		(3.04)
Wage	–		−0.055***		−0.066***
			(−3.56)		(−4.06)
Govsize	?		0.041		0.168**
			(0.57)		(2.36)
Open	–	−0.445**	−0.056***	0.278	−0.068***
		(−2.56)	(−3.02)	(1.57)	(−3.50)
Market	–	−4.856***	−0.240	−6.341***	−0.346**
		(−3.17)	(−1.49)	(−4.03)	(−2.12)
Year		Controlled	Controlled	Controlled	Controlled
N		247	247	247	247
Chi2		224.94	197.81	263.64	181.22
R^2		0.350	0.381	0.490	0.397

Note: *Z*-values are in parentheses.
$Au\_irrp_{i,t-1}$ and $Au\_irru_{i,t-1}$ take the values of the observations in year $t-1$, while other variables take the values of the observations in year t.
* Significance at the 1%.
** Significance at the 5%.
*** Significance at the 10%.

important. If violations and misbehavior are not punished accordingly, the audit decisions will be worthless. It is only by punishing violations and rectifying wrongdoings that government audits can deter malfeasant officials. Audit institutions are involved in the rectification process in several ways. First, once violations and misbehavior are found, the audit institution must either take measures to deal with them directly, or transfer severe cases to the people's government and departments in charge and provide disposal suggestions. The audit institution should also provide suggestions on how to improve and standardize the internal control and financial management of the auditee. Finally, the audit institution should perform checks on the implementation of all sanctions and penalties and the outcome of transferred cases and clues, and urge the audited bodies to complete all of the treatment decisions and rectification suggestions when they are reluctant to do so. However, as indicated in the previous analysis, the registration rate of cases and clues transferred by audit institutions is quite low, thus the implementation of sanctions and penalties imposed directly by the audit institutions may be the key to guaranteeing the power of the government audit system. Therefore, we use the implementation of sanctions and penalties to measure rectification effort, and examine its influence on corruption.

The scatter plot in Fig. 5 describes the relationship between the degree of corruption in year t ($Corrupt_{i,t}$) and the rectification results after an audit in year $t-1$ ($Au\_rec_{i,t-1}$). Fig. 5a applies the rectification amount per

capita ($Au\_recp_{i,t-1}$) and Fig. 5b applies the rectification amount per audited unit ($Au\_recu_{i,t-1}$). From the figure, a primary negative correlation between audit rectification effort and the degree of corruption in the lagged year can be inferred.

6.2. Multivariate models

According to previous analysis, on the one hand, rectification is the implementation of sanctions, penalties and suggestions imposed by audit institutions. Only when all sanctions, penalties and suggestions are carried out can economic and financial order be maintained and the deterrent effect of government auditing guaranteed. On the other hand, the rectification process needs the support of leading local government officials and the cooperation of related parties in addition to the effort of the audit institution. Therefore, the more thoroughly the audit sanctions and penalties are implemented, the better the rectification results will be, and the audited bodies that are punished will be less likely to commit misbehavior in the future. At the same time, the prevailing corruption may also hinder rectification effort. That is, rectification may be even more difficult to enforce in more corrupt places. To capture the two-way relationship between audit rectification and corruption, the following simultaneous equation models are empirically tested.

$$Corrupt_{i,t} = a_0 + a_1 Au\_rec_{i,t-1} + a_2 \mathrm{Growth}_{i,t} + a_3 \mathrm{Educ}_{i,t} + a_4 \mathrm{Wage}_{i,t} + a_5 \mathrm{Govsize}_{i,t} + a_6 \mathrm{Open}_{i,t} + a_7 \mathrm{Market}_{i,t} + \sum year + \varphi_{it} \quad (2a)$$

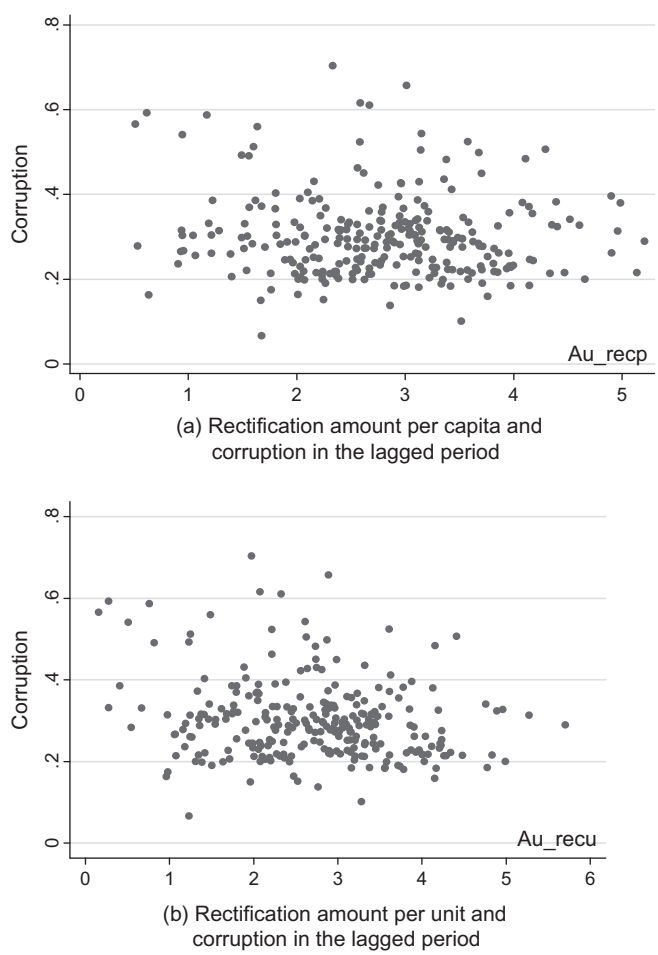


Fig. 5. Correlation between audit rectification effort and the degree of local corruption (1999–2008).

$$Au\_rec_{i,t} = b_0 + b_1 Corrupt_{i,t} + b_2 Auditor_{i,t} + b_3 Rptcyl_{i,t} + b_4 \mathrm{Rev}p_{i,t} + b_5 Deficit_{i,t} + b_6 \mathrm{Open}_{i,t} + b_7 \mathrm{Market}_{i,t} + \sum year + \eta_{it} \quad (2b)$$

Model (2a) examines how audit rectification effort in year $t-1$ ($Au\_rec_{i,t-1}$) affect the degree of bureaucrats' corruption in year t ($Corrupt_{i,t}$). Model (2b) tests whether corruption in year t ($Corrupt_{i,t}$) influences the audit rectification process in the same period ($Au\_rec_{i,t}$). Similar to the measurement of audit detection effort, we use the amount of rectification per capita (*Au_recp*) and per unit (*Au_recu*) to proxy for audit rectification effort. The variable definitions are presented in Table 3 and descriptive statistics are in Table 4. The regression results are reported in Table 6.

6.3. Empirical results

Table 6 reports the regression results for Models (2a) and (2b); Part I uses rectification per capita (*Au_recp*) as the measure of rectification effort, whereas Part II uses rectification per units (*Au_recu*). As shown in the

Table 6
Post-audit rectification and corruption.

Variables	Expected sign	I		II	
		Corrupt	*Au_recp*	*Corrupt*	*Au_recu*
Cons.	?	0.219**	−3.247***	0.251***	−2.558**
		(2.26)	(−2.91)	(3.01)	(−2.33)
$Au\_recp_{i,t-1}$	–	−0.020***			
		(−2.94)			
$Au\_recu_{i,t-1}$	-			−0.034***	
				(−5.91)	
Corrupt	?		−2.182*		−4.691***
			(−1.78)		(−3.80)
Growth	–	−0.002		−0.001	
		(−0.53)		(−0.59)	
Educ	?	0.041***		0.039***	
		(4.43)		(4.76)	
Wage	–	−0.071***		−0.065***	
		(−4.23)		(−4.44)	
Govsize	+	0.244***		0.192***	
		(3.48)		(2.86)	
Open	?	−0.983***	−0.594**	−0.024	−0.299
		(−3.60)	(−2.22)	(−1.29)	(−1.08)
Market	?	−3.888**	−1.165	−0.405**	−5.728***
		(−2.20)	(−0.65)	(−2.56)	(−3.09)
Rptcyl	+		0.626*		1.289***
			(1.95)		(4.24)
Deficit	–		−0.058**		−0.079***
			(−2.06)		(−2.76)
Auditor	+		0.005		−0.001
			(0.52)		(−0.10)
Rev	+		1.071***		1.029***
			(4.63)		(4.60)
Year		Controlled	Controlled	Controlled	Controlled
N		247	247	247	247
R^2		0.408	0.419	0.398	0.463
Chi2		183.45	191.31	205.56	258.91
P-value		0.000	0.000	0.000	0.000

Note: *Z*-values are in parentheses.
* Significance at the 1%.
** Significance at the 5%.
*** Significance at the 10%.

table, the coefficients of $Au\_recp_{i,t-1}$ and $Au\_recu_{i,t-1}$ are both significantly negative, indicating that after controlling for other factors, the more effort put into rectification at present, the less corruption there will be in the following period, which is consistent with our Hypothesis 2. Meanwhile, concerning the reverse influence of corruption on audit rectification, the regression results of Model (2b) also show that more corrupt places tend to have worse rectification results (the coefficients of *Corrupt* are significantly negative in both Column 4 and Column 6). In addition, the coefficients of *Wage*, *Govsize*, *Open*, *Market Rptcyl*, *Deficit* and *Auditor* are all consistent with our predictions. Provinces that have higher relative compensation for public officials, have smaller local governments, are more open in international trade and have better market development tend to be less corrupt. Better rectification results are also achieved in provinces with better financial status (higher revenue and low deficit) and when audit reports and other audit information are valued by leading government officials, the audited departments and other related parties.

6.4. Further analysis

We have examined the relationships between audit detection effort and corruption and between audit rectification and corruption separately. Through these tests and analysis we have learnt two things: first, the detection effort of government auditing is positively related to the degree of corruption—that is, local audit institutions tend to find more irregularities in more corrupt places; and second, the degree of corruption is negatively related to audit rectification effort in the previous period—that is, thorough rectification after an audit can help to reduce corruption. To capture the interactions between the three factors—audit detection effort, audit rectification and corruption—we construct the following simultaneous equation models.

$$Au\_irrp_{i,t} = r_0 + r_1 Corrupt_{i,t} + r_2 Auditor_{i,t} + r_3 Rptcyl_{i,t} + r_4 Amount_{i,t} + r_5 \mathrm{Open}_{i,t} + r_6 \mathrm{Market}_{i,t} + \sum year + \lambda_{it} \quad (3a)$$

Table 7
Regression results of simultaneous equations for detection of irregularities, rectification and corruption.

Variables	Corruption		Irregularities		Rectification	
	Coef.	*Z*-value	Coef.	*Z*-value	Coef.	*Z*-value
Cons.	0.198**	(2.49)	−5.41***	(−4.72)	−3.388**	(−3.11)
$Au\_irrp_{i,t-1}$	0.043***	(6.09)				
$Au\_recp_{i,t-1}$	−0.025***	(−4.18)				
Corrupt			5.701***	(7.22)	−1.927*	(−1.71)
Growth	0.001	(0.18)				
Educ	0.020**	(2.49)				
Wage	−0.064***	(−4.47)				
Govsize	0.024	(0.34)				
Open	−0.053***	(−2.91)	−0.469***	(−2.71)	−0.980***	(−3.80)
Market	−0.228	(−1.42)	−5.21***	(−3.42)	−3.928**	(−2.29)
Rptcyl			1.092***	(4.00)	0.667**	(2.09)
Auditor			−0.001	(−0.17)	0.005	(0.53)
Amount			1.021***	(6.20)		
Deficit					−0.056**	(−2.08)
Rev					1.076	(4.90)
Year	Controlled	Controlled	Controlled			
N	247	247	247			
R^2	0.400	0.341	0.425			
Chi2	199.50	243.92	201.85			
P-value	0.000	0.000	0.000			

Note: The independent variables in the corruption equation, detection of irregularities equation and rectification equation are $Corrupt_{i,t}$, $Au\_irrp_{i,t}$, and $Au\_corp_{i,t}$ respectively.

* Significance at the 1%.

** Significance at the 5%.

*** Significance at the 10%.

$$\begin{aligned}\text{Corrupt}_{i,t} = {} & \delta_0 + \delta_1 Au\_irrp_{i,t-1} + \delta_2 Au\_recp_{i,t-1} + \delta_3 \text{Growth}_{i,t} + \delta_4 \text{Educ}_{i,t} + \delta_5 \text{Wage}_{i,t} \\ & + \delta_6 \text{Govsize}_{i,t} + \delta_7 \text{Open}_{i,t} + \delta_8 \text{Market}_{i,t} + \sum year + \tau_{it} \end{aligned} \tag{3b}$$

$$\begin{aligned} Au\_recp_{i,t} = {} & \theta_0 + \theta_1 Corrupt_{i,t} + \theta_2 Au\_irrp_{i,t} + \theta_3 Auditor_{i,t} + \theta_4 Rptcyl_{i,t} + \theta_5 \text{Rev}p_{i,t} + \theta_6 \text{Deficit}_{i,t} \\ & + \theta_7 \text{Open}_{i,t} + \theta_8 \text{Market}_{i,t} + \sum year + v_{it} \end{aligned} \tag{3c}$$

Model (3a) is exactly the same as Model (1a). Model (3b) is based on Model (1b) but adds $Au\_recp_{i,t-1}$ as another determinant of $Corrupt_{i,t}$, as it was significant in Table 6. Model (3c) is the same as Model (2b). The variables are defined in Table 3 and descriptive statistics are in Table 4. The regression results are stated in Table 7.

As shown in Table 7, the coefficient of $Au\_irrp_{i,t-1}$ in Model (3a) remains significantly positive and the coefficient of $Au\_recp_{i,t-1}$ remains significantly negative, which are consistent with previous findings. These results again demonstrate that local audit institutions are diligent in detecting irregularities, thus more irregularities tend to be found in more corrupt places. Furthermore, rectification effort after an audit can strengthen the effectiveness of government auditing and help to reduce corruption in the future.

7. Conclusion

This paper investigates the role that government auditing plays in the fight against corruption. Using a sample of provincial data from China from 1999 to 2008, we construct simultaneous equation models to examine the interactions among audit detection, audit rectification and bureaucratic corruption at the local level. Our research indicates that local audit institutions can detect misbehavior and violations in public financial revenues and expenditures and make corresponding decisions to rectify these problems. However, not all sanctions, penalties and suggestions proposed by audit institutions are fulfilled. The empirical results also indicate that rectification effort after an audit can strengthen the effectiveness of government auditing. That is, the level of corruption can be reduced more effectively in places where rectification activities are carried out more thoroughly.

This paper also provides some far-reaching implications for China's government auditing practices and corruption control initiatives. Our research indicates that rectification after an audit is even more important than the fraud detection process itself. Whereas the discovery of irregularities without subsequent disposals cannot make government auditing a powerful accountability regime, rectification that includes "asking for responsibility" is effective in reducing corruption. Therefore, leading government officials, audit institutions and other professional supervisory agencies should place greater emphasis on the rectification process after audits. They should ensure not only that all lawful sanctions and penalties imposed by government auditors are exercised thoroughly, but also that institutional problems found in auditing are solved in a timely manner. It is only by correcting misbehavior found in government auditing and punishing all of the responsible departments and individuals for their wrongdoing, that government transparency can be achieved and the chronic corruption problem can be genuinely relieved.

There are two limitations of this study that must be acknowledged. First, auditors' independence, competence and the quality control of the auditing process may all affect an audit institution's performance, but due to data availability we did not include these factors in our regression. Second, although the deterrent effect of government auditing may arise from several aspects, such as the public exposure of irregularities and responsible officers, lawful punishment of severe economic crimes, political demotion and other administrative punishments, we focus only on the implementation of sanctions and penalties. Thus, our results should be interpreted with caution. However, the limitations of this paper can also be overcome as China's government auditing practices are further standardized and perfected and more data becomes available. Therefore, this paper also leaves much room for future research.

Acknowledgements

This paper is the result of research supported by China's National Natural Science Foundation (70972076), the Humanities and Social Science Foundation of Ministry of Education (09YJA790199), and the Key Re-

search Institutions of Humanities and Social Science Foundation of Guangdong Province (11JDXM79004). We would like to thank Dr. Liandong Zhang, Prof. Xiajia Su, Xiaohui Qu, Minghai Wei, Feng Liu, Dr. Danglun Luo and other workshop participants at the 2011 CJAR Symposium for their insightful comments, among which, Dr. Liandong Zhang's suggestions are especially constructive for the improvement of this paper. We are grateful to the helpful advice from PhD candidates Linjian Wang, Wei Shu, Meihua Zhou, Dongjie Lin and Chunli Liu at Sun Yat-Sen University. We would like to give special thanks to the anonymous referees and editors. However, we are completely responsible for the content of this paper.

References

Adit, T.S., 2003. Economic analysis of corruption: a survey. The Economic Journal 113 (491), 632–655.
Ali, A.M., Isse, H.S., 2003. Determinants of economic corruption: a cross-country comparison. Canto Journal 22 (3), 449–466.
Blume, L., Voigt, S., 2011. Does organizational design of supreme audit institutions matter? A cross-country assessment. European Journal of Political Economy 27, 15–229.
Chen, G., Li, S., 2010. Corruption, income distribution and income gap in China. Economic Science 2, 55–68 (in Chinese).
Cheng, B.K., Sun, X.T., 2006. Market reform reduce corruption: the experience of Chile's reform and its inspiration for China. Journal of Beijing Administrative College 6, 23–26.
DeAngelo, L.E., 1981. Auditor size and audit quality. Journal of Accounting and Economics 3, 183–199.
Di Tella, R., Schargrodsky, E., 2003. The role of wages and auditing during a crackdown on corruption in the city of Buenos Aires. Journal of Law and Economics 46 (1), 269–292.
Dye, K.M., Stapenhurst, R., 1998. Pillars of Integrity: The Importance of Supreme Audit Institutions in Curbing Corruption. The World Bank.
Feng, J.K., 2005. Research on national audit system directed by Accountable government. Auditing Research 6, 13–18 (in Chinese).
Ferraz, C., Finan, F., 2008. Exposing corrupt politicians: the effect of Brazil's publicly released audits on electoral outcomes. Quarterly Journal of Economics 123 (2), 703–745.
Ferraz, C., Finan, F., 2011. Electoral accountability and corruption: evidence from the audits of local government. American Economic Review 101 (4), 1274–1311.
Fisman, R., Gatti, R., 2002. Decentralization and corruption: evidence across countries. Journal of Public Economics 83, 325–345.
Gatti, R., 2004. Explaining corruption: are open countries less corrupt? Journal of International Development 16, 851–861.
Glaeser, E.L., Saks, R.E., 2006. Corruption in America. Journal of Public Economics 90, 1053–1072.
Gong, T., 2009. Audit for accountability in China: an incomplete mission. The Australian Journal of Public Administration 68 (1), 5–16.
Gong, T., 2010. Auditing, accountability, and corruption in China: prospects and problems. Journal of Public Administration 2, 69–84 (in Chinese).
Hu, Z.Y., 2005. Promoting the state audit system to curb corruption and rent-seeking. Economy & Audit Study 1, 18–22 (in Chinese).
Hu, A.G., Guo, Y., 2001. The comprehensive strategies and institutional design for curbing corruption in the transitional period. Management World 6, 44–55 (in Chinese).
Huang, R.B., Wang, Y.T., 2010. The empirical study on provincial government audit quality (2002–2006). Accounting Research 6, 70–76 (in Chinese).
Klitgaard, R., 1998. International cooperation against corruption. Finance and Development 35 (1), 3–6.
Leff, N., 1964. Economic development through bureaucratic corruption. American Behavioral Scientist 8 (3), 8–14.
Li, C.Y., Zhuang, D.S., 2009. A new look at financial corruption. Decision 12, 34–35.
Li, J.T., Miao, L.Q., Liang, Y.H., 2011. An empirical study on operating effects of accountability audit. Auditing Research 3, 24–30 (in Chinese).
Ma, S.G., 2007. Empirical research on the effect of government auditors' qualities on audit performance. Auditing Research 3, 24–29 (in Chinese).
Mauro, P., 1998. Corruption and the composition of government expenditure. Journal of Public Economics 69 (2), 263–279.
Melo, M.A., Pereira, C., Figueiredo, C.M., 2009. Political and institutional checks on corruption—explaining the performance of Brazilian audit institutions. Comparative Political Studies 42 (9), 1217–1244.
Olken, B.A., 2007. Monitoring corruption: evidence from a field experiment in Indonesia. Journal of Political Economy 115 (2), 200–249.
Pereira, C., Melo, M.A., Figueiredo, C.M., 2009. The corruption-enhancing role of re-election incentives: counter-intuitive evidence from Brazil's audit reports. Political Research Quarterly 62 (4), 731–744.
Raman, K.K., Wilson, E.R., 1994. Governmental audit procurement practices and seasoned bond prices. The Accounting Review 69 (4), 517–538.
Reinikka, R., Svensson, J., 2005. Fighting corruption to improve schooling: evidence from a newspaper Campaign in Uganda. Journal of the European Economic Association 3 (2–3), 1–9.
Saito, Y., Mcintosh, C.S., 2010. The economic value of auditing and its effectiveness in public school operations. Contemporary Accounting Research 27 (2), 639–667.
Schelker, M., Eichenberger, R., 2010. Auditors and fiscal policy: empirical evidence on a little big institution. Journal of Comparative Economics 38, 357–380.
Shleifer, A., Vishny, R.W., 1993. Corruption. Quarterly Journal of Economics 108 (3), 599–617.

Song, C., Zhou, C.X., Huang, L., 2009. A study of the audit results announcement of the local auditing organs in China. Contemporary Finance & Economics 9, 121–126 (in Chinese).
Sun, G., Lu, M., Zhang, J.P., 2005. Anti-corruption, market construction and economic growth. China Economic Quarterly 4 (10), 1–22.
Svensson, J., 2005. Eight questions about corruption. Journal of Economic Perspectives 19 (3), 19–42.
Wei, D.H., Qin, Z.Y., Tang, S.Q., 2010. Research on the relation between the efficiency of government audit and the security of financial fund: some evidence from the data of national audit yearbook. Auditing Research 3, 9–14 (in Chinese).
Wu, Y.P., 2010. Government size, government quality and economic performance. China's experience. Social Science Front 3, 36–46 (in Chinese).
Wu, Y.P., Rui, M., 2010. Regional corruption, marketization and economic growth in China. Management World 11, 10–17 (in Chinese).
Wu, J.P., Yao, L.F., 2008. Corruption and the departure in the composition of public expenditure. China Soft Science 5, 8–14 (in Chinese).
Yang, C.M., Zhao, F.J., 2004. The macroeconomic analysis of administrative corruption. Economic Research Journal 9, 101–109 (in Chinese).
Zhao, J.S., 2005. An analytical framework for government audit quality characteristics in China. Auditing Research 4, 65–68 (in Chinese).
Zheng, S.Q., Yin, P., 2010. Position of auditing office, auditing compromise and efficiency of auditing decisions. Auditing Research 6, 53–58 (in Chinese).
Zhou, L.A., Tao, J., 2009. Government size, market development and corruption. Economic Research Journal 1, 58–69 (in Chinese).

China Journal of Accounting Research 5 (2012) 187–198

Contents lists available at SciVerse ScienceDirect

China Journal of Accounting Research

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

The reform of accounting standards and audit pricing

Kai Zhu [a], Hong Sun [b,*]

[a] *Institute of Accounting and Finance, Shanghai University of Finance and Economics, China*
[b] *School of Accountancy, Shanghai University of Finance and Economics, China*

ARTICLE INFO

Article history:
Received 3 November 2011
Revised 29 May 2012
Accepted 29 May 2012
Available online 24 July 2012

JEL classification:
L11
M42
M48

Keywords:
Reform of accounting standards
Audit market
Industry structure
Audit pricing

ABSTRACT

This paper focuses on the reform of accounting standards in China in 2007 and investigates its impact on equilibrium pricing in the audit market. We find that the concentration of the audit market and the probability of issuing modified audit opinions do not significantly change, but that audit fees increase significantly after the adoption of the new accounting standards in China. Deeper analysis suggests that (1) the implementation of the new IFRS-based Chinese Accounting Standards (CASs) has increased the market risk faced by listed firms and thus auditors' expected audit risk, causing an increase in audit fees, and (2) the degree of the increase in audit fees is positively related to the adjusted difference between net income according to the old CAS before 2007 and the new CAS after 2007. We thus conclude that the reform has had a significant impact on audit pricing in China.

1. Introduction

This study investigates the impact of the adoption of the new accounting standards in China in 2007 on audit pricing. Adopting or widely drawing on International Financial Reporting Standards (IFRSs) has become the trend in accounting standards in the current global capital market (Daske et al., 2008; Barth et al., 2008, Barth and Taylor, 2009; IFRS). However, there is some controversy about whether or not the

* Corresponding author.
E-mail addresses: aczhuk@mail.shufe.edu.cn (K. Zhu), sophiesun126@gmail.com (H. Sun).

1755-3091/$ - see front matter © 2012 China Journal of Accounting Research. Founded by Sun Yat-sen University and City University of Hong Kong. Production and hosting by Elsevier B.V. All rights reserved.
http://dx.doi.org/10.1016/j.cjar.2012.05.002

adoption of new accounting standards based on the measurement attribute of fair value improves accounting information quality or the resource allocation efficiency of the capital market (Dechow et al., 2009; Barth and Taylor, 2009; Xianjie, 2009; Kai et al., 2009). As a result, it is necessary to comprehensively test the impact of the change in accounting standards on the use of accounting information.

Accounting standards are an important basis that auditors use to issue audit opinions, so any change in accounting standards will affect the working base of auditors directly and thus the structure of the entire audit industry. We investigate how a change in accounting standards affects audit pricing from three dimensions: the concentration of the audit market, the attributes of the audit product and audit risk. Summary statistics show that audit fees clearly increased following the adoption of the new accounting standards. However, the concentration of the audit market has not changed. Product heterogeneity, measured as the proportion of modified audit opinions (MAOs), decreased. We thus conclude that the impact of the adoption of the new accounting standards on audit pricing has mainly occurred due to a change in expected audit risk.

We also discuss how the adoption of the new accounting standards in China has affected audit market pricing strategy according to economic theory. Based on previous relevant research, we argue that the adoption of fair value measurement in the new accounting standards makes firms disclose more information about their market risk, which increases the expected audit risk of auditors and also audit fees. The original sample that we select includes all listed firms in the A share market in China between 2004 and 2008. We use the same method as Kai et al. (2009) and employ the difference between net income under the old accounting standards and net income under the new accounting standards to measure the degree of the impact on earnings information. The results suggest that the larger the difference in net income between the old and new accounting standards, the larger the change in audit fees. That is to say, the adoption of the new CAS has had a significant impact on equilibrium pricing in the audit market and has increased audit fees.

The remainder of this paper is arranged as follows. Section 2 describes characteristics of the industry structure of the audit market before and after the reform of the accounting standards in 2007. Section 3 reviews the relevant literature and develops the hypothesis. Section 4 discusses the research design. Section 5 presents the empirical results and Section 6 concludes the paper.

2. Audit market structure: Summary analysis

The independent audit opinions offered by auditors are based on the legitimacy, rationality and consistency of the accounting information disclosed by firms. Accounting standards are the main benchmark used to assess the quality of accounting information. Changes in accounting standards not only lead to changes in the recording, measuring and reporting of financial statements, but also directly influence auditors' work and the competitive behavior of auditors. This can lead to certain problems. For example, the adoption of IFRS may create more space for auditors to express a reasonable professional judgment, but this may confer a competitive advantage on high-quality auditors. Further, changes in standards may influence the differences between the audit products provided by auditors, which may cause the type and structure of audit opinions to change. The reform of Chinese accounting standards, in particular, may have affected the expected audit risk of auditors and in turn increase the audit fees paid by firms.

If the adoption of new accounting standards has affected the equilibrium in audit pricing, it is necessary to evaluate the characteristics both of the supply side and demand side of audit services. This study assumes the main characteristics of the supply side to be audit market concentration and audit product differentiation, and the main characteristic of the demand side to be audit risk. If audit prices increase due to the increased concentration of the audit market and differentiation of audit products, then we can conclude that it may lead to market monopoly or market segmentation. Thus, the adoption of new accounting standards may decrease the resource allocation efficiency of the audit market. Conversely, if an increase in audit risk leads to an increase in the marginal cost of audit services, that is, if audit fees increase as compensation for the additional risk assumed by auditors, then the equilibrium price of audit services will remain effective, which suggests that the adoption of new accounting standards does not change the resource allocation efficiency of the audit market.

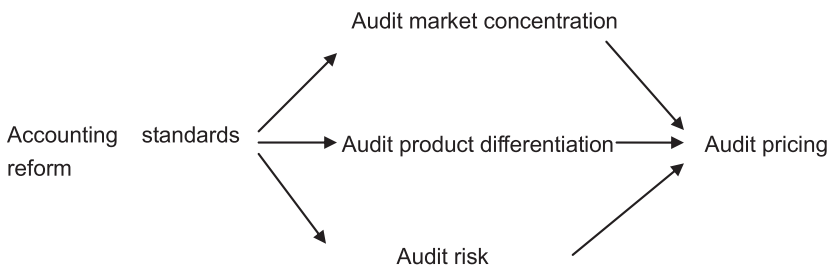
At the beginning of 2006, the Ministry of Finance issued the new Chinese Accounting Standards (CASs), comprising one basic standard and 38 specific standards, which listed firms were required to fully follow from

2007. The introduction of the CAS offers an important institutional setting to investigate how the adoption of new standards affects equilibrium pricing in the audit market. We first look at whether the reform of accounting standards has affected audit fees.

2.1. Audit fees

We summarize the audit fees paid by listed firms between 2002 and 2009 (see Chart 1). Before the accounting standards reform (2002–2006), the average fee paid by listed firms for audit services was 6,00,000 yuan, whereas the average fee in 2007 was 8,40,000 yuan. Chart 1 clearly shows that audit fees increased sharply in 2007, but in 2008 and 2009 were more or less the same as in 2007. The price change corresponds to the time when listed firms were required to follow the new accounting rules. We thus conclude that the reform of the CAS has affected pricing in the audit market.

The price of audit products is determined by both the supply side and demand side. We argue that the main characteristics of the supply side are audit market concentration and audit product differentiation, and that audit risk is the main characteristic of the demand side of audit services. If the change in the CAS has affected audit fees, it must also be the case that the change in the CAS has led to a change in the concentration of the audit market, audit product differentiation or audit risk, or a combination of these, which in turn relates to a change in the final pricing of audits, as shown in the following diagram.



2.2. Audit market concentration

The new CAS implemented from 2007 onward are very different to the old CAS. First, many of the new accounting methods give firms more discretionary power. For example, according to the new rules, the consolidation difference in an acquisition at a premium is defined as goodwill. Intangible assets such as goodwill and trademarks need not be amortized and need only be evaluated annually. The impairment, if any, must be extracted. Further, one of the most important characteristics of the new CAS is the use of fair value as a new measurement attribute, which gives firms more room to change their accounting policy. Although the rules on asset write-downs reduce the opportunity for income management, the rules on the measurement of fair value,

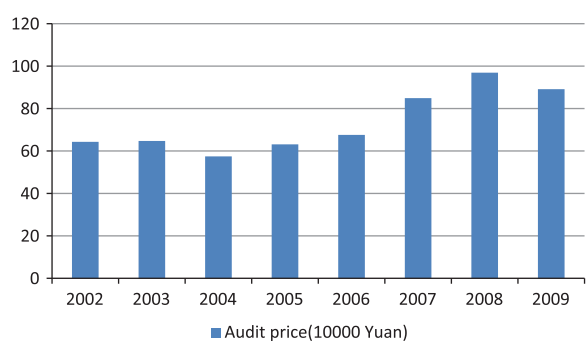


Chart 1. Average audit price by year.

debt restructuring, non-currency asset exchange, R&D expenses relative to intangible assets and the capitalization of borrowing costs increase the opportunity for income management among listed firms.

When firms comply with the new CAS to account for transactions, auditors must use more of their professional judgment in the audit process. As a consequence, high-quality audit firms may possess a greater competitive advantage, which will improve their market share and alter the concentration of the audit market.

We use the ratio of revenue of the four (ten) largest audit firms ("Big Four" and "Big Ten") to the 100 largest audit firms as the proxy for audit market concentration (see Chart 2). Past studies usually consider the Big Four to be a measure of high-quality audit firms, which is the reason why we use the ratio of the revenue of Big Four (Ten) to the 100 largest audit firms to measure audit market concentration.

The largest 100 audit firms are ranked based on the revenue of audit firms in a fiscal year. This information comes from the "Information on the National Top 100 Accounting Firms" announced by the Chinese Institute of Certified Public Accountants (CICPA). Between 2002 and 2009, the four largest firms were Price Waterhouse Coopers, KPMG, Deloitte and Ernst and Young. The remaining six firms in the Big Ten changed every year.

Chart 2 suggests that the concentration of the Big Four increased year by year in the sample period. Their market share was 36.98% in 2002, reached 54.72% in 2007 and then began to decrease. The ratio in 2009 was 44.3%. Using the information on the Big Ten to measure market concentration produces a similar result. We thus conclude that the adoption of the new CAS has not affected the concentration of the audit market significantly.

In accordance with the stipulation of the Ministry of Finance, listed firms began to follow the new CAS from 2007. The revenue of audit firms announced by CICPA include audit fees from non-listed firms, which may not match our sample firms, so we use another proxy for audit market concentration to reflect the influence of the adoption of the new accounting standards on the structure of the audit market: the total number of listed firms audited by the Big Four (Big Ten).

In Chart 3, we calculate the ratio of the number of listed firms audited by the Big Four to the number of all listed firms. We find that the ratio does not change significantly after the adoption of the new CAS, but that the ratio calculated with the number of listed firms audited by the Big Ten rises slightly. These results indicate that the change in the CAS has not led to a change in the concentration of the audit market.

2.3. Product characteristics: audit opinion

An audit opinion is the judgment about a firm by auditors using accounting standards as the criterion. It provides assurance of the information contained in financial statements. We explore whether the change in the CAS has affected the type and content of audit opinions issued by audit firms, or more specifically whether the characteristics of the product provided by audit firms has changed with the adoption of the new accounting standards. Compared with the pre-2007 CAS, the new CAS place more emphasis on the professional judgment of auditors. This may have caused a change in audit quality requirements. If the required audit quality has increased, then auditors who possess greater professional knowledge are more likely to issue modified audit

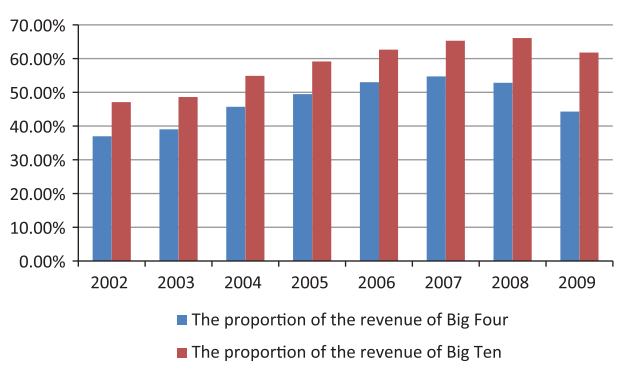


Chart 2. Ratio of the revenue of Big Four (Big Ten) to the revenue of the 100 largest audit firms.

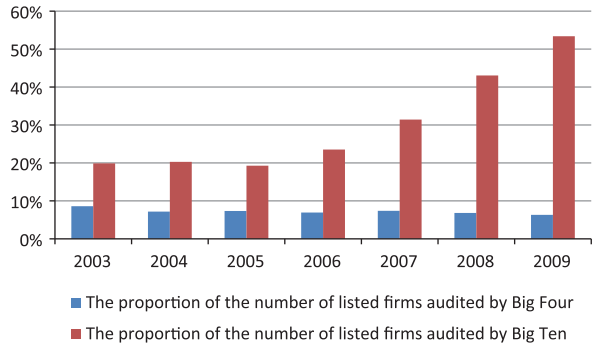


Chart 3. Ratio of the number of listed firms audited by the Big Four (Big Ten) to the total number of listed firms.

opinions (MAOs) when they audit the financial statements of listed firms. The number of MAOs should thus increase following the adoption of the new CAS. We examine the classified statistics on the audit opinions of listed firms between 2002 and 2009 (see Table 1) and find that the number of MAOs and the ratio of the number of MAOs to the total number of audit opinions slightly decreased over the period, which is contrary to our conjecture. However, the decrease in the proportion of MAOs may in fact indicate that information disclosure quality has improved. In all, there is no conclusive evidence to indicate that the implementation of the new CAS has had a significant impact on the structure of the audit opinions of listed firms from the perspective of the industry structure of the audit market.

One of the most important characteristics of the new accounting standards is the adoption of fair value as a measurement base, in compliance with the IFRS. This raises the question of whether, in issuing their opinions, auditors pay more attention to the fair value factor since the change. To answer this question, we need to investigate the specific reason why some listed firms were given MAOs after the adoption of the new CAS. We examine all of the audit opinion reports and find that the reasons why auditors issued MAOs are mainly related to traditional problems such as uncertainty about accounts receivable, the possession of the funds of listed firms by controlling shareholders and related parties, obscure long-term equity investments caused by the losses of subsidiaries or affiliated companies, and so on, and that no firm was given an MAO because there was some flaw in the quality of information disclosed due to fair value. In all, we conclude that the change in the CAS has not had a significant impact on the content and quality of the products provided by auditors.

The results from these summary statistics show that the change in the CAS has not affected the concentration of the audit market or the differentiation of audit products. However, we do find that audit fees increased significantly after 2007. We thus argue that the change in CAS has caused expected audit risk to increase, which has in turn caused an increase in audit fees.

Whatever the audit market structure, the marginal return of audit services is always equal to the marginal cost in equilibrium, which is the condition that determines the audit price. As the audit market is not always competitive, the equilibrium price may be higher than the marginal cost. If the increase in audit fees is caused by supply side factors (audit market concentration and audit product differentiation), that is, if the increase in audit fees is caused by an increase in the degree of monopoly, then the difference between the audit price and its marginal cost will increase, which indicates that the resource allocation efficiency of the audit market will

Table 1
Proportion of each type of audit opinion.

	2002	2003	2004	2005	2006	2007	2008	2009
Clean opinion with emphasis of matter	8.31%	4.64%	5.00%	5.67%	5.56%	5.85	4.74%	4.85%
Modified opinion	3.50%	2.09%	3.77%	4.36%	2.67%	1.02	1.11%	0.73%
Disclaimer of opinion	1.63%	1.63%	2.17%	2.40%	2.06%	1.02	1.11%	1.07%
Adverse opinion						0.06		
Proportion of MAOs	13.44%	8.36%	10.94%	12.44%	10.29%	7.95	6.95%	6.65%
Proportion of clean opinions	86.56%	91.64%	89.06%	87.56%	89.71%	92.05	93.05%	93.35%

decrease. Conversely, if the increase in audit fees is caused by demand side factors, that is, if audit fees are reasonable compensation for the elevated audit risk, then the increase is due to the increase in the marginal cost of the audit. In this case, the difference between the audit price and its marginal cost has not widened, which means that the resource allocation efficiency of the audit market has not deteriorated.

We now examine how the adoption of the IFRS-based accounting standards has affected the expected audit risk and the determination of price when the audit market is in equilibrium.

3. Reform of accounting standards and audit fees: Theoretical analysis

As both direct users and assurers of the accounting information of firms, auditors need to assess the relevant audit risk based on the quality of the accounting information provided by firms. Accounting information risk (accounting information quality) is an important factor affecting audit risk. For example, when accrual items are higher (accounting information quality is lower), auditors are more likely to issue MAOs (Bartov et al., 2000), the probability of audit failure is greater (Geiger and Raghunandan, 2002) and firms are more likely to change auditors to obtain a clean opinion (DeFond and Subramanyam, 1998). These previous empirical results indicate that changing accounting information quality will influence audit risk. There are some similar empirical findings in China on this topic. For example, a return on equity (ROE) in the range of "Baopai" [In China, if losses have been incurred for 3 years in succession in any listed firm, then the stock of the listed firm is likely to be delisted. To avoid the occurrence of this situation, the listed firms will make use of various measures to be profitable and the behavior of these firms is called "Baopai". The range of "Baopai" refers to ROE that falls in the range of 0–2%] is an important factor that significantly affects annual audit fees (Lina, 2003). The ratio of the amount guaranteed by other firms to total assets and the ratio of accounts receivable to total assets also significantly affect audit fees (Jixun et al., 2005). When listed firms change auditors, the new auditors are prone to use the degree of earnings management of the firm to measure audit risk and require higher fees as a result (Yanheng and Dequan, 2005). Audit fees are also positively related to the difference between book income and taxable income (Qian and Zhou, 2005). These research results from China suggest that the lower the accounting information quality of a firm, the higher the risk that auditors must bear and the higher the audit fees that they require as compensation for the elevated risk. Although the CAS changed, the ability of firms to generate cash flow did not change and the impact of the change in the CAS on audit pricing can thus be explained as the impact of the change of CAS on auditors' expected audit risk.

As stated, an important characteristic of the new CAS is that it uses fair value as an additional basic measurement attribute. When we examine the specific content of the new accounting standards, such as the standards on inventory, the restructuring of debt, consolidated financial statements, financial instruments and income taxes, we note that there are many changes. In general, the new accounting standards are greatly different in content and the application of the standards has become more complicated. Thus, the ability and professional judgment required of accountants is greater.

Under the old accounting standards, auditors formed stable expectations of the quality of accounting information and the related audit risk of the firms that they audited. Under the new accounting standards, auditors need to fully assess the audit risk of firms, especially the change in detection risk. The main factors of audit risk – inherent risk and internal control risk – did not change with the change in accounting standards. However, due to the introduction of the fair value measurement, auditors must reevaluate the fairness of the disclosed accounting information. The consequence for the whole audit market is an increase in detection risk and thus the overall audit risk, which has caused an increase in audit fees.

To control for the impact of the change in accounting standards on the comparability of financial information, listed firms in China had to disclosure how their net income under the old standards changed under the new standards. Thus, there are two numbers for net income in 2006. Kai et al. (2009) argue that the adoption of the new CAS will increase the expected uncertainty of investors about accounting information quality. Under the old standards, investors could form relatively stable expectations about accounting information quality. In the transition to the new accounting standards, however, these expectations disappeared and new expectations had yet to be effectively formed, which increased investors' expected uncertainty about firms' accounting information quality and increased the cost of capital of firms and reduced their value.

The change in the CAS may also have affected auditors' assessment of the risk of firms. There are two specific aspects of firm risk: market risk and information disclosure risk. According to the old accounting rules, which were based on historical costs, firms were not required to disclose their market risk. However, when the new accounting standards were implemented for the first time, the difference between the net income according to the old and new accounting standards reflected the market risk faced by firms to a certain degree. Market risk here refers to the potential impact of the change in the market price of assets on the continuing operations of firms. Even if investors can obtain information about firms' market risk through other channels, the duty of auditors is to provide assurances about the accounting information disclosed in financial reports. Once the information relevant to the risk is disclosed in the financial report, auditors must adjust their own risk expectations. When the influence of the change in accounting standards on the new income information is greater, the continued viability of the firms is more risky and the expected audit risk is higher. To compensate for the elevated expected audit risk caused by the increase in market risk, auditors must demand higher audit fees. This leads to our main hypothesis.

H1. The greater the impact of the change in CAS on firms' accounting information, the greater the increase in audit fees.

4. Research design

4.1. Sample selection

We select 802 non-financial listed firms that disclosed in their financial reports the relevant adjustment data about net income according to the rules for the fiscal year 2007 as our research sample. We exclude the following firms: (1) financial firms; (2) firms for which the relevant data cannot be found (including observations for which the audit fee or the value of equity is missing); and (3) firms with MAOs (including clean opinions with an emphasis of matter, modified opinions, opinions with disclaimers and adverse opinions).

To test the main hypothesis, we construct the following model. Based on the research of Kai et al. (2009), we use the absolute value of the difference between the old and new accounting standards (the degree of adjustment between the two standards) as the proxy for the impact of the change in accounting standards on earnings information, and test how this value is related to the change in audit fees. The specification of the variables is shown in Table 2.

$$\begin{aligned} Chgfee = {} & \beta_0 + \beta_1 ABS\_ChgCAS + \beta_2 Chgd + \beta_3 Croe + \beta_4 Crein + \beta_5 Ccur + \beta_6 Size + \beta_7 Bigfour \\ & + \beta_8 Lbigfour + \beta_9 Loss + \beta_{10} Lloss + \beta_{11} Audchg + \beta_{12} Laudchg + \beta_{13} For + \varepsilon \end{aligned} \quad (1)$$

The main explanatory variable ABS_ChgCAS is a proxy for the degree of adjustment between the old and new accounting standards. According to the theoretical analysis, the greater the impact of the adoption of the new CAS on the earnings information of firms, the higher the market risk embedded in earnings information and the higher the audit fees paid. Thus, the coefficient β_1 of the main explanatory variable ABS_ChgCAS should be significantly positive.

The increase in audit fees may also be caused by an increase in auditors' expenditure on learning the new rules and carrying out their business. The new CAS based on fair value are significantly different from the old CAS. As a result, auditors have had to study the new rules to use the new standards effectively. When auditors spend more time on or devote more energy to auditing, they charge higher audit fees in compensation. We thus add Chgd to the model as a control variable.

According to the research of Simunic (1980), Wang (2002) and Bing et al. (2003), the main factors that affect audit fees include firm size, the complexity of the audit, the audit risk of the firm, the characteristics of the audit firm and other characteristics of the audited firm. Much research indicates that firm size is the main determinant of audit fees, and total assets are usually considered to control for the influence of size. Here, we use the natural logarithm of the total assets of the firm (Size) to proxy for the size of the firm. We use the ratio of the sum of accounts receivable and inventory to total assets (Rein) to proxy for the complexity of auditing the firm. Return on equity (Roe), current ratio (cur) and a loss dummy variable (Loss) to measure the audit risk caused by firm

Table 2
Variable definitions.

Type of variable	Name of variable	Definition
Explained variable	Chgfee	The change in audit fees, calculated as (audit fees in 2007 – audit fees in 2006)/(total assets at the end of 2006 according to the new accounting standards/1000)
Main explanatory variable	ABS_ChgCAS	The absolute value of the difference between net income in 2006 according to the new accounting standards and that according to the old accounting standards/total assets at the end of 2006 according to the new accounting standards
Control variables	Days	Days spent auditing, calculated as the number of days between the day when the financial report was announced to the public and the last day of the fiscal year
	Chgd	The change in the number of days spent auditing, calculated as the natural logarithm of the days spent auditing the financial report for 2007 minus the natural logarithm of the days spent auditing the financial report for 2006
	Roe	Return on equity (Roe), calculated as operational income dividend by equity
	Croe	The change in Roe, calculated as the Roe of the current year minus the Roe of the previous year
	Rein	Proportion of accounts receivable and inventory to total assets
	Crein	The change in Rein, calculated as the Rein of the current year minus the Rein of the previous year
	Cur	Liquidity ratio, calculated as the ratio of liquid assets to liquid debts
	Ccur	The change in Cur, calculated as the Cur of the current year net of the Cur of the previous year
	Size	Natural logarithm of total assets
	Bigfour	A dummy variable that takes the value of 1 if the audit firm is in the Big Four, and 0 otherwise
	Lbigfour	A dummy variable that is the lagged value of Bigfour
	Loss	A dummy variable that takes the value of 1 if the net income in the current year is negative, and 0 otherwise
	Lloss	A dummy variable that is the lagged value of Loss
	Audchg	A dummy variable that takes the value of 1 if the audit firm changed in that year, and 0 otherwise
	Laudchg	A dummy variable that is the lagged value of Audchg
	For	A dummy variable that takes the value of 1 if the firm has B shares or H shares, and 0 otherwise
	Sic	Industry dummy variables. The manufacturing sector is differentiated by the first two codes and the other sectors by the first code

characteristics. We use another dummy variable (Bigfour), which is equal to 1 if the audit firm is in the Big Four, to measure the main characteristic of the audit firm. Whether or not listed firms change auditors may be correlated with instances where firms and auditors do not agree on the amount of audit fees payable. Thus we use a dummy variable to control for this situation. Because the dependent variable is the change in audit fees, we use the change in the continuous variables Roe, Rein and Cur (Croe, Crein, and Ccur) as control variables and add the lagged variables (Lbigfour, Lloss, and Laudchg) of the indicator variables Bigfour, Loss and Augchg as control variables. As the purpose of establishing the new accounting standards was to align with international conventions, the new CAS often refer to IFRS. As listed firms that have issued B shares or H shares are more familiar with IFRS than those that have not issued such shares, the costs of implementing the new standards are different for these two types of firms. Thus we add another dummy variable that is equal to 1 if the listed firm has B shares or H shares (For) to control for this difference.

Finally, to remove the influence of potential outliers, we winsorize the top and bottom one percent of the distributions of all of the continuous variables.

5. Empirical results and analysis

5.1. Descriptive analysis

The descriptive statistics in Table 3 show that the average change in audit fees in 2007 is 0.0186. The average audit fee in one thousand-yuan total assets caused by the reform of the CAS is about 0.02 yuan.

Table 3
Descriptive statistics.

Variable	*N*	Mean	Std.	Min	Max
Chgfee	802	0.0186	0.0989	−0.4249	0.4494
ABS_ChgCAS	802	0.0084	0.0111	0	0.0545
Days	802	86.9726	24.2883	22	121
lnd	802	4.4148	0.3451	3.0910	4.7958
Chgd	802	−0.0111	0.4085	−1.3531	2.1102
Croe	802	0.0238	0.1554	−1.2384	0.7566
Crein	802	−0.0360	0.0803	−0.2768	0.2598
Ccur	802	0.0301	0.6804	−3.4115	2.2920
Size	802	21.6216	1.0519	18.0281	25.6966
Bigfour	802	0.0623	0.2419	0	1
Lbigfour	802	0.0648	0.2464	0	1
Loss	802	0.0599	0.2374	0	1
Lloss	802	0.0736	0.2612	0	1
Audchg	802	0.0848	0.2787	0	1
Laudchg	802	0.0736	0.2612	0	1
For	802	0.0137	0.1164	0	1

The difference between net income according to the old and new CAS (ABS_ChgCAS) is 0.008 on average, which suggests that the difference in net income in one-thousand-yuan total assets is 0.8 yuan.

Days is the time between the end of the fiscal year and the announcement date of the financial report, and lnd is the natural logarithm of Days. Among the 802 firms, the shortest period is 22 days, the longest period is 121 days and the average period is 86.9726 days. Chgd is the difference between lnd in the current year and lnd in the previous year. The average Chgd is −0.01, which suggests that the time spent on auditing financial reports in 2007 is only slightly less than the time spent in 2006, which implies that the change in the CAS has not significantly increased the time that audit firms spend auditing.

5.2. Regression analysis

To control for the potential influence caused by sample selection bias, we first use our sample to test the model of Simunic (1980) and Gul (1999). If the result is generally consistent with the results in these past studies, then we can conclude that our findings are not caused by the uniqueness of the selected sample. The descriptive statistics for the industry structure of the audit market suggest that audit fees increased significantly after the change in the CAS. The question then arises as to whether this increase in audit fees is due to changes in the characteristics of firms or to the changes in the CAS. The foregoing analysis does not give direct evidence on this, which is the question that the hypothesis testing is attempting to answer.

Table 4 shows the results of a regression using our sample of the main variables from the model of Simunic (1980) and Gul (1999) to test for the influence of sample selection bias in our research sample and to test whether audit fees increased significantly following the change in the CAS.

The first regression in Table 4 presents the results for the sample of all listed firms for the period 2004–2008. The second regression presents the results for the sample excluding the observations from 2006, as we consider 2006 to be the transitional period during which the CAS changed. The sample in the third regression includes only observations of listed firms that existed in all years between 2004 and 2008 (balanced panel data). The regression results are generally consistent those reported by Simunic (1980) and Gul (1999). Specifically, the coefficient of Cur is significantly negative, which suggests that the higher the liquidity of a firm, the lower its financial risk, the lower the audit risk and the lower the audit fee charged by auditors to audit the firm. The coefficient of Bigfour is significantly positive, which means that the audit fees paid to the largest four audit firms are significantly greater than those paid to other audit firms. The coefficients of Rein and Loss are positive as predicted, but the results are not statistically significant. All of the results based on our sample are generally consistent with previous results, indicating that there is no selection bias in our sample.

Table 4
Regression results for the traditional audit pricing model.

Explanatory variable	Predicted sign	(1) Coefficient (*t*-value)	(2) Coefficient (*t*-value)	(3) Coefficient (*t*-value)
Intercept	?	4.2041***	4.1840***	3.9985***
		(44.90)	(40.25)	(35.58)
After	+	0.0237***	0.0278***	0.0244***
		(4.236)	(4.569)	(3.637)
Roe	?	0.0580**	0.0988***	0.0839***
		(2.467)	(4.306)	(3.552)
Rein	+	0.0278	0.0201	0.0084
		(1.376)	(0.888)	(0.356)
Cur	–	−0.0091***	−0.0128***	−0.0098***
		(−3.536)	(−5.047)	(−4.055)
Size	?	−0.1826***	−0.1817***	−0.1738***
		(−42.48)	(−38.04)	(−33.62)
Bigfour	+	0.2509***	0.2286***	0.2522***
		(15.47)	(13.74)	(12.19)
Loss	+	0.0070	0.0184	0.0185
		(0.554)	(1.348)	(1.186)
Audchg	?	−0.0074	−0.0048	−0.0018
		(−0.681)	(−0.376)	(−0.127)
For	?	0.0638**	0.0509**	0.0557*
		(2.225)	(2.432)	(1.768)
N		4421	3505	2550
industry		control	control	control
R-squared		0.506	0.509	0.513

* indicate significant at the $p < 0.10$ level.
** indicate significant at the $p < 0.05$ level.
*** indicate significant at the $p < 0.01$ level.

In the regression results for the three samples, the coefficient of the dummy variable After is significantly positive and the magnitude of the coefficient ranges from 2% to 3%, which suggests that audit fees increased significantly after the implementation of the new CAS in 2007 and 2008. In other words, the implementation of the new CAS led the audit fees for every thousand yuan in assets to increase from 2% to 3%. The actual audit fees increased from 6,00,000 yuan to 8,00,000 yuan after the adoption of the new CAS, an increase of almost one third (80/60-1). Thus, the impact of the change in the CAS on audit market equilibrium pricing is not only statistically significant, but also economically significant.

Table 5 presents the regression results for our main hypothesis test. The first regression considers ABS_ChgCAS to be the main independent variable and does not control for any other variables except for industry. The second regression controls for all of the other variables. Whether or not we control for other variables, the coefficient of ABS_ChgCAS is significantly positive at a significance level of greater than 5%. This result supports our main hypothesis that the larger the impact of the change in the CAS on firms' accounting information, the greater the change in audit fees. This result is economically significant. When the difference in net income under the two standards increases by 1% in every thousand-yuan assets, the audit fee increases by 0.79%.

To measure the potential influence of time spent auditing on audit fees, we add the period between the end of the fiscal year and the announcement day of the yearly financial report Chgd as the proxy for auditing time. The results in Table 5 shows that the coefficient of Chgd is negative but not significant. This result suggests that the actual time spent auditing does not significantly affect the audit pricing decisions of auditors. The coefficients of Bigfour and Lbigfour are not statistically significant, which confirm the conclusion reached from the descriptive statistics that the change in the CAS has not significantly influenced audit market concentration, and thus the concentration of the audit market does not have the ability to explain the change in audit pricing. All of the other control variables are generally not statistically significant, except for Audchg, which is significantly negative, indicating that the reason why firms replace their audit firm may be that they do not want to pay excessive audit fees.

Table 5
Regression results for the main model.

Explanatory variable	Predicted sign	(1) Coefficient (*t*-value)	(2) Coefficient (*t*-value)
Intercept	?	0.0024	0.1234
		(0.0953)	(1.404)
ABS_ChgCAS	+	0.6496**	0.7907**
		(2.042)	(2.432)
Chgd	+		−0.0008
			(−0.0836)
Croe	?		0.0120
			(0.425)
Crein	?		−0.0480
			(−1.122)
Ccur	?		−0.0010
			(−0.216)
Size	?		−0.0055
			(−1.382)
Bigfour	?		0.0259
			(0.350)
Lbigfour	?		−0.0274
			(−0.372)
Loss	?		−0.0019
			(−0.0867)
Lloss	?		−0.0240*
			(−1.931)
Audchg	?		−0.0296**
			(−2.237)
Laudchg	?		−0.0134
			(−1.248)
For	?		−0.0400
			(−0.896)
N		802	802
Industry		Control	Control
R-squared		0.0024	0.042

* indicate significant at the $p < 0.10$ level.
** indicate significant at the $p < 0.05$ level.

6. Conclusion

This study investigates how the change in accounting standards in China in 2007 has influenced audit equilibrium pricing. As auditors are the direct users of accounting information, the questions of whether and how the change in accounting standards has affected the industry structure and audit prices has become a common concern for academics and business practitioners alike.

We investigate the impact of the change in the CAS on audit pricing from three dimensions: the concentration of the audit market, the differentiation of audit products and audit risk. The results suggest that audit fees increased significantly after the adoption of the new CAS. However, the change in accounting standards did not increase the concentration of the audit market significantly, as larger audit firms have not displayed scale superiority or further increased their market share. The structure of audit opinions (the ratio of the number of MAOs to the total number of audit opinions) as the final product of audit services has also not changed significantly, and the specific reason why MAOs were issued in the sample period is not directly linked to the change in the CAS. We thus argue that the change in the CAS has affected audit pricing due to changes in audit risk.

We analyze the potential influence of the change in the CAS on audit pricing from the perspective of information disclosure risk. The change in accounting standards makes firms disclose more information that is relevant to market risk, which increases firms' information disclosure risk. As a consequence, auditors are confronted with higher audit risk and charge higher fees as compensation.

An important implication of our research is that the increase in audit fees during changes in accounting standards should be considered as a potential cost of the reform of the rules. However, although audit fees increase from the perspective of a single firm, the resource allocation efficiency of the audit market as a whole does not deteriorate. This is because the marginal return is always equal to the marginal cost in equilibrium, and it is the increase in audit risk caused by the change in the accounting standards that leads to an increase in the marginal cost of auditing that elevates audit fees. That is, the change of rules does not widen the gap between audit prices and the marginal cost of auditing, and does not lead to a deterioration of the resource allocation efficiency of the audit market. However, the increase in the expected risk of auditors caused by the difference between the old and new accounting standards causes auditors to pay more attention to audit risk relative to asset value and to charge higher audit fees as a result. This can be regarded to a certain extent as a signal to investors to pay more attention to the market risk of the operating activities of listed firms.

References

Barth, Mary., Taylor, Daniel., 2009. In defense of fair value: weighing the evidence on earnings management and asset securitizations. Journal of Accounting and Economics 49, 26–33.

Barth, M.E., Landsman, W.R., Lang, M.H., 2008. International accounting standards and accounting quality. Journal of Accounting Research 46, 457–498.

Bartov, E., Gul, F.A., Tsui, J.S.L., 2000. Discretionary-accruals models and audit qualifications. Journal of Accounting and Economics 30, 95–119.

Bing, Liu., Jianzhong, Ye., Yingyi, Liao., 2003. The empirical research about the affecting factors of the audit charge in listed firms in China. Auditing Research 1, 44–47.

Dechow, P., Myers, L., Shakespeare, C., 2009. Fair value accounting and gains from asset securitizations: a convenient earnings management tool with compensation side-benefits. Journal of Accounting and Economics 49, 2–25.

DeFond, M.L., Subramanyam, K.R., 1998. Auditor changes and discretionary accruals. Journal of Accounting and Economics 25, 35–67.

Geiger, M., Raghunandan, K., 2002. Auditor tenure and audit quality. Auditing: A Journal of Practice and Theory 21, 187–196.

Gul, F.A., 1999. Audit prices, product differentiation and economic equilibrium. Auditing: A Journal of Practice and Theory, 90–100.

Jixun, Zhang., Yin, Chen., Xuan, Wu., 2005. The analysis of the impact of the risk factors on the audit fee in listed firms in China. Auditing Research 4, 34–38.

Kai, Zhu., Xuyin, Zhao., Hong, Sun., 2009. The reform of the accounting standards, information precision and value relevance. Management World 4, 47–54.

Lina, Wu., 2003. The analysis of the impact of earnings management on the audit fee. Accounting Research 12, 39–44.

Simunic, D.A., 1980. The pricing of audit services: theory and evidence. Journal of Accounting Research 16, 161–190.

He Xianjie, 2009. The implementation effect and the economical consequence. Doctoral dissertation at the Shanghai University of Finance and Economics.

Yanheng, Song., Dequan, Yin., 2005. The change of audit firm, audit fee and audit quality. Auditing Research 2, 72–77.